Date: 11/6/97 5:23 PM

Jim,

Based on very limited understanding of work planned at Portland to unload pitch from ocean vessels, I want to express concern for spill prevention design. A spill into the river would present a serious environmental problem and would be a dissaster to KII. I would like to discuss with you design standards included to minimize to the maximum extent the potential for and severity of any spill.

Since neither Bill nor I are experts in design of such marine facilities, I would like assurance that an expert is involved in review and approval of the design.

Please call at your leasure to discuss.

Steve.

Author: Steve Smith at PITT
Date: 11/6/97 5:23 PM
Priority: Normal
TO: JIM DIETZ at TECHCTR
CC: Bill Swearingen at PITT
CC: Amos Kamerer at PITT
CC: Randy Collins at PITT
Subject: Portland Terminal Pitch Unloading
---------- Message Contents ----------

Jim,

Based on very limited understanding of work planned at Portland to unload pitch from ocean vessels, I want to express concern for spill prevention design. A spill into the river would present a serious environmental problem and would be a dissaster to KII. I would like to discuss with you design standards included to minimize to the maximum extent the potential for and severity of any spill.

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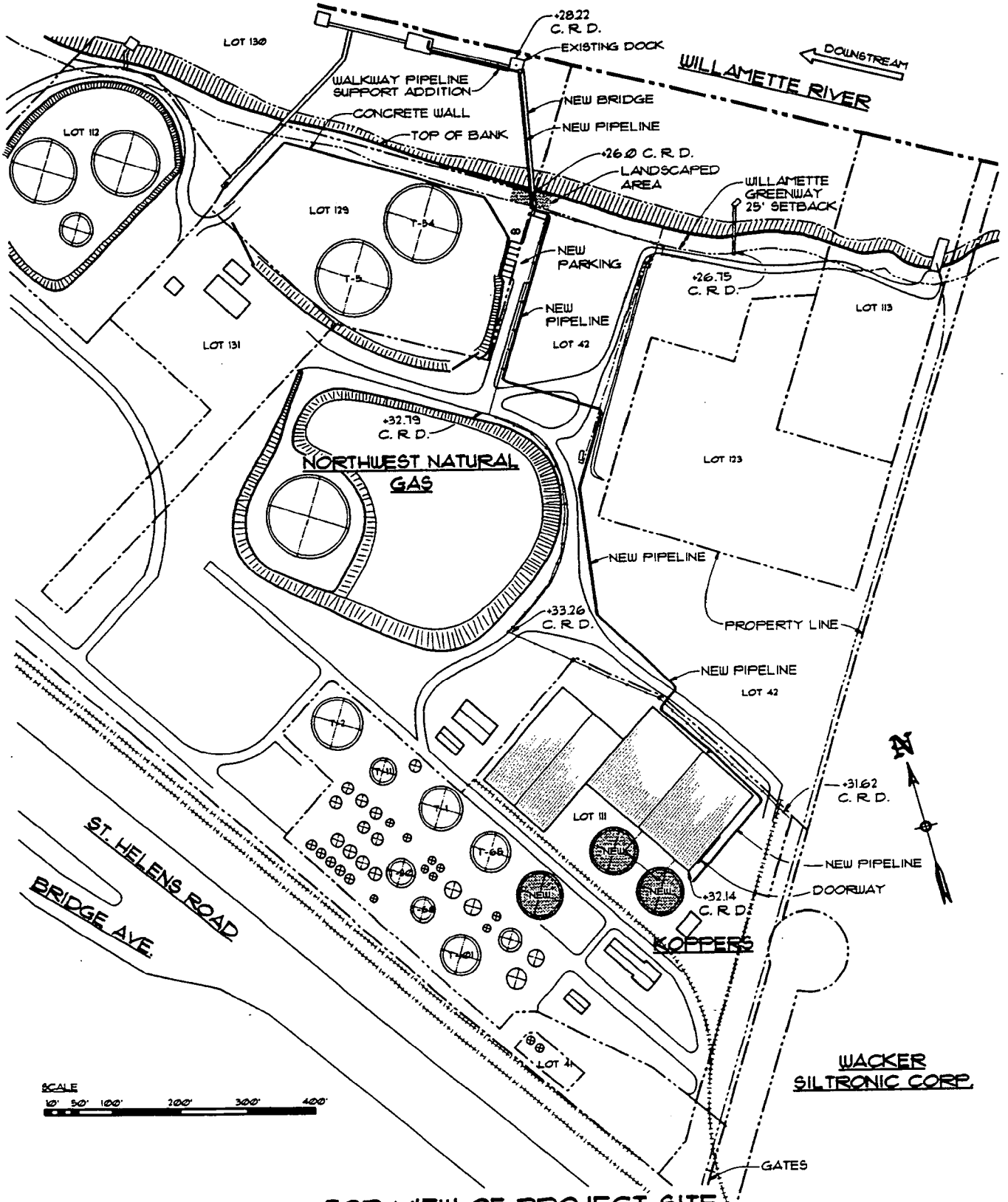
Steve.



TOP VIEW OF PROJECT SITE

PIER MODIFICATION
WILLAMETTE RIVER AT MILE 6.3
MAY 1997

KOPPERS INDUSTRIES
SHEET 2 OF 5

KOPPERS INDUSTRIES

INTEROFFICE CORRESPONDENCE

To:	John Kunkle	From:	W. A. Meisinger
Location:	K-1650	Location:	Harmarville Technical Center
Subject:	Portland Estimate	Date:	August 8, 1997

Attached is the summary of the Portland Liquid Pitch Facility estimate. Dismantling costs and the cost for the new shop and change house have been deleted. Let me know if you need more information.

Bill

W. Meisinger

RECEIVED
AUG 18 1997
KOPPERS INDS. INC.
PORTLAND, OR

cc. A. Kamerer
J. Dietz

Portland Liquid Pitch Facility Cost Estimate 08/08/97

Shared Facility

Dock and Unloading Pipeline	$1,159,639
Fume System	$357,716
Heating System	$690,257

6000 MT Pitch Tank Installation

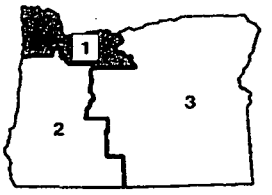
Tank	$770,035
Material Handling and Loadout	$314,904

Engineering	$491,990
Contingency	$315,459
Total	$4,100,000

PEC REPORT®

PLANNING - ENGINEERING - CONSTRUCTION

OREGON



Verification Code: OR970601-01

PROJECT: PORTLAND TERMINAL EXPANSION
TIV: $1,500,000
SIC/Project: 5171 Petroleum Bulk Stations & Terminals
Environmental Impact: Air (A) Land (L)

Industry Code: (02) Terminals
SIC/Business: 5171 Petroleum Bulk Stations & Terminals

Plant Profile® ID: 1032975

OWNER: Koppers Industries Incorporated (1967)
Address: 7540 Northwest Saint Helens Road
City/State: Portland, OR 97210-3697
Phone: (503) 286-3681
Contact: Amos Kamerer
Title: Plant Manager

PLANT: Portland Terminal
Zone: OR*01
County: [MT] Multnomah
Location: 7540 Northwest Saint Helens Road
City/State: Portland, OR 97210-3697
Phone: (503) 286-3681

DEVELOPER: Koppers Industries Incorporated
Address: 436 7th Avenue
City/State: Pittsburgh, PA 15219-1818
Phone: (412) 227-2001
Contact: Walt Turner
Title: VP and General Manager

SITE REP: Koppers Industries Incorporated
Address: 7540 Northwest Saint Helens Road
City/State: Portland, OR 97210-3697
Phone: (503) 286-3681
Contact: T J Turner
Title: Plant Engineer

PEC® TIMING: P1 | P2 | E1 | E2 | C1 | C2

PEC® ACTIVITY: Capital Approval (20)

Report Reference: 960995D

Verification Date: 05-23-1997 Project ID: 22000513 Plant Activity No: 01JGH

SCOPE: OWNER awaits final Capital Approval for Terminal Expansion. DETAILS: On existing Plant Site, construct 1,400' of 10'dia aboveground heated Pipeline and Tank pads for (3) 70' x 50' (6,200M Ton) Tanks heated to 400F. REQUIRES: (1) Storage Tank (AST), Pipeline, Piperacks, 1 1/2" Heat Tracing, Control Valves, Pumps, Switchgear, Transformer, Controls (PLC), Mass Flowmeters, Scales. ENVIRONMENTAL: (A) Vapor Recovery, (L) Spill Containment, Liners, Tank Pads, Leak Detection/Alarm.

PROCUREMENT: OWNER DEVELOPER SITE

SCHEDULE: OWNER expects to receive final AFE approval and begin Detailed Engineering 3Q97 (Aug). Upon completion of Engineering, OWNER will begin to release Equipment RFQ's and Subcontractor Bid Documents 4Q97 (Oct)-1Q98. Construction Kick-Off 4Q97 (Nov). Completion 1Q98 (Mar).

KEY NEEDS: (Equipment, Services & Processes):

CIVIL	PROCESS	TANKS
	HEAT TRANSFER	
	INSTRUMENTATION	
	ELECTRICAL	PIPE/VALVES/FITTINGS
	MECHANICAL	INSULATION/COATINGS
CONTROL ROOM		ENVIRON COMPLIANCE

Rev. Date 94/06

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P.O. Box 42442 Houston, Texas 77242-2442 Phone: 713/783-5147 1-800-762-3361 Fax: 713/266-9306

Author: Mike Juba at PITT
Date: 7/30/97 4:16 PM
Priority: Normal
TO: JIM DIETZ at TECHCTR
CC: Neil Cochenour at ATTGATE
CC: Amos Kamerer
Subject: Portland Terminal Liquid Pitch System
---------- Message Contents ----------

Jim,

I would like to discuss fire protection needs, if any, relative to the subject project. Please advise on current project status as well as the availability of engineering specs./PIDs.
My desire is to get Neil Cochenour with J&H involved preliminarily and depending on Neil's analysis we may need to coordinate with Cigna.My sense is that fire protection should not be a major issue; However we need to confirm and Neil can assist in this regard.
Please advise when we can schedule a meeting. Thanks!

Mike

April 15, 1997

Memo to File:

Northwest Natural Gas Co.
Office Visit - April 15, 1997

I. Those Present

NW Natural Gas	KII
R. Opitz	A. Kamerer
S. Hart	C. McKernan

II. Purpose of Visit

To review our preliminary design work and plans for the new liquid pitch pipeline and related tanks.

III. Discussion

After a review of the design plans, Cameron explained that the pipeline/pedestrian bridge had a span of approx. 180' from the east end of the existing pier, to the shore landing location. Ideally, this would be built with 3 - 60' segments that would require 2 pile clusters in the river for supports. Cameron estimated that 2 H beam piles per cluster, driven to a depth of about 30', would be required. Also, that a clear span bridge could be built, but at an increased cost of about 3 times that of the conventional bridge.

Sandy advised that the driving of pilings in the river would have to be approved by the DEQ. She will call them, explaining the circumstances and suggest that they contact me with any questions and a possible plant visit.

Ron advised that he has been working on the lease addendum and related fees, however, this requires a management committee review process, and unfortunately, he has not been able to get this done to date. The timing is poor right now; their management committee is leaving tomorrow at noon for a 2½ day retreat, and then they have their 2 day BOD meetings next Monday and Tuesday. Thus, he may not have anything for me until late next week.

Ron will set up a meeting with PNO in the next couple of weeks, to review our plans and the joint use of the dock.

Ron will pursue the demolition of the 2 concrete buildings on the west end of our lease; he thought that this had already been completed.

Neither Ron, nor Sandy, were aware of any recent depth sounding at the pier, thus, we will most likely have to do our own.

IV. Follow-up

I will keep on top of these issues and report accordingly.

Amos

Amos S. Kamerer

cc: W.W. Turner
K.J. Fitzgerald
J.T. Dietz

Northwest Natural Gas 4/15/97

Ron Opitz, Sandy Hart, Cameron McKernan

Questions

- Any Recent dock soundings completed

- PNO / George Markwood meeting

- lease Addendum - cost, etc.

- concrete buildings demolition $19,895

T-11 & T-2 Are on our lease

Hydrants ~~are~~ on our lease

* Advise Fax # to Ron

DEQ, ~~Erik blischke~~

Eric blischke

- $5.5 to 6 million
- 5 year ok, any thing beyond 5 years makes them nervous

Reservation of rights for 2nd 5 year lease

- Water piling still a concern (Hot button)
  Routing info important

CAMERON
AMOS
SANDY
RON

- PNO - Nonexclusive use of the dock
  Need operating permits of our own.
- Ron will try to set up meeting with PNO w/o 4/14
- Ron to have a draft addendant by 4/14, or so.
- Ron will look into back loading the lease rates
  Over the 5 years

NORTHWEST NATURAL GAS 4/4/97

RON Opitz,

— JOHN OXFORD - "T-11 & T-2 NOT ON OUR LEASE"

— PNO — RR TRACK AND fire Hydrants
- shows on our lease
- Fire hydrant, who's Responsibility

— LEASE
- 5 YEARS OR 10 YEARS
- BACK landing
- LETTER of INTENT on the CURRENT AND "NEW" PERFORMA

WWT/EVANS NEED for PERMITTING purposes, need 4/14/97 if possible

— PNO CONTACTS
- DIRECT or through WWNG ?
- OPERATING permits for the Dock

DO WE NEED our own or CAN WE COAT tail theirs?

KOPPERS INDUSTRIES

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238

Telephone: (412) 826-3970
FAX: (412) 826-3999

February 18, 1997

Tarconord A/S
Nyborg, Denmark

Fax transmission to: 45-65 30 37 15, 2 pages.

Attn: Christian Nielsen - TarTech Int.

Reference: KII Portland Terminal Liquid Pitch Unloading - Site Visit

Dear Christian:

I would like to invite you to visit our Portland terminal the week of March 10th to discuss the following items:

1. Plant layout - We should have an agreement with the size of tankage and future expansion required. Based on this, I want us to decide on locations for the tanks and equipment.

2. Preliminary flowsheet review - Including discussing tie-ins with existing plant and control requirements.

3. Environmental controls - Our Environmental Manager, Bill Swearingen, has indicated that he can join us for a day that week to discuss environmental compliance and permitting issues. Sven may have told you that we want to consider a fume combustion system in leiu of a scrubber. We would eliminate the existing fume scrubbing tank and combine the existing plant load in the new design. This should ensure both maximum emissions and odor control. We are interested in your thoughts and experience.

4. Docking facility - We will meet with a marine engineer who will be assessing the existing dock structure for the ship receipt and the permits required for expanding the receiving facility.

5. TarTech engineering services - After reviewing your proposal for engineering services, I would like to discuss the working on a time basis.

6. Selection of a local detailed engineering firm - I will contact a couple of firms in Portland for interviews to provide detailed design.

I will call you tomorrow afternoon, Wednesday, your time to confirm your availability and when you can arrive. I will follow-up with an agenda for the week once we talk.

Best Regards,

Jim Dietz

cc: Sven Hansen - Tarconord
Amos Kamerer - Portland
Kevin Fitzgerald - Stickney
Bill Swearingen - K-1800
Walt Turner - K-1600

2/4/97

Sandy Hart, NWNG

#1

There was a boring in the black top to the east of the still — showed no sheen and little "head space" to 10' depth — thus should be ok.

#2

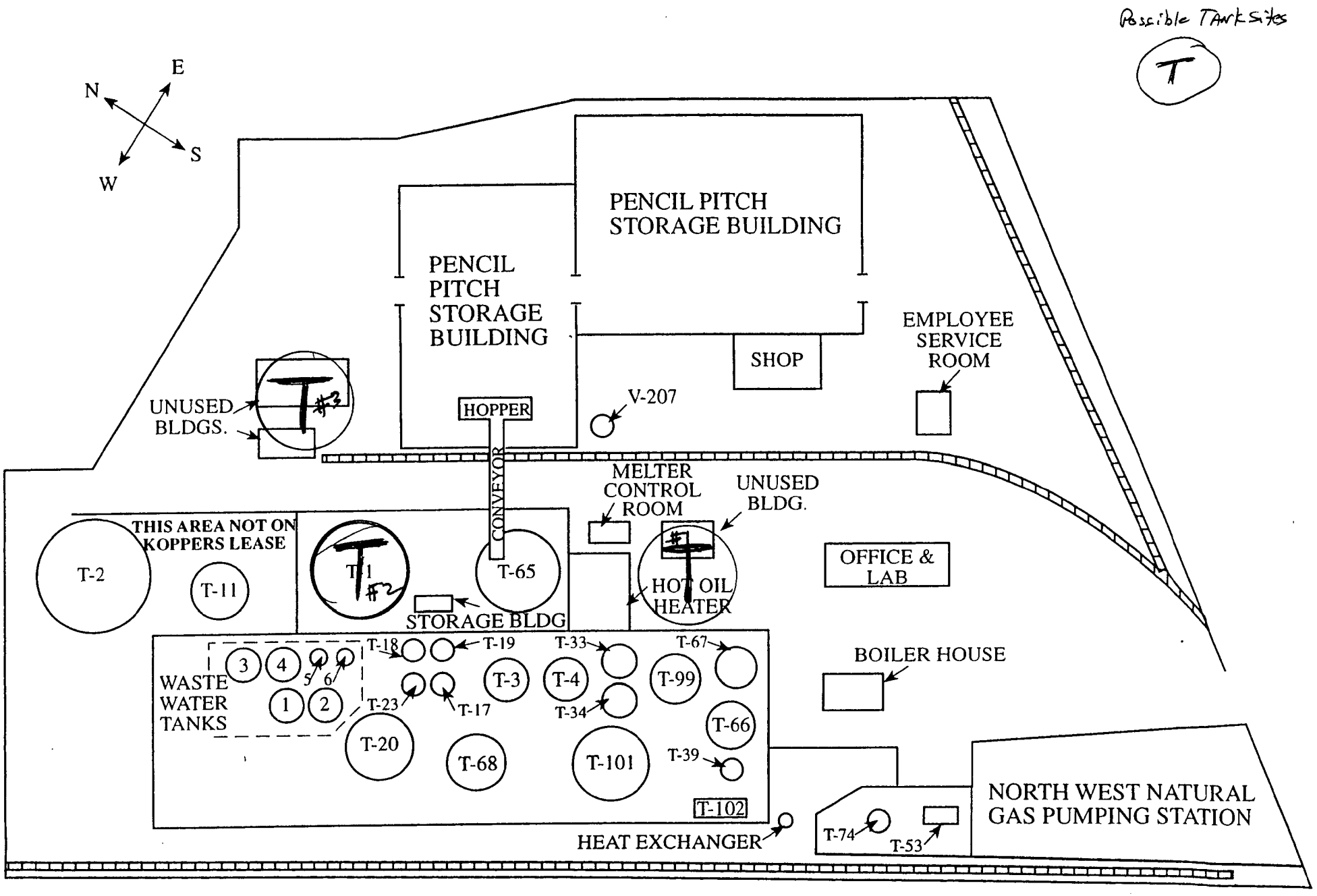
boring # B-20 was to the west of T-1 and showed the same as the one above, thus should be ok.

#3

No borings in this area

old buildings — have been there long enough that they should be ok

Keep her posted on a regular basis, especially with a G/A as soon as available.



PROPERTY SITE PLAN

Koppers010032

KOPPERS INDUSTRIES

FAX TRANSMITTAL

Koppers Industries, Inc.
7540 N.W. St. Helens Road
Portland, OR 97210-3663

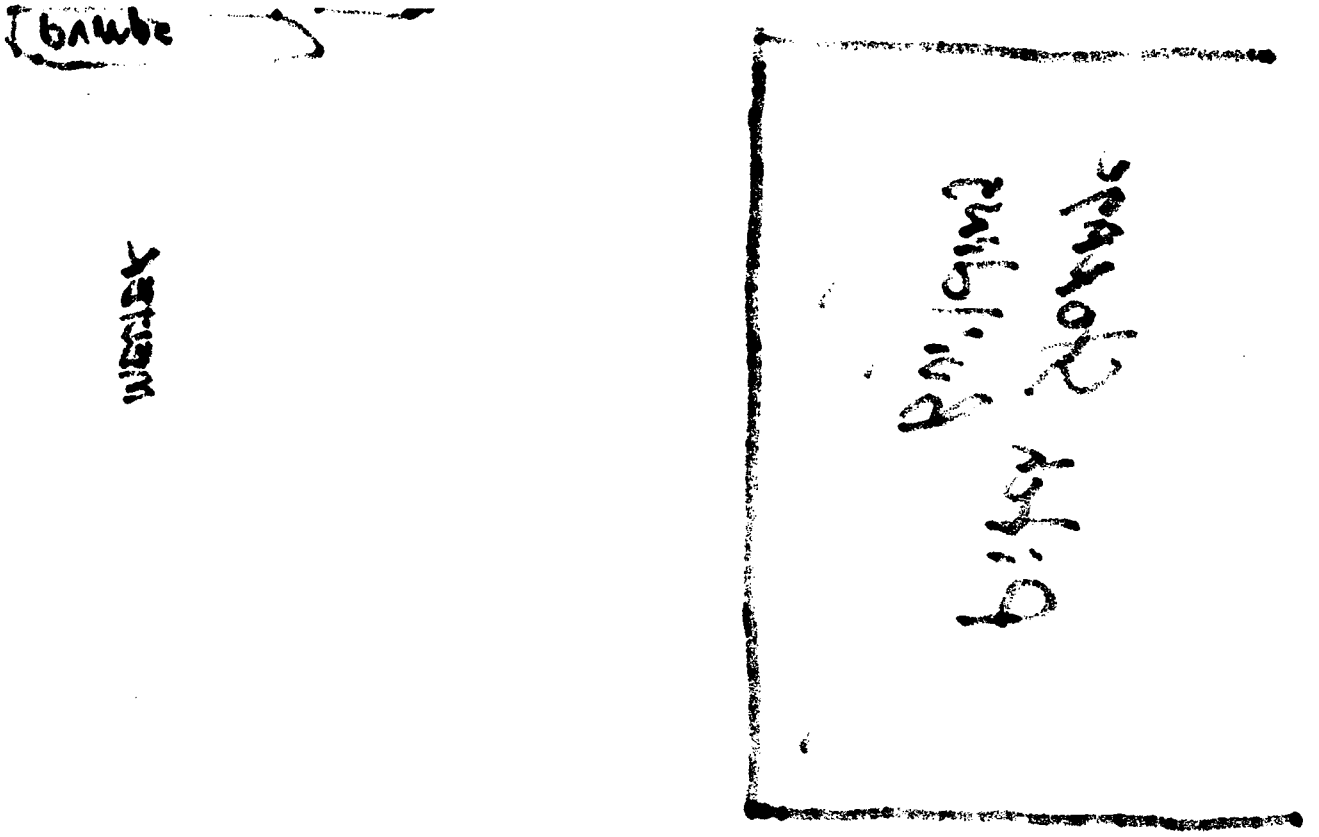
Telephone: 503-286-3681
Fax: 503-285-2831

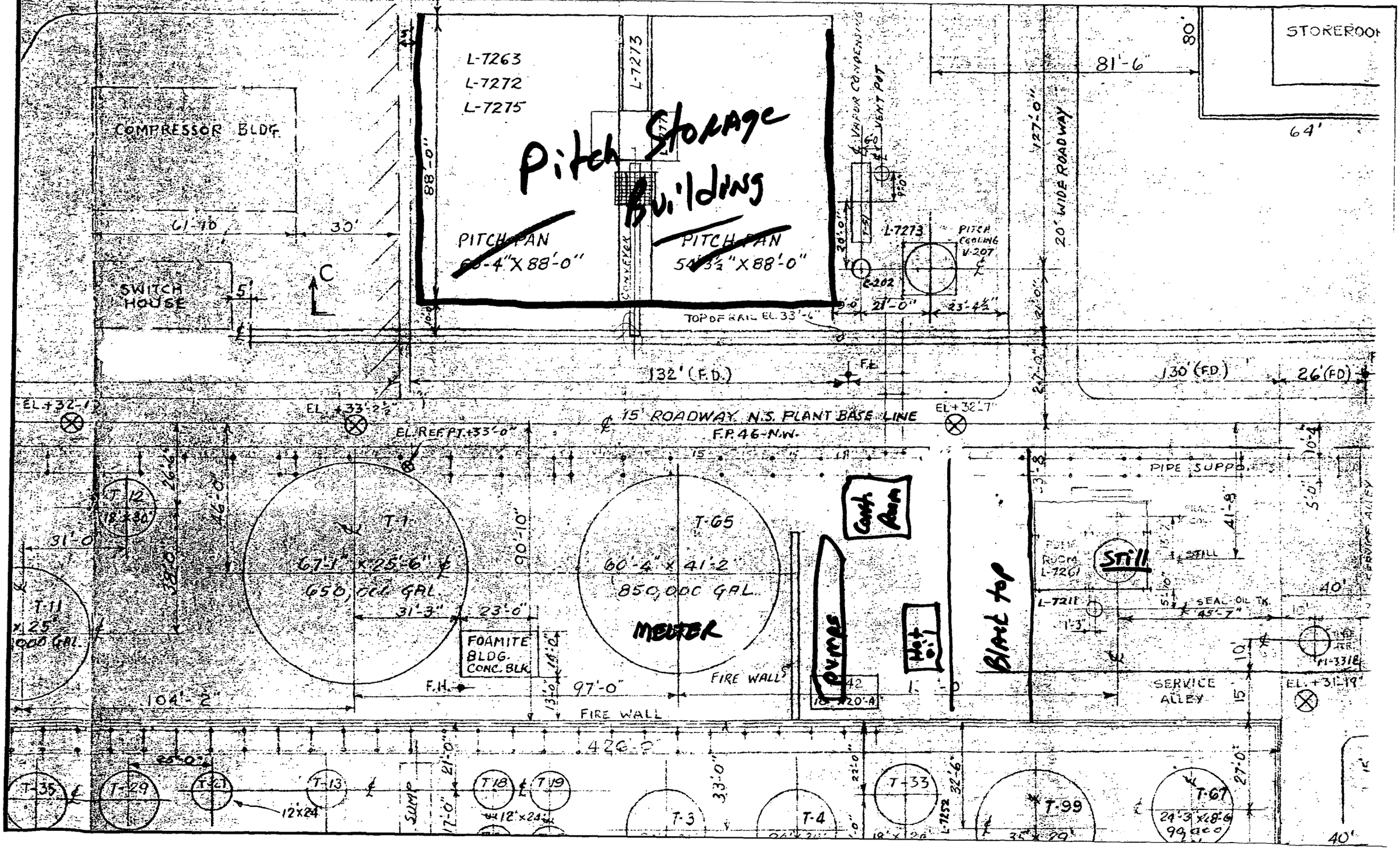
TO: Jim Dretz DATE: 2/5/97

FROM: Amos TOTAL # OF PAGES: 2

Here's the drawing, hopefully you can read the measurements 3 Areas have been selected as possible sites for tanks — The current T-1 tank, the compressor & Switch house buildings Area, and the old still Area. Scale is 1" = 30'

IF THIS TRANSMITTAL IS IN ERROR, PLEASE CALL 503-286-3681 FAX # 503-285-2831





Koppers010034

KOPPERS INDUSTRIES

INTEROFFICE CORRESPONDENCE

To: M.H. MURRAY

Location: K-1650, PITTSBURGH

Subject: CAPITAL EXPENDITURE PRE-AUTHORIZATION

From: AMOS S. KAMERER

Location: PORTLAND, OR

Date: MARCH 26, 1997

REQUESTING DIVISION (Circle One)	WOOD (TAR) COKE ADMINISTRATIVE
REQUESTING LOCATION	PORTLAND, OR - 9270
REQUEST DATE	MARCH 26, 1997
PROJECT TITLE	IMPORT LIQUID PITCH DOCK, UNLOADING LINE AND TANKS
AMOUNT OF REQUEST NOTE: THIS AMOUNT SHOULD BE FOR THE PRELIMINARY SCOPE OF THE WORK ONLY.	$80,000.00
TEMPORARY APPROPRIATION NUMBER ASSIGNED	GL DET SUB LOC DEPT 4210 - X - X - 9270 - 9027
DESCRIPTION OF THE PROJECT SCOPE TO MODIFY AN EXISTING DOCK TO PERMIT THE RECEIPT OF IMPORT LIQUID PITCH. TO CONSTRUCT A 2000 FT. LONG PIPELINE FROM THE DOCK TO 3 NEW 6,000 METRIC TON CAPACITY STORAGE TANKS. WORK WILL INCLUDE A NEW HOT OIL HEATING SYSTEM AND FUME COMBUSTOR, TRANSFORMER AND SWITCHGEAR, INSTRUMENTATION, PUMPS, VALVES, CONTROL / MCC HOUSES, LIGHTING, PAVING, ETC.	
AUTHORIZED SIGNATURE	
COPY TO: REQUESTING LOCATION MANAGER	A.S. KAMERER
REQUESTING DEPARTMENT	J.T. DIETZ
DIVISION CONTROLLER	J.W. KUNKLE
DIVISION GENERAL MANAGER	W.W. TURNER 4/4/97

J. CAMERON McKERNAN COMPANY

Engineering & Naval Architecture

825 NE 20th Avenue, Suite 110 • Portland, Oregon 97232 • (503) 232-7211 • FAX (503) 232-7658

File No. P97-10
January 8, 1999

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

COPY

Attention: Bill Meisinger

Subject: Portland Facility Pitch Ship Terminal
Modification of Pier and Piping from Ship to Storage Tanks
Increased Cost of Engineering

References:
* Your Purchase Order Number 300-8-13016
* McKernan letter Cost of Construction Plans and Engineering dated June 15, 1998
* Engineering Tasks Description dated May 22, 1997

Enclosures:
* Engineering Tasks Description dated May 22, 1997
* Summary of McKernan Billings
* Changes & Additions Descriptions
* McKernan Estimated Cost Summary
* McKernan Cost Estimate (5 sheets)

Gentlemen:

We have completed the design and pre construction support task work required by your purchase order. Specifically we have completed Tasks 1, 2, 4, and 5 contained in our proposal dated June 15, 1998.

The principal remaining McKernan tasks are shown on the attached Engineering Task Description dated May 22, 1997 marked-up to show the tasks already completed.

Our time charges up to this point have nearly exhausted the purchase order amount. Actually the difference between the amount of the Purchase Order and the amount billed is $5,956.31 remaining. (See attached summary for detail.)

We still have significant construction support work and document preparation to do.

We have gone back and reviewed our actual charges and tasks. As you are aware, during the engineering development of this project we have done additional work which was not included in our proposal and your purchase order.

Cont'd . . .

Koppers Industries, Inc.
Portland Facility Pitch Ship Terminal
Increased Cost of Engineering

File No. P97-10
January 8, 1999

We have prepared the attached Description of Changed or Added Work. We have also estimated the cost impact on us for these changes and additions. We would appreciate your consideration of these items. We request you to increase your purchase order amount by our estimated cost of $25,968.88. (See attached summary and estimate.)

We would be pleased to discuss these Changes and Additions with you and to provide any additional information you require.

COPY

Very truly yours,

J. CAMERON MCKERNAN COMPANY

By: Cameron McKernan

J. Cameron McKernan, President

cc: Amos Kamerer
Jack L. Stephenson

Koppers Industries, Inc.
Portland Facility Pitch Ship Terminal
Modification of Pier and Piping from
Ship to Storage Tanks

File No. P97-10
May 22, 1997

COPY

ENGINEERING TASKS DESCRIPTION

1. Prepare construction plans as shown on attached list.

2. Do engineering calculations for development of plans. Such calculations are:

   a.) Pier walkway and bridge structural analysis.

   b.) Piling and "spread" footing analysis for pier and shoreside pipe and piping cross-over bridge supports.

   c.) Piping thermal expansion and flexibility/stress analysis. These analysis will be done using a computer.

3. Interface and coordinate with ship operator to assure shore connection; ship transfer hose; and operation of ship connecting, ship pumping, and ship disconnecting are compatible and meet requirements.

4. Follow up and coordination with City, State, and U. S. Corps of Engineers to obtain permits.

5. Prepare construction specifications for Contractor bidding. Assist with solicitation and evaluation of bids. Construction specifications will be developed by trade of Contractor specialty.

6. Provide engineering support during construction to resolve engineering problems and to coordinate Contractors and City inspection.

7. Perform "in-process" inspection of work to satisfy City requirement for certification that work is done in accordance with the approved plans and standards. This will include coordination of Special Inspectors such as welding inspectors and soil tests for contamination. The cost of hiring the Special Inspectors in not included.

8. Prepare operating procedures for Ship Terminal Operation in accordance with U. S. Coast Guard Regulations.

9. Prepare applications and supporting documents for U. S. Coast Guard Permits to operate the Marine Terminal Facility. Some of these documents are: Emergency Spill Response Plan, Procedure for Disposition of Ship's Oily Waste, and Procedure for Disposition of Ship's Garbage.

10. Provide the City with Certification the project is completed in accordance with the approved plans.

END

Portland Pitch Ship Terminal
McKernan Engineering Tasks
Changes and Additions – Description

File No. P97-10
January 8, 1999

1. Rerouting Pipe on Pier After C. McKernan and Amos Kamerer inspected pier on August 13, 1998, it was decided to re-route the piping from the inshore side of the walkway to the off shore side. This change, although early in the program resulted in revising several drawings and re-doing the thermal flexibility analysis for the affected section of pipe.

COPY

2. Preparation of Plans for Lease Documents Five drawings were prepared specifically for use in the lease documents. These drawings were furnished to Koppers on August 13, 1998. Although these plans were later substantially incorporated into the completed plan package, the preparation of these separate plans during this early stage required extra work.

3. Pipe on Pier Changed from 10" to 8" Chem Tech informed McKernan about September 20, 1998 piping on pier would change from 10" to 8". This was done to reduce cost, particularly cost of wedge plug valves. An additional length of shore side piping was changed on October 9, 1998. This change required revision of plans and rerun of piping flexibility analysis for the affected sections. The change to 8" also required additional details to add trace and supports for the 8" pipe.

4. Hazards Analysis McKernan participated in a Process Hazards Analysis at Koppers Plant on September 28 & 29, 1998. McKernan also reviewed the report and incorporated the recommendations into the drawings developed by his firm.

5. HAZMAT Requirements McKernan participated in a site inspection with Amos Kamerer and Northwest Natural's Senior Environmental Specialist, Mike Hayward. From information obtained during this inspection McKernan developed construction specification requirements and incorporated these requirements into the bid specifications.

6. Pier Service Platform Re-arrangement McKernan personnel did site checks and worked with Pacific Northern Oil's Superintendent, Mike Satre to work out re-arrangement of pier service platform. A new drawing "Service Platform: Deck Plan," McKernan Plan No. 97010-39 was prepared. This plan shows the re-arrangement and modifications worked-out with Pacific Northern Oil. Incidentally, copies of pipe line and pier modification drawings were sent to Pacific Northern Oil (George Markwood, V.P. Operations) for information and review.

7. Flow Meter Spill Containment The Hazard Analysis for the Hot Oil Tracing System recommended addition of spill containment around flow meter and a weather cover over the containment to prevent collection of rain water. To implement this recommendation two additional drawings were developed showing arrangements and requirements. These plans are:

Cont'd . . .

7. Flow Meter Spill Containment CONTINUED

Plan No.	Title
97010-59	Heat Tracing Piping: At Flow Meter
97010-73	Rain Shield Containment for Flow Meter

Additional engineering work was required to develop these plans.

COPY

8. Tank Calculations & Plan Review On 11-4-98 Meisinger asked McKernan to review and coordinate obtaining calculations and plans suitable for submittal to the City of Portland. A number of telephone conferences were held with Roberts Engineers (particularly Fai au Young) and several FAX's were exchanged.

9. Hot Oil Piping Changes Several design developments resulted in additional engineering work, particularly the piping on pitch ship unloading line:

   * The First Chem Tech drawings (available Aug 20, 1998) showed 1½" traces reducing to 4-3/4" traces at the end of the pier.

   * A later drawing (6526-D006 Rev C 9-19-98) showed 1½" traces reducing to 4-1" traces.

   * Final drawing (6526-D0010 Rev D 11-18-98) show 2" traces reducing to 4-1" traces with several more valves installed.

   * An additional sketch was received from Chem Tech (8-28-98) showing additional valves for bypassing the end of the pier drain pump.

   These developments resulted in additional engineering work. Pipe header boxes were developed instead of using standard pipe fitting to change from one 1½" to four ¾" pipes. Additional types of pipe support clamps were detailed. This work is shown on the following plans.

Plan No.	Title
97010-61	Heat Tracing Piping on Pier
97010-62	Pipe Support: Bridge & Walkway

10. Tank Fill Nozzle Relocation The pitch tank roof was redesigned to be a simple sloping conical section. This redesign resulted in changing the height of the pipe flange connection. The pipe arrangement drawing had to be revised and the thermal piping flexibility analysis redone (3 temperature conditions). In addition pipe sway braces at top of tank were detailed to accommodate change in roof slope and for installation by tank contractor.

Cont'd . . .

11. "Engineer of Record" Services McKernan was tasked to review and coordinate engineering of all project participants and obtain City of Portland Building Permits for all non-waterfront work. McKernan obtained all project plans and specifications from other engineering contractors as follows:

    Morse Tank/Roberts Engineers
    Geo Engineers/KPFF
    Chem Tech

COPY

    McKernan reviewed all plans and specifications and coordinated resolutions of comments. McKernan "stamped" drawings and specifications as appropriate. McKernan copied drawings and assembled submittal "packages" for the City of Portland. An application for a Mechanical and Structural Permit was submitted to the City of December 23, 1998.

Cont'd . . .

Koppers Pitch Ship Terminal
Changes and Additions
McKernan Estimated Cost – Summary

File No. P97-10
January 8, 1999

COPY

1. Reroute Pipe on Pier	$ 1,527.00
2. Preparation of Plans for Lease Documents	3,681.50
3. Pipe on Pier Changed from 10" to 8"	1,723.00
4. Hazards Review & Analysis	2,291.00
5. HAZMAT Requirements	1,422.00
6. Pier Service Platform Rearrangement	2,301.00
7. Flow Meter Spill Containment	4,232.00
8. Tank Calculations and Plan Review	948.00
9. Hot Oil Piping Changes	2,962.00
10. Tank Fill Nozzle Relocation	1,876.00
11. "Engineer of Record" (plus prints) Services	3,084.38
TOTAL	$25,968.88

Author: Ted Andersen <tsandersen@chemtech88.com> at internet
Date: 10/27/98 5:41 PM
Priority: Normal
TO: "'J. Cameron McKernan Company'" <canita@teleport.com> at Internet
CC: "'Koppers Bill Meisinger'" <Bill_Meisinger@Koppers.com> at Internet
CC: Amos Kamerer at PITT
CC: "Logan Dave" <Windows/catena/logan@chemtech88.com> at Internet
CC: "Mack Larry" <Windows/catena/mack@chemtech88.com> at Internet
Subject: RE: Koppers Pitch Ship Terminal
---------- Message Contents ----------

Cameron,
We are getting together the info you request. I will be out of the office on Wed;if you need it before Thu call Dave Logan at 412-220-4557.

We expect to send out revised tank drawings Thu. AM. The biggest change for you I think, is a change to a conical roof which has a lower profile for nozzle D an the work platform. Will you still need the rod sway braces? If so please defin locations for connecting lugs and appropriate design loads.

Thanks to your Mary-Anne for sending the latest version of your drawing 97010-43A;it looks the same as the earlier one we had. We will include it in the new tank package to define your support stools and locations. We are presuming that the p tion welded to the tank will be provided by the tank vendor.

Ted

From: J. Cameron McKernan Company
Sent: Tuesday, October 27, 1998 12:56 PM
To: TSAndersen@ChemTech88.com
Subject: Koppers Pitch Ship Terminal

<<File: ATT00000.html>>
Subject: Insulation - Specifically the pitch piping on pages 7 and 8 of the ins ation spec.

Ted,

Can you send me telephone numbers so I can contact the vendors for some of the p prietary materials that you have in your specification? I am interested in the llowing list:

Metal Mesh supplied by Rockwell or Fiberex

Metal Jacketing supplied by Childers Lock-on or maybe what I need is the Childers'system. It sounds like what you've got specified in there is some system for the metal lagging over the insulation. What I need is Childers' phone number so I canget their technical data sheets.

Question on the metal jacketing: Is .024 inch thick aluminum pipe jacketing suf ciently thick? Seems kind of thin to me. Left to my own devices I would have u d twice that thickness for sheet metal lagging, especially aluminum.

Very truly yours,

Cameron McKernan

J. CAMERON McKERNAN COMPANY

Engineering & Naval Architecture

825 NE 20th Avenue, Suite 110 • Portland, Oregon 97232 • (503) 232-7211 • FAX (503) 232-7658

File No. P97-10
September 3, 1998

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, Pennsylvania 15238-1362

COPY

Attention: William Meisinger

Subject: Portland Pitch Ship Terminal

Reference: Purchase Order No. 300-8-13016

Enclosure: McKernan Invoice No. PI98-62 (original & 2 copies)

Dear Bill,

We send an original and two copies of our invoice (for the period from "start" through 8-31-98) as required by the Referenced Purchase Order.

Very truly yours,

J. CAMERON MCKERNAN COMPANY

By:

J. Cameron McKernan, President

cc: Jack L. Stephenson (w/copy of invoice)
Amos S. Kamerer (w/copy of invoice)

J. CAMERON McKERNAN COMPANY

Engineering & Naval Architecture

825 NE 20th Avenue, Suite 110 • Portland, Oregon 97232 • (503) 232-7211 • FAX (503) 232-7658

INVOICE
NO: PI98-62

September 3, 1998

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

Attention: WM. Meisinger

COPY

Reference: Purchase Order # 300-8-13016

DESCRIPTION AMOUNT

ENGINEERING SERVICES (Portland Pitch Ship Terminal)
(INTERIM INVOICE for the period from "start" to 8/31/98
(McKernan File No. P97-10)

Service to do engineering tasks and prepare construction plans as required by the referenced Purchase Order. Work performed in connection with modification of pier and piping installation from ship to new storage tank. Charges are for the period from "start" through 8/31/98. Services are listed on the following page.

CHARGES:

Labor (Summary & Activity Logs attached):

Principal Engineer:		
66 man-hours @ $79.00 per man-hour	$ 5,214.00	
Senior Engineer:		
143½ man-hours @ $52.50 per man-hour	7,533.75	
Senior Drafter:		
93½ man-hours @ $40.00 per man-hour	3,740.00	
Labor Total (303 man-hours)	$16,487.75	$16,487.75

Material:

AutoPIPE Program rental and shipping charges (2 – 50 use packages)	1,425.04
TOTAL AMOUNT DUE	$17,912.79

TERMS: Net cash

Cont'd . . .

Koppers Industries, Inc. (Attention: WM. Meisinger) September 3, 1998
Portland Pitch Ship Terminal - Purchase Order # 300-8-13016
McKernan Engineering Service Invoice No: PI98-62

DESCRIPTION AMOUNT

COPY

SERVICES:

1. Visited Koppers in Portland on 7/28/98. Met will all the different engineering principals involved in the project to get coordinated.

2. Began piping flexibility stress analysis. Obtained computer software "AutoPIPE" and began running calculations.

3. .Visited Koppers in Portland on 8/13/98. Met with Amos Kamerer and toured the facility. Discussed the lay out of the piping runs and the arrangement at the ship connection.

4. Prepared the following plans incorporating previously developed site plans with new Koppers' drawing format and including new pipeline lay out. Delivered 3 copies of the plans to Amos Kamerer and sent a copy via UPS Next Day Air to Bill Meisinger on 8/17/98

PLAN NO.	REV.	TITLE
9710-S10	A	SITE PLAN – PIER & PIPE LINE
9710-S11	A	PIER & BRIDGE – ARRANGEMENT PLAN
9710-S12	A	PIER – WALKWAY & PIPE ARRANGEMENT
9710-S13	A	BRIDGE – SHORE TO PIER PLAN & ELEVATION
9710-S14	A	BRIDGE – SHORE END & PARKING AREA

5. Started work on the bridge design. Did calculations for strength and support to meet AISC Requirements. Prepared the following plans:

PLAN NO.	REV.	TITLE
97010-23	PRELIM	WALKWAY PIER – DOLPHIN ARRANGEMENT
97010-24	PRELIM	WALKWAY PIER – STRUCTURAL DETAILS
97010-27	PRELIM	BRIDGE TO SHORE ARRANGEMENT
97010-28	PRELIM	BRIDGE TO SHORE STRUCTURAL DETAILS

Koppers Industries, Inc. (Attention: WM. Meisinger) September 3, 1998
Portland Pitch Ship Terminal - Purchase Order # 300-8-13016
McKernan Engineering Service Invoice No: PI98-62

LABOR SUMMARY:

Period ending:	7/31	8/15	8/31	Total
Principal Engineer:				
McKernan	20	19½	26½	66
Senior Engineer:				
Parham	38	62	43½	143½
Senior Drafter:				
Kincaid	0	21¾	71¾	93 ½
				303 man-hours

COPY

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING JULY 31, 1998

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
7-16	1½	Instructed Mike to obtain info on piping stress analysis programs so we can make arrangements to rent one of the programs so we can do our analysis. Telephone conversation with Bill Meisenger who asked that I send him the information on the surveyor we used for the project.
7-24	1	Pulled out the files to see what we got. We received the pipe stress analysis program and instructed Jerome to install it. Reviewed our files on what we got for the design of the piping system.
7-27	2½	Worked with Jerome trying to understand the new pipe stress analysis program and helped him set up a test problem and reviewed the test problem with him and instructed him to revise the test problem to be a little more realistic to our situation.
7-28	9	Attended a meeting at Koppers St. Helens Road with all the engineering people that are involved in the pitch terminal project. Arrived there just shortly after 10:00 am and left there at 8:00 pm. Took an hour off for lunch. That was a total of 9 hours.
7-29	2	Worked with Jerome learning about the pipe stress program. Reviewed his model that he had run and worked out how we wanted to put more pipe supports in there and what combinations we wanted to run.
7-30	1	Worked with Jerome again trying to get the computer program output and to understand exactly what they are doing.
7-31	3	Worked with Jerome on the autoPIPE Program sample calculations. We finally got it to be modeled and worked up with him what we're going to do Monday with it.

SIGNED JC McK DATE 8-5-98

ACTIVITY LOG

NAME Jerome Parham PERIOD ENDING 31 July 1998

JOB NO: 97-10 NAME Koppers Patch Ship Terminal

DATE	HOURS	DESCRIPTION OF ACTIVITY
7-24	2	Read Autopipe Manuals & install on my workstation
7-27	8	Continue Reading Manual & Do tutorial Problem Input data for 2 sample Problems from CAM & Print Results for 1 Problem
7-28	6	Calc more load cases and work on Modelling Piping Systems
7-29	8	Calc Load cases & Review w/CAM & Troubleshoot Results & analyse w/CAM
7-30	6	Correct supports in model Program & call tech support. Recalc case with new P, T & GR combinations & Print out
7-31	8	Model New Pipe Run with correct supports Discuss w/CAM & Fix wt Distrib. Print out OK case

SIGNED Jerome J. Parham DATE 8-3-98

38 mh

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING AUGUST 15, 1998

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
8-3	1½	Worked with Jerome to review the computer print outs on the piping flexibility analysis.
8-4	2	Worked with Jerome reviewing the pipe flexibility analysis on our simplified model and got out our General Arrangement Plan and laid out on the plan where the expansion bends are going to be. Also worked out how we are going to make the first expansion bend at the shore end of the bridge and instructed Jerome on how to make that model.
8-10	1	Worked with Mike to get our title block modifications and had Mike email it back east to the title people. Reviewed with Jerome some of the pipe stress analysis that he is doing. Not in very great depth though. More or less checked to see if he was progressing.
8-11	2	Worked with Jerome reviewing pipe stress analysis output especially the problem at the end of the dock bridge and suggested that he divide it up into two pieces and rerun the flexibility analysis.
8-12	1½	Worked with Jerome reviewing the flexibility calculations. Revised the run coming off the pier to make it so we're not so over stressed. We put an anchor right at the end of the pier.
8-13	1½	Worked with Jerome reviewing the flexibility analysis. Worked out some tentative arrangements at the end of the bridge.
	2½	Went over to St. Helens Road Plant. Met with Amos Kamerer. Did a check out on the pier and tried to lay out things the way we wanted to. Moved the pipe from the way we had shown on the original drawings.
	½	Worked with Mike to get the preliminary drawings started and laid out and outlined what we're going to give Amos on Monday morning.
8-14	4	Marked up some plans for Mike to revise and went with Mike over to the St. Helens Plant and gave him a tour of the dock and the dolphins and where the bridge is going to end and traced the whole pipe line from one end to the other. Came back and marked up some more drawings.
8-15	3	Working on Koppers. Marked up original site plans and general arrangements to reflex the changes Amos wanted made in the location of the pipe line and other things for the drawings he need for his lease.

SIGNED J. Cameron DATE 8/15/98

1998

ACTIVITY LOG

NAME Jerome Parham PERIOD ENDING 15 Aug 1998

JOB NO: 97-10 NAME Koppers Pitch Ship Terminal

DATE	HOURS	DESCRIPTION OF ACTIVITY
8-3	7	Print out & Analyze Test cases Model 1A, 1B, 1C errors w/#2 & Re input from scratch. Review with CAM. Print out cases for review.
8-4	8	Fix model 2 & review w/CAM. Do models 2B, 2C & 2D & Print. Get AutoCAD site plan & Layout Reference Points for use in Auto Pipe
8-5	8	Alter layout of Pipe in AutoCAD & Pick off support Points & input into new Model Leg 09 in Autopipe & Calc stresses
8-6	7	Check inputs for pl09 for TI Pmax calcs & Printout. Remodel 1½" coil loop to account for offset.
8-7	7	Layout all remaining Pipe Leg Runs in ACAD & indicate support Points & spacings for Pickoff
8-10	7	Pick off offsets in XYZ from ACAD plan for runs 8, 7, 6, 5 & 4 Input model for Runs 8 & 6
8-11	7	Continue Pickoff of Points on some Legs. Review Leg 09 w/cam made mods to reduce reactions for model 09A, made changes to other legs as cam commented Re run new model 09A
8-12	6	Reviewed new cases w/cam on 9A & make changes for 9B & added Leg 10 w/exp loop to Dock. Calc stresses & Print Briefly check w/cam. Made Plot of Arrgt Plan & continued work on Leg Models
8-13	5	Made Prelim. Plan & sketches of Pipe Runs for cam's meeting w/Koppers. Modeled Legs 3, 4 & 5 & Put into Auto Pipe

SIGNED Jerome J. Parham DATE 8-17-98

ACTIVITY LOG

NAME MICHAEL H. KINCAID PERIOD ENDING AUGUST 15, 1998

JOB NO: P97-10 NAME KOPPERS PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
8-10-98	2	HAD DISCUSSION w/ CAM ABOUT THE TITLE BLOCK. MADE MODIFICATIONS TO THE TITLE BLOCK AFTER DISCUSSION. SENT AN E-MAIL OF TITLE BLOCK TO KOPPERS
8-12-98	3¼	WORKED ON MODIFING THE TITLE BLOCKS FOR THE PROJECT. STARTED TO PUT TOGETHER DRAWINGS 9710-S10, -S11, -S12, & -S13
8-13-98	3½	WORKED ON PLAN No. 9710-S12, -13, & -14.
8-14-98	6½	WORKED ON PLAN No's 9710-S10 THROUGH 9710-S14. MADE PLOTS OF THEM FOR CAM TO REVIEW. WORKED ON 9710-S10 & S11 DOING CHANGES MADE BY CAM. PLOTTED THEM FOR REVIEW. VISITED SITE W/CAM
8-15-98	6½	HAD A DISCUSSION w/ CAM ABOUT THE DRAWINGS (A REVIEW). WORKED ON PLAN No's 9710-S10 THROUGH 9710-S14. AND PLOTTED THEM AFTER DOING THE CHANGES THE CAM MARKED UP.

SIGNED [signature] DATE AUGUST 15, 1998

21¾

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING AUGUST 31, 1998

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL (1 OF 2)

DATE	HOURS	DESCRIPTION OF ACTIVITY
8-16	3	Went over the mark ups with Mike and he finished the drawings. I checked them, made a few minor mark ups and helped get the drawings plotted, printed and folded for delivery to Amos on Monday morning.
8-17	1	Visited Amos and delivered the prints. Reviewed the prints with him and he had basically no comments and I had a couple of changes I was going to make.
	1	Worked with Mike. Marked up a set of prints to make the small changes and he made the changes. Mary got the drawings plotted, I signed and stamped all the drawings, and Mary delivered them over to Amos in the afternoon.
	1	Telephone conversation with Ted Andersen. Sent him an email with the pipe lengths including expansion bends. Worked with Mike to get the bridge drawings started.
8-18	2	Worked with Mike on the bridge drawings. Figured out how to make the connections at the mid span of the bridge and generally the whole bridge scheme.
8-21	2	Reviewed with Michael the design of the preliminary drawing of the bridge from the dolphin to the shore. Telephone conversation with Dave Logan about some data he is going to send me by overnight mail. Reviewed with Jerome the continuance of the pipe flexibility analysis and some deflections and stresses. Especially the piping at the shore end of the bridge.
8-24	2	Worked with Mike on the bridge. Telephone conversations with galvanizing plants to determine the size of the tanks they can dip the pieces in. Called Amos and discussed the limitations on the dipping. Discussed maybe not having to galvanize the bridges. He and Bill Meisinger called back later and said they wanted to go ahead with the galvanizing. I went back with Mike and told him we have to put some splices in the bridge sections and to get them set up so we can make them not longer than 40 feet. We worked out a scheme for framing the bridge and relocating the pilings.
8-25	3	Asked Mike to work up the weights for the bridge. Asked Mike to work out sections of the bridge so we can bolt it together in sections that are no longer than 40' and discussed some of the design details so he can proceed with that part of it. Started to do the preliminary calculations to re-verify the bridge strength but did not finish them. Telephone conversations with Dave Lurch over at Bartells, an insulation contractor, and sent them over copies of some plans for the piping.
8-26	2	Telephone conversation with Dave Logan at Chem Tech. He wanted to know the pipe sizes of the structure that held the hoist we designed a few years back. Had Mary pull the file and we made some XEROX copies of parts of it and I marked them up to show the pipe sizes that I determined from the check and sent the marked up drawings pieces and a photograph by FAX to Dave Logan. Worked with Mike some more on the bridge. Got the details of the bridge fairly well fixed and decided to increase the span between the new pilings from 60' to 70' so that we can accommodate the limitations on the 40' lengths.

CONT'D . . .

SIGNED JCMK DATE 9/2/98

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING AUGUST 31, 1998

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL (2 OF 2)

DATE	HOURS	DESCRIPTION OF ACTIVITY
8-27	3	Completed the preliminary calculations. Verified that the beams are non compact sections and made some provisions for chocks and brackets to stiffen the flanges so they meet the requirements of the AISC specification. Instructed Mike to go ahead with the detail bridge design to incorporate those things that I worked up.
	1	Worked with Jerome and reviewed where we were with the piping design.
8-28	2	Worked with Mike on the bridge design and decided to make an additional length so that the bridge ends up on the bank far enough so that the foundation won't squish out through the bank. The last section will be 2 – 24' lengths. So we lengthened the bridge by 8 feet. We now have 4 – 40' sections and 2 – 24' sections for a total of 208' of fabricated length. Instructed Mike about the diagonal bracing on the bridge and how we're going to put that in underneath the bridge. Worked with Jerome on the piping design and explained to him what the piping at the end of the dock is going to look like. Gave him the information I received from Chem Tech about the pipe sizes and the valves and asked him to find out about the heating jackets that are going on the valves and generally got ready to do the detail design of the pipe connections at the end of the pier.
8-31	3½	Worked with Mike on the lay out of the walkway from the service platform to the upstream mooring dolphin. Figured out the frame spacing and how we're going to attach that walkway to the existing dolphin and service platform structures. Made a number of sketches. Revised the way we are going to handle the connection of the grating supports where they cross the main splice plates for the stringers.

SIGNED [signature] DATE 9/1/98

ACTIVITY LOG

NAME JEROME PARHAM PERIOD ENDING 31 AUG 1998

JOB NO: 97-10 NAME KOPPERS ATCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
8-17	4	PICK OFF NEW OFFSETS FOR MODIFIED PIPE RUN TO DOCK - 9C FROM MIKE & INPUT INTO AUTOPIPE
8-18	3½	FIX DOCK LEG OFFSETS & RE-INPUT INTO MODEL 9-C. CALC STRESSES & HAVE MARY INPUT
8-19	4½	CALC STRESSES FOR MODELS 8 THRU 3
8-20	2	WORK ON FIX FOR MODEL 1 ON CAD & INPUT OF MODEL #2
8-21	7	PRINT OUT MODELS 8-3 & INPUT REST OF #2 & PRINT. WORK ON MODEL 1
8-25	2	FINISH INPUT OF LEG 01 & CHECK
8-26	4	CALC STRESSES ON LEG 01 & MOVE SUPPORTS TO REDUCE STRESS & RECALC & PRINT
8-27	6	BACKUP OLD DATA RERUN #1 LOAD CASE & CHECK OTHERS & FIX SOME CALCS MAKE QUICK PLOT OF LEG TO CORRECT
8-28	6	MEET WITH CAM DISCUSS SHIP CONN LINE & PUMP CALL VALVE VENDOR FOR INFO. LAYOUT 365' OF 8" PIPE ON DOCK RUN TO CHECK VALVE LOCATION CHECK STRESS ON OLD CASE
9-31	4½	START ACAD LAYOUT OF PIPE DRAIN PUMP AT SHIP CONNECTION.

SIGNED Jerome J. Parham DATE 9-1-98

ACTIVITY LOG

NAME MICHAEL H. KINCAID PERIOD ENDING AUGUST 31, 1998

JOB NO: P97-10 NAME KOPPERS PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
8-16-98	3	WORKED ON 9710-S10 THROUGH 9710-S14 AFTER CAM'S REVIEW. MADE PLOTS OF THEM FOR CAM TO TAKE OVER TO AMOS ON THE 17th
8-17-98	3½	MADE CHANGES TO PLAN No's 9710-S11, -S12, & -S13. DISCUSSED w/ CAM THE DETAILS OF THE BRIDGE TO SHORE.
8-18-98	8	WORKED ON 9710-S15 & -S16 (BRIDGE CONNECTION AT DOLPHIN, BRIDGE CONNECTION AT PILES)
8-19-98	7	WORKED ON 9710-S15 & 9710-S16. HAD A DISCUSSION w/ CAM ABOUT THE BRIDGE. DID SOME REVIEWING ON THE INTERNET FOR SOME BOLTS.
8-20-98	3	WORKED ON 9710-S15 & 9710-S16
8-21-98	3½	WORKED ON 9710-S15 (ACTUALLY THE DEVELOPMENT OF THE BRIDGE FROM PIER TO SHORE). HAD A DISCUSSION w/ CAM ABOUT THE PROJECT.
8-24-98	7¼	DISCUSSED w/ CAM A REDESIGN IN THE BRIDGE FROM THE EXISTING PIER TO SHORE. CHANGED FROM (3) 60' PANELS TO (5) 40' PANELS. WORKED ON 9710-S10 (SITE PLAN) BY CHANGING COORIDINATES SO THEY MATCH THE SURVEY FROM MINISTER/GRAESER.
8-25-98	5	WORKED ON THE BRIDGE DESIGN & THE CONCRETE PAD SUPPORTING THE PIER
8-26-98	8	WORKED ON THE WEIGHTS OF THE BRIDGE. WENT THROUGH SOME MODIFICATIONS DURING THE PROCESS OF CALCULATIONS. DID SOME WORK ON PLAN No. 9710-S10 AND EMAILED IT TO CHEMTECH.
8-27-98	7	WORKED ON OVERALL DRAWINGS OF THE BRIDGE. DISCUSSED SOME DESIGN CHANGES w/ CAM. WORKED ON SOME OF THE DESIGN CHANGES
8-28-98	8½	HAD DISCUSSIONS w/ CAM ABOUT DESIGN CHANGES TO THE BRIDGE TO SHORE. WORKED ON THE CHANGES AND MADE A PLOT OF THE BRIDGE FOR CAM TO REVIEW. WORKED ON IT MORE.
8-31-98	8	DISCUSSED THE DESIGN OF THE BRIDGE FROM THE PIER TO THE SERVICE PLATFORM w/ CAM. WORKED ON 9710-S13 (PLAN & PROFILE OF THE BRIDGE TO SHORE)

SIGNED _____ DATE AUGUST 31, 1998

RECEIVED
SEP - 4 1998
KOPPERS INDS., INC.
PORTLAND, OR

J. CAMERON McKERNAN COMPANY

Engineering & Naval Architecture

825 NE 20th Avenue, Suite 110 • Portland, Oregon 97232 • (503) 232-7211 • FAX (503) 232-7658

HAND DELIVERED

File No. P97-10
August 17, 1998

Koppers Industries, Inc.
7540 NW St. Helens Road
Portland, Oregon 97210-3663

Attention: Amos Kamerer

Subject: Liquid Pitch Unloading Facility

Enclosures:

PLAN NO.	REV.	TITLE
9710-S10	A	SITE PLAN – PIER & PIPE LINE
9710-S11	A	PIER & BRIDGE – ARRANGEMENT PLAN
9710-S12	A	PIER – WALKWAY & PIPE ARRANGEMENT
9710-S13	A	BRIDGE – SHORE TO PIER PLAN & ELEVATION
9710-S14	A	BRIDGE – SHORE END & PARKING AREA

Gentlemen:

We send 3 copies of the enclosed plans for your use in connection with your new lease.

Very truly yours,

J. CAMERON MCKERNAN COMPANY

Mary Anne McKernan

By: FOR:

J. Cameron McKernan, President

cc: Bill Meisinger (Via: UPS Next Day Air)

KOPPERS INDUSTRIES

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238

Telephone: (412) 826-3970
FAX: (412) 826-3999

July 15, 1998

J. Cameron McKernan Co.
Attention: Mr. J. Cameron McKernan
825 NE 20th Avenue, Suite 110
Portland OR 97232

Subject: Portland Pitch Ship Terminal – Modification of Pier and Piping from Ship to Storage Tanks

Gentlemen:

Please be advised that Koppers Industries, Inc. has assigned Purchase Order #300-8-13016 to J. Cameron McKernan Company to prepare the necessary construction plans and engineering, as quoted, for the above referenced project on a cost plus not to exceed $130,305 basis. A formal purchase order will follow shortly; however, please use this letter as your authorization to proceed with the project.

Should you have any questions, please contact me at 412/826-3907.

Very truly yours,

Jack L. Stephenson
Manager of Purchasing

JLS/sad

CC: W. Meisinger – HTC
A. Kammerer – Portland, OR

Fax to: 503/232-7658

RECEIVED
KOPPERS INDS., INC
PORTLAND, OR

Date: 8/19/99 11:42 AM
Sender: <ISKOPPERS@aol.com>
To: BILL MEISINGER
cc: Amos Kamerer; canita@teleport.com
Priority: Normal
Subject: piping problem

Bill,

A minor problem has come to my attention which you will need to address while
in Portland. The FD-4 pipe stands as shown on the left side of drawing C005
all line up correctly to each other, and the other supports on this project.
However, the relationship to the existing loading station is not correct.
this will effect the alignment of the piping shown on P001 and P010 which
feed the loading manifold. I circled the effected areas on the working copies
of the drawings in the trailer.

My suggestion for a solution is to modify the pipe supports PS-14 (which
haven't been built yet) so that the pipe can be run outside the column, and
mounted outside the railing for the loading station. Steve Hinds suggested
that we make the turn before the final FD-4 pipe stand, and use a "sleeper"
pipe to catch the support. Frankly I would rather not have dead-end lines
unless there is no alternative.

The final call is obviously yours. May I suggest that you look into it as
soon as possible, since Steve will need to build these pipe supports real
soon.

Thank you and good luck on the PLC work.
Charlie

PS to Cameron -- The tank roof structural will probable be installed Friday
or Saturday. I won't be there to call you though.

RFC822.TXT

Date: 8/11/99 9:59 PM
Sender: Bill Meisinger
To: Amos Kamerer
Priority: Normal
Subject: Re: Harder Mechanical

Amos,
Thanks for the info. I agree on the Harder invoice.

Bill

_____ Reply Separator

Subject: Harder Mechanical
Author: Amos Kamerer at PITT
Date: 8/11/99 3:17 PM

Bill,

First, I received the separate invoice from Harder today for the RM Cat work on the ODEQ well's and gave it to April fro processing. We will need to remember to make sure that this is deducted off the existing bills.

Second, we are holding the last 2 invoice as we previously discussed for these guys. The first one is dated 6/28/99 and is for $93,824 (82% of the job). I think that we should go ahead and process this one for payment and hold the last one which covers about $190,000. Please advise if you concur?

Also, FYI. Jack Tuttle did stop by this AM. He agreed to let Harder try to do the back filling under the tank floor and inside the ring wall with sand. Bill Thorpe is looking into the possible ways of doing this. We all felt, that if we can find a good way to get the sand in there,we would be better off than using the grout. We are thinking about blowing the sand in as best we can, and then packing the few inches in with 2x4"s or something; then using the required grout in the ring wall area. When we do this, we will call GEO and have someone from their office come out to watch, and give an opinion the process.

Amos

PS: Charlie just came in and told me that he had talked to you about Jack's visit. Better that you hear it twice, rather than not at all.

kpff
Consulting Engineers

FAX COVER SHEET

Date:	7-27-99	**Pages Sent:** (including cover sheet)	5	**Job No.:**	98567
Attention:	Charlie Norris	**Company Name:**	Koopers		
From:	Sam Moss	**Company Fax #:**	285-2831		
Regarding:	Site Visit Report				
Message:	Please see the attached report for your information and review. Thank you.				
Copies To:	JACK TUTTLE (206) 361-6056		BILL TARPE 285-2834		
	BILL MEISSNER 412 826 3799		GENE SILVEY 360-225-6467		
After Faxing, please:	☐ File ☐ Return to Sender ☐ Mail ☐ Discard				

*** PLEASE CONTACT THE SENDER IF YOU DO NOT RECEIVE ALL PAGES ***

111 SW 5th Avenue, Suite 2500, Portland, OR 97204 (503) 227-3251 Fax No. (503) 227-7980

kpff

SITE VISIT REPORT

PROJECT NAME:	**Koppers**	Owner:	Koppers Industries
Permit No.:	BLD98-03757		
Location:	Portland, Oregon	Client:	Geo Engineers
Job No.:	98567	Contractor:	Harder Mechanical
Site Visit Date:	July 26, 1999	Weather:	75° Sunny
Present At Site:	Charlie Norris / Koopers Sam Moss / KPFF Bill Thorpe / Harder Mechanical		

Those present walked the project site to review portions of the current construction. The following was noted:

- The structural drawings show two inches high temperature grout between the bottom plate and the ring wall. The actual grout thickness varies from 1" to 5". In addition, there are significant areas beneath the top plate that do not bear on the compacted sand.

  One solution to the problem is shown on the attached sketch. The high temperature grout beneath the shell of the tank would be poured initially to create a dam. Tubes would be inserted into the initial pour for grouting the interior voids and venting. Once the outer high temperature grout ring has set, standard grout could be used to fill the interior voids. A standard grout could be used for this because it will respond similarly as the original sand layer. If the standard grout deteriorates with temperature, it is confined and cannot move. The standard grout at the voids would be less expensive then the high temperature perimeter grout. Jack Tuttle from GeoEngineers does not feel we can get adequate compaction by introducing sand and compacting it horizontally.

  The final solution needs to be coordinated with the grout supplier and contractor. Please review the attached sketch and contact Sam Moss with your comments.

- I spoke with Gene Silvey from the "5 Star Grout" company. He has reviewed the grout specification as shown in the General Notes. Gene feels comfortable that the "5 Star High Temperature Grout" will meet the project specifications. Gene is willing to ship a bag of grout to the contractor so specimens can be prepared. He has requested the contractor contact him so this can be coordinated.

  It is recommended that Koppers coordinate the testing of the high temperature grout with "Harder," "CTL," and "5 Star."

- Several existing footings were discovered on the east side of the containment slab. It is recommended that the slab be isolated from existing footings. One solution would be to "Jog" the slab and install expansion joints adjacent to the footings. Coordinate final decision with Charlie Norris.

- On June 16, I received a questions from Harder Mechanical regarding the use of Hilti HY150 Dowels in the sump pit (see attached). For this particular case, it is acceptable to use the Hilti HY150 dowels.

The purpose of this visit was to evaluate portions of the current construction with respect to the design intent. This report is based on a visual observation of construction readily accessible to view. Concealed conditions and items, which were not described in this report, were not included in this review.

Sincerely,

Sam Moss, P.E.

Copy by fax: Bill Thorpe & Charlie Norris
285-2831

[SM:kw\985670726sv.doc]

PRELIMINARY
- PLEASE REVIEW AND COMMENT

NCHOR
ND

VARIES REF. PLANS

1ST POUR HIGH TEMP GROUT

2ND POUR SUPPLY + VENT TUBES FOR STANDARD GROUT

ND

SHELL

INTERNAL VOID

1" TO 5"

BOTTOM PLATE

5
S11

ELEV. VARIES
REF. PLANS

3" CLR TYP.

2'-6"

6"

3"

8"

1'-2"

1'-2"

6'-0"

3

3" CLR TYP.

3/16

10"

3"

1'-3"

6"

6"

3

12-16-99

KPFF

ATTN: Sam moss

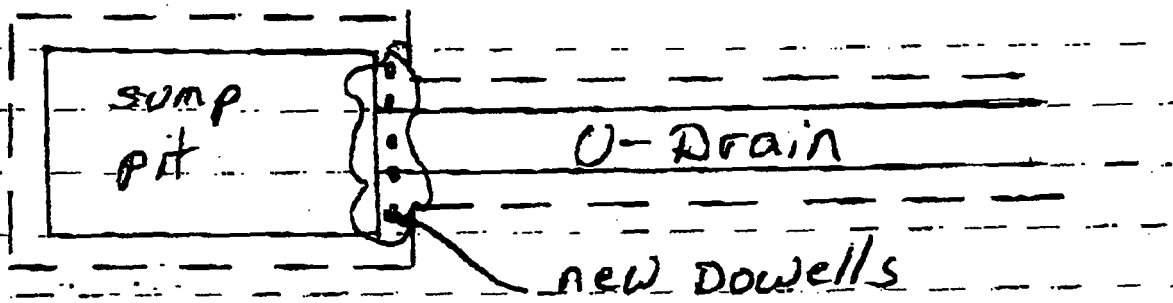
Subject: Dowell epoxy

Sam, this is a response to the conversation we had on 12-15-99 about the sump pit dowells.

5 of the vertical wall rebar were not properly placed, so were cut off + Dowelled into the slab.

The dowelling procedure was that we used a 5/8" Fatobit, Drilled approx. 4½" in depth, blew out the holes + used Hilti Hy 150 epoxy to redowell. This procedure was done while P.S.I. observed.

The dowells were on the U-Drain side of the pit.



NOTE: USE HILT HVA CAMPS

KOPPERS INDUSTRIES

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Telephone: (412) 227-2001

July 22, 1999

Harder Mechanical Contractors
Attention: Mr. Thomas Howell
Camas WA 98607

SUBJECT: P.O. #3000-9-13023 – Tank Foundations and Piling

Gentlemen:

We have, again, reviewed the grouting of the tank as raised in your fax of July 7. Our bid documents clearly show the grouting of the tank as part of the work scope. No where in your quotation did Harder Mechanical take exception to the bid documents to make a declaration that this wasn't included in your bid. Accordingly, Koppers Industries, Inc. will expect that Harder Mechanical will honor its proposals and complete the work when required.

Very truly yours,

Jack L. Stephenson
Jack L. Stephenson
Manager of Purchasing

CC: A. Kamerer – Portland, OR
W. Meisinger – HTC
C. Norris – Portland, OR

Fax to: 360/833-2524

RECEIVED
JUL 26 1999
KOPPERS INDS, INC.
PORTLAND OR

KOPPERS INDUSTRIES

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Telephone: (412) 227-2001

July 14, 1999

Harder Mechanical Contractors, Inc.
Attention: Mr. Thomas Howell
P.O. Box 5118
Portland OR 97208-5118

SUBJECT: P.O. #3000-9-13023 – PILING EXTRAS

Gentlemen:

As we discussed today, Koppers' final offer on the Dewitt Construction request is $332/pile.

We previously, in good faith, tried to settle this request when I was in Portland during June, 1999. At that time, a higher offer to settle was made and subsequently withdrawn by Koppers Industries, Inc. after no effort to settle was exhibited on DeWitt Construction's behalf. As you stated to me when our last offer was made, "This ought to do it." Well, it didn't do it and with further research into the situation our position has changed.

After review with GEO Engineers the arguments presented by DeWitt Construction do not hold up. Their main contention that UT weld inspection delayed them, costing them greatly, is not acceptable. As we stated in June and GEO Engineers consensus, the requirements of UBC Section 1703 are very clear in the requirement of testing of all fill penetration welds.

I have attached a copy of the GEO Engineers response to Koppers Industries, Inc. for your information. Their additional comments about schedule also reflect what we tried to convey in June.

In summary, DeWitt Construction is your contractor and it would be appreciated if you would deal with this problem accordingly. At the time the order was placed, Harder Mechanical recommended not deleting the piling from the contract because it was felt that by contracting all the civil activities with one contractor better controls would be in place.

Very truly yours

Jack L. Stephenson
Manager of Purchasing

JLS/sad

Attachment

CC: W. Meisinger – HTC
A. Kamerer - Portland

RECEIVED

JUL 19 1999

KOPPERS INDS, INC.
PORTLAND OR

DRAFT

July 9, 1999

Koppers Industries
1005 William Pitt Way
Pittsburgh, Pennsylvania 15328

Attention: Jack Stephenson

Coal Tar Pitch Storage Tank Foundation
7540 Northwest St. Helens Road
Portland, Oregon
File No. 5823-001-02

This letter is in response to your facsimile dated June 24, 1999 regarding charges from Harder Mechanical Contractors, Incorporated for piling driving completed by DeWitt Construction. Specifically, you asked us to review invoices from DeWitt, and a letter sent to you from Mr. Tom Howell with Harder Mechanical regarding pile splicing charges.

Based on our review of the letter from Harder and invoices from DeWitt, it appears that an initial price of $320 per splice was originally agreed upon between Harder Mechanical, DeWitt Construction and Koppers Industries. DeWitt Construction later revised this price to $480 per splice after they became aware that project specifications required that welds be ultrasonically tested. It is stated in the June 9, 1999 letter from Harder to Koppers that "All welds are quality welds but more care must be taken to assure that a UT weld passes testing." In our opinion, this is stating the obvious since the requirements of UBC Section 1703 are explicit in the requirement of testing of all fill penetration welds. This should have been known to Harder and DeWitt when they bid the job and, in our opinion, is no basis for an increase in the agreed upon cost per splice.

In the letter Mr. Howell claims that there were "a minimum of five extra days of time required to drive these piles because of the welding". This appears to be based on the assumption that 22 piles per day would have been driven for a total of 10 days (216 piles/10 days = 22 piles/day) instead of the actual completion time of 15 days. Based on our review of time lost during the pile driving activities, Mr. Howell appears to have overlooked consider time spent on normal operations of pile driving such as mobilizing the crane, moving and cutting piles, mechanical failures, and pile availability. These items account for a large part of the five days of extra time claimed. We believe that achieving a production rate of 22 piles per day would have to be based on a "best case" scenario.

DRAFT

Based on our daily field reports, pile logs and observations during full-time construction monitoring of pile installation, only one delay in pile driving appears to be directly attributable to occurred due to welding activities. This occurred on the morning of May 21, 1999. This delay was approximately 4 hours long due to welding and ultrasonic testing. Otherwise, delays attributed to other than mechanical problems or inadequate marking of pile locations was attributed to crane time spent setting piles for splicing. This time requirement should have been anticipated in their bid response and factored into the cost per splice.

In summary, we see no basis for an upset in the unit cost for splicing piles. All requirements were spelled out in the project specifications and should have been anticipated by the contractor when he bid the job.

Additional information regarding pile installation can be found in our pile driving logs and daily field reports. Please call if you have any questions regarding the information presented in this letter or if we can be of further assistance.

Respectfully submitted,

GeoEngineers, Inc.

Jack K. Tuttle, P.E.
Principal

Nicole O. Blanchard
Geotechnical Engineer

Document ID: P:\5823001\02\5823001review.doc

NOB

CTL Structural/Architectural Engineering, Testing and Materials Technology

5420 Old Orchard Road, Skokie, Illinois 60077-1030
847/ 965-7500 800/ 522-2CTL Fax: 847/ 965-6541

June 18, 1999

Mr. Bill Meisinger
Koppers Industries
436 Seventh Ave.
Pittsburg, PA 15219

Phone: 412-227-2001
Fax: 412-826-3999

Thermal Analyses and Recommendations Regarding the Concrete Pile Cap of the Liquid Pitch Unloading Tank
CTL Project No. 186007

Dear Mr. Meisinger:

At your request, Construction Technology Laboratories, Inc. (CTL) has analyzed the concrete pile cap at the referenced project to determine the heat generation and the resulting dissipation due to hydrating portland cement. Analyses were also performed to determine the maximum allowable temperature differences to prevent thermal cracking due to heat generation and dissipation.

BACKGROUND

The analyses and recommendations presented in this report are based on a drawing entitled, "Liquid Pitch Unloading Structural Details, Portland Terminal", Drawing 98567-S11, Revision No. 0, a facsimile from Mr. Dave Germer of Lonestar Northwest, dated June 16, 1999, and several telephone conversations with you, Dave Germer, and Amos Kamerer of Koppers Industries on June 16, 1999.

The analyzed concrete section consisted of a concrete slab on grade with a thickness of 48-in. The referenced facsimile indicated the mix design consisted of 705 pcy of Lonestar Northwest Type I/II cement. Heat of hydration data was not available and was estimated based on the chemical composition provided in the mill certification sheets. The heat of hydration was assumed to be similar to that of a typical Type II cement[1,2].

Mr. Amos Kamerer indicated that the concrete pile cap is to be placed June 17, 1999. Anticipated ambient air temperature data was taken from the Portland, OR local weather forecast. The average ambient air temperature was taken to be 65°F for the four days after the concrete pour. Based on the forecast, the average temperature was assumed to be 65°F for a period of two weeks after the concrete pour.

---

[1] Design and Control of Concrete Mixtures, 13th Edition, Portland Cement Association, Skokie, IL, 1992.

[2] The Chemistry of Cement and Concrete, 3rd Edition, F. M. Lea, Chemical Publishing Co., New York, NY, 1971.

CTL

Mr. Dave Gerber indicated that due to the low water-to-cement ratio, decreasing the initial concrete temperature below the current level of 75°F would be difficult. Therefore, the concrete temperature during placement was assumed to be 75°F.

Mr. Amos Kamerer also indicated that ¼-in. expanded polystyrene insulation, plastic sheeting, and thermocouples will be available for use during curing of the concrete.

RESULTS

Analyses were performed to determine the heat generation and the resulting dissipation due to hydrating portland cement of the concrete pile cap. Analyses were also performed to determine the maximum allowable temperature differences to prevent thermal cracking due to heat generation and dissipation. Analyses were performed using procedures outlined in ACI 207.

Results from the analyses to determine the maximum concrete temperature and concrete temperature difference are presented in Table 1. Analyses considered the use of insulation as a means to control the temperature difference.

Table 1 – Predicted Temperatures and Temperature Differences

Case	Insulation R-value	Predicted Maximum Concrete Temperature, °F	Time of Maximum Temperature, days	Predicted Maximum Concrete Temperature Difference, °F	Estimated Time of Insulation*, days
1	0	127	1.5	62	No Meaning
2	1	134	1.9	26	11
3	2	137	2.0	17	14

* Estimated time that insulation must be left in place. Removal of insulation should be based in criteria presented below.

Since early age concrete compressive strength data was not available, CTL calculated the allowable temperature difference to prevent thermal cracking based on the in-place concrete compressive strength. The restraint on the pier cap was assumed to be 0.45, and the coefficient of thermal expansion of the concrete was taken to be 3.7×10^{-6} in/in/°F.

Results are presented in Table 2. It is important to note that the in-place concrete will develop compressive strength considerably faster than lab-cured cylinders due to the elevated temperatures of the pile cap resulting from the hydrating cement.

CTL

Table 2 – Allowable Temperature Difference based on Compressive Strength

Concrete Compressive Strength*, psi	Calculated Allowable Temperature Difference to Prevent Thermal Cracking, °F
1000	26
1500	32
2000	37
2500	41
3000	45
3500	48
4000	52
4500	55
5000	58
5500	61
6000	63
6500	66

* Compressive strength of in-place concrete.

RECOMENDATIONS

Based on the analyzed data, CTL recommends insulating the surface of the concrete with a minimum of R-1 insulation. Formwork should also be insulated to this level. Based on published information, ¼-in. of expanded polystyrene meets the required R-value. Insulation and plastic sheeting should be placed on the concrete surface immediately after initial set of the concrete. Plastic sheeting should consist of 6-mil (minimum) polyethylene sheeting.

Thermocouples should be installed in the concrete to determine when the insulation can be removed. Thermocouples should be installed at the top surface, bottom surface, and at mid-depth of the concrete. Thermocouples should be supported by plastic or wooden dowels, and should be kept away from edges, and piles.

Insulation must be kept in place until the hottest concrete temperature minus the average daily temperature is less than the allowable temperature difference. As an example, assume the concrete temperature at mid-depth is 140°F, the average air temperature is 80°F (average of the high and low air temperatures), and the in-place concrete compressive strength is 3,000 psi. The current temperature difference (if the insulation is removed) is 60°F. Table 2 indicates that the allowable temperature difference for 3000 psi concrete is

CTL

45°F. Therefore, the insulation cannot be removed at this time. If the concrete was at 5,500 psi, or the internal temperature was 125°F or less, the insulation could be removed.

Formwork can be removed at any time after the concrete reaches an acceptable strength, however, the exposed concrete must be immediately recovered with insulation. Insulation must remain in place until the insulation removal criteria are met, as described above. It is good practice to remove the formwork and insulate the exposed concrete on a warm sunny windless day.

IMPORTANCE OF ASSUMPTIONS

CTL has exercised engineering judgment to make reasonable assumptions in these analyses. Calculation assumptions may not replicate field conditions. Calculations for insulated concrete assume the insulation completely covers the concrete surfaces. The heat generation of the cement and fly ash was estimated and may not be the same as the actual heat generation. The analyses performed were one-dimensional analyses across the specified section and did not consider discontinuities in the concrete, nor complex details at intersections of geometric shapes.

Thank you for using the engineering services of CTL. Please call if you have any questions or require any additional information.

Sincerely,

CONSTRUCTION TECHNOLOGY LABORATORIES, INC.

John Gajda, PE
Senior Engineer

JGajda@C-T-L.com

186007

Bill - # 219-881-1048

CTL

Strength is good, going up — 6040 @ 14 days

Monday - Harter said loan star could not do
- CTL would have to do.
- CTL needs the mix design from loan star
(Dave Germer) to do the calculation (Heat cals)

Ted Hutcheson - # 503-335-2878
335-3600

Heat Rise

CTL - John Gajda - 11:35 PST
847-965-7500

- 360-833-9813

Ship Monday

If it requires ice to cool
can't do thursday
need 3 days notice for the ice

1:40 PM 6/16/99 - Amos / John Gajda
ok to use 1/4" S. foam
Lay plastic 1st, then 1/4" S.F., then bricks or
something to hold it down
strip forms, include in his write up

kpff

SITE VISIT REPORT

PROJECT NAME:	**Koppers**	*Owner:*	Koppers Industries
Permit No.:	BLD98-03757		
Location:	Portland, Oregon	*Client:*	Geo Engineers
Job No.:	98567	*Contractor:*	Harder Mechanical
Site Visit Date:	June 15, 1999	*Weather:*	60° Overcast
Present At Site:	*Bill Thorpe / Harder Mechanical* *Charlie Norris / Koopers* *Sam Moss / KPFF*		

Those present walked the project site to review portions of the current construction. The following was noted:

- The perimeter bars as shown on Detail 2/S11 have been installed. The contractor was still working on the interior bars and the ring wall dowels
- The anchor bolts were on site, but did not have the heavy hex double nuts as shown on Detail 2/S11.
- The information pertaining to the curing of the concrete had not been received from CTL. This issue is on the critical path because it may be necessary to secure thermal blankets or a thermocouple.
- Foundation "FD-1" as shown on drawing 6526-C005 has been formed. The top layer of rebar needs to be adjusted to match the detail as shown on drawing 6526-C003.
- Grounding for piles has not been installed.

The purpose of this visit was to evaluate portions of the current construction with respect to the design intent. This report is based on a visual observation of construction readily accessible to view. Concealed conditions and items, which were not described in this report, were not included in this review.

Sincerely,

Sam Moss

Sam Moss, P.E.

[SM:kw\98567\0615sv.doc]

Author: AMOS KAMERER at PITT
Date: 6/16/99 2:53 PM
Priority: Normal
TO: BILL MEISINGER at TECHCTR
TO: Jack Stephenson at PITT
Subject: CTL

---------- Message Contents ----------

Bill,

I called and spoke to John Gajda this PM on 2 issues.

1) Harder said that they were only able to find 1/4" and 1" styrofoam in local stalk. John said to use the 1/4", but to lay down plastic first and then the styrofoam.

2) How long do we have to wait before taking the forms off? John said that they could be taken off fairly soon, 3 days or so, but you would then need to put the styrofoam on the sides. He started to give me some specific parameters for this; and I just asked him to include both of these items in the procedural write up that he has promised to fax to us tomorrow.

Amos

J. CAMERON McKERNAN COMPANY

Engineering & Naval Architecture

2303 North Randolph Avenue • Portland, Oregon 97227 • (503) 232-7211 • FAX (503) 232-7658

File No. P97-10
March 16, 2001

Bill Meisinger
Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

COPY

Subject: Portland Facility Pitch Ship Terminal

Enclosures: CDROM Containing AutoCAD v14 Drawings as follows:

- CHEM TECH DRAWINGS
- McKERNAN DRAWINGS
- HOSE HANDLING
- SKETCHES (MISC.)

Dear Bill,

We send a copy of the electronic files of the updated drawings. These drawings basically show the as-built configurations. Please note the Hose Handling & Sketches folders contain a mish mash of sketches and drawings that may or may not be as-built.

Next week we will send a hard copy (blue line prints) of the Chem Tech and McKernan Drawings.

Very truly yours,

J. CAMERON MCKERNAN COMPANY

By:

J. Cameron McKernan, President

RECEIVED
MAR 19 2001
KOPPERS INDS, INC.
PORTLAND OR

cc: Amos Kamerer

02-Apr-1999 16:35:21

Fax Cover Page

TO: Cameron McKernan

2327658

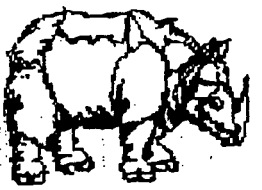
FROM: Amit Kumar

Post-it® Fax Note 7671 | Date 4/2 | # of pages ▶ 5
To Amit | From [illegible]
Co./Dept. | Co. | Phone # 232-7211
Phone # | Fax #
Fax # 285-2831

Comments:

Plan check comments for BLD98-03757
Second Check Sheet

Total pages with cover: 5



Sent Using Fax Sr. - Omtool

CITY OF
PORTLAND, OREGON
BUREAU OF BUILDINGS
PO Box 8120
Portland, OR 97207-8120

MULTNOMAH COUNTY

STRUCTURAL PLAN EXAMINATION SHEET

APPLICATION # BLD98-03757
Review Date March 5, 1999

APPLICANT INFORMATION

Name	Cameron McKernan	Phone 232-7211	Fax 232-7658
Mailing Address	825 NE 20th Ave. Suite 110 Portland, OR 97232		

PROJECT INFORMATION

Street Address 7540 NW St. Helens
Description of Work New Tank and Piping for Tar Pitch

Structural Plan Examiner Amit Kumar Phone 503-823-7561 Fax 503-823-7692

PLAN CHECK

The following items are in apparent violation of the specific codes or laws noted. Please revise documents to show compliance. Return this sheet and the marked drawings with corrected plans.

Corr. OK	Item No.	Location on Plans	Apparent Violation or Conflict	Appeal, Code Section or City Ordinance
			SECOND CHECK SHEET The following comments from the Structural Plan Examination Sheet dated March 5, 1999 need further clarification prior to issuance of the permit. Additional comments are in **Bold.**	
	1		Complete and return the attached Special Inspection Form prior to issuance of the permit. **2nd Check Sheet** **(a) In the special inspections form we would like to specifically include as a separate item, the verification of mix design for concrete subject to high temperatures as part of the special inspections to be performed by a special inspection agency (PSI in this case) . As discussed over the telephone and directed by the applicant today, this note has been added to the inspection form which was signed and returned by the applicant earlier. A copy of the modified Special inspection form was faxed to the applicant.** **(b) Response indicated that the tank is to be inspected by Pacific Technical Industries, Inc. The Special Inspection agencies need to be certified by The City of Portland. It appears that the above agency is currently not certified by the City of Portland. Please contact Tony Re at 823-7386 for additional information on obtaining certification.**	
	2		Details shown do not appear to be complete. For example on 97010-S9, the footing thickness and reinforcing is not shown, welding of the angle 8x8x3/4 to the "column" is not shown, etc. Please complete all details. **2nd Check Sheet** **The revised drawings are not clear as to layout of the rebar. Are the #8 bars to be placed top and bottom and where are they located ? Are #4 bars @ 12"o.c typical top and bottom ? Please clarify.**	UBC106.3.3.1

	3	6526-A001, A002	Please provide complete details of stair and access platform support. Detail 14 and 16/A002 appear to be conceptual in nature. Please show connection to the main tank including all welds, bolts etc. **2nd Check Sheet** **The drawings submitted by Morse Bros. have a stamp from R.J Roberts Inc. stating that the drawings have been reviewed. However there are several items like stairs, platforms etc. that were not designed by Roberts Inc. These appear to be shown on drawings stamped by J. Cameron McKernan Company. We would therefore require that the relevant Morse Bros. drawings that pertain to the area of work shown on drawings by Cameron McKernan be stamped by McKernan Company stating that the drawings from the vendor have been reviewed and are acceptable.**	UBC106.3.3.1
	6	6526-S001 thru S006	General notes on S004 indicates that the connections are to be designed by the contractor. Before a permit for these structures can be issued, the design of these connections should be completed and drawings stamped and submitted for review. **2nd Check Sheet** **The response indicates that detail drawings are not available for review. In order to issue a permit for the remainder of the work sheets S001 through S006 either need to be removed from this set of drawings or marked to say " FOR INFORMATION ONLY. NOT PART OF THIS PERMIT". A separate permit would be required for these items. Please update drawings.**	Title 24.10.07c
	8	6526-003	Please verify if "Knee Braces are not required at details A_A and D_D at the 56' elevation as shown on section B-B. **2nd Check Sheet** **The response indicates that knee braces are not required at details A-A and D-D because they connect to the existing tower. It appears that for detail D-D there is no such connection. Please verify.** **For section A-A where the connection is to the existing tower, please show via calculations that the new 4" diameter pipes can cantilever up above the existing tower for the lateral load from the pipe bridge and that the existing verticals are adequate to resist the moment.** **Per item 6 above, since this work is to be excluded from this permit, no response is required for this item at this time , however please address this concern in the documents to be submitted later for this portion of the work.**	UBC106.3.3.1
	9	98587-S11	Detail 1/S11 shows bottom reinforcing placed 3" above the bottom of the pile cap while the piles extend 1'-3" into the pile cap. With the layout of the reinforcing as shown on 2/S11 and layout of piles shown on S10, it appears that the piles would interfere with the rebar. Should the re-bar be moved up above the top of piles to avoid interference ? Please verify **2nd check sheet** **It appears that the rebar in the thickened portion of the pile cap along the exterior was moved above the top of piles to avoid the interference , however in the interior of the pile cap the rebar was left below. The rebar is spaced at 12"o.c and it appears that some of this rebar may interfere with the piles. Please clarify.**	UBC106.3.3.1
	10	1/S11	Please verify that the edge distance from the edge of concrete ring wall was considered when determining the concrete capacity in pull out for the 2 3/8 " diameter anchor bolts. **2nd Check Sheet** **It appears that the bolt size was revised in response to 2 ½" diameter. The minimum edge distance required for 2 ½" diameter**	Title 24.10.07c

			bolt is 12 ¾". It does not appear that there is adequate edge distance currently. Please revise.	

INFORMATION AND INSTRUCTIONS

1. Codes referenced for this review:
   1) The 1998 State of Oregon Structural Specialty Code and Fire and Life Safety Regulations (1997 U.B.C. with State of Oregon revisions), and current U.B.C. Standards.
   2) The 1996 State of Oregon Mechanical Code (1994 U.M.C with State of Oregon revisions).

2. Code sections or references are listed for the applicants' and staff reference. In many cases it will be necessary to refer to the referenced code for the sections noted in order to properly address the violations. The Bureau of Buildings does not provide copies of the codes for this purpose.

3. This check sheet is for the Specialty Area noted on the face of the sheet only. Please note other specialty check sheet items must be addressed. Permits cannot be issued until all check sheets have been responded to in a manner acceptable. Responses to check sheets from other Bureaus are to be routed through the Bureau of Buildings document control.

NOTE: To assist us in providing timely reviews of corrected plans please do the following.

1. Provide a response letter showing the location of each correction in reference to the Plan Check Sheet.

2. Plans can not be approved until all corrections have been made. Please make all corrections to the original tracing and reprint. Return the marked copy, along with four (4) corrected sets of plans, to Document Control. Note corrections made on the plans for easy reference.
   Exceptions:
   Where approved by the Bureau, minor corrections may be made to the submitted plans with black felt-tip pen. All corrections must be of a quality that will microfilm clearly. Plans are not considered updated until corrections are made to all four sets as rechecks are done on the first available set.

3. Notify the Document Control staff that you are submitting corrections for the **Fire and Life Safety review.** To insure that the plan reviewer receives notification, verify that the computer has been updated to show that corrections were received.

NOTE: Approvals may be required from other Bureaus / Departments for this project. To determine the status of the permitting process for this project contact the Plan Check Status line at (503) 823-7357. Request a status by Fax and leave a Fax number for a quicker response.

J. CAMERON McKERNAN COMPANY

Engineering + Naval Architecture

825 NE 20th Avenue, Suite 110 * Portland, Oregon 97232 * (503) 232-7211 * FAX (503) 232-7658

FACSIMILE TRANSMITTAL FORM

FILE NO: P97-10

DATE: 4-2-99

TRANSMIT TO: McDowell Welding & Pipefitting, Inc. (Attention: Gray Johnson)

FAX NUMBER: 503-241-2767

NUMBER OF PAGES TRANSMITTED INCLUDING THIS COVER SHEET: 4

PROJECT NAME: Koppers Industries

Reference: RFI #4 FAX 04/01/99
RFI #6 FAX 04/01/99
RFI #7 FAX 04/01/99

COPY

Gentlemen:

We return marked-up FAX'es with reply.

Very truly yours,

J. CAMERON MCKERNAN COMPANY

By: Cameron McKernan

J. Cameron McKernan, President

cc: Koppers Industries, Inc.
Bill Meisinger
Amos Kamerer

RECEIVED

APR - 5 1999

KOPPERS INDS, INC.
PORTLAND OR

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/01/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #4

The pipe support at the metering shed appears to include a pre-cast block and a pile in the foundation of the shed. Did you intend for the shed foundation to be poured around the block and doweled into it or did you intend for the pipe support to be poured with the foundation. Is a pile still required since the pipe support is part of a larger foundation? We would prefer the first option.

Please contact me with your preferred solution.

Regards

Gray Johnson

C. McKernan 4-2-99.

SHED FOUNDATION POURED AROUND PIPE FOUNDATION BLOCK SUITABLY KEYED & GROUTED TO BE LIQUID TIGHT. SHED ~~FOU~~ FOUNDATION IS BASICALLY A "CONTAINMENT" FOR HOT OIL LEAKAGE FROM METERS & PIPING. IT IS ONLY SECONDARALY A SHED FOUNDATION. PILE IS STILL REQUIRED ~~OF~~ ON PIPE SUPPORT FOUNDATION.

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/01/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #6 Drawing 97010-53 shows the oil header (2" to (4) each 1") at the reducer on the cargo line from 8" to 10". This reducer and header are on land prior to the dock. This drawing also points out two each 1 ½" expansion loops on the hot oil tracing return over the dock. Drawing 97010-54 shows 2" expansion loops on the return and the second hot oil header near the elbow at the ship transfer pump. Drawing 97010-60 shows a line sketch of the hot oil tracing on the dock and shows 2" return pipe and expansion loops. Finally, drawing 97010-61 shows a typical pier side assembly with two 1 ½ " pipes under the cargo line.

1. Please verify that the hot oil return on the dock is entirely 2" including the expansion loops. (YES)
2. Please clarify where a typical pier assembly of the type shown on 97010-61 would occur. (THERE ARE NONE)
3. Verify that clamps and straps occur every 5Ft and 30" respectively along the entire line and not just where shown. (YES. WHERE THERE'S A CLAMP: NO STRAP)
4. Please explain where an 8" pipe support clamp with 2 each 2" heat traces would occur as shown on drawing 97010-62. (THERE ARE NONE)

Please contact Scott Crawford to clarify the size and number of heat trace pipes along various sections of the cargo line. (SEE ~~REVISED~~ DWGS 6526-D006 & 6526-D004 & 6526-D0010.)

Regards

Gray Johnson

C. McKernan 4-2-99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/01/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	Randy Exley

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #7

ChemTech drawing 6526-P013 shows the hot oil tracing on the 8" pipe line to the tank as 1" where your drawing 97010-44 shows this tracing at 1 ½". They also show a valve in the vertical section of the pipe along the tank that you do not include.

1. Is the ChemTech tracing only for valve jackets and yours for the pipe? = No. SEE BELOW.
2. If the tracing is duplicate which size is correct? IT IS A DUPLICATE. 1" IS CORRECT.
3. Is this second valve in the 8" line along the vertical required? YES.

Regards

Gray Johnson

Plan No 97010-44 DOES NOT SHOW HEAT TRACE ON 8" PIPE TO TANK CORRECTLY - IT SHOW 1½" TRACES STARTING AT "BIG TEE." THIS IS NOT CORRECT.

PLAN No 6526-P013 SHOWS THE CORRECT SIZE OF 1" AND THE CORRECT ARRANGEMENT.

C. McKernan
4-2-99

J. CAMERON McKERNAN COMPANY

Engineering & Naval Architecture

825 NE 20th Avenue, Suite 110 • Portland, Oregon 97232 • (503) 232-7211 • FAX (503) 232-7658

April 5, 1999

INVOICE

NO: PI99-17

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

COPY

Attention: Wm. Meisinger

Reference: Purchase Order # 300-8-13016

DESCRIPTION AMOUNT

ENGINEERING SERVICES (Portland Pitch Ship Terminal)
(INTERIM INVOICE for the period from 1/1/99 through 3/31/99)
(McKernan File No. P97-10)

Service to do engineering tasks and prepare construction plans as required by the referenced Purchase Order. Work performed in connection with modification of pier and piping installation from ship to new storage tank. Charges are for the period from 1/1/99 through 3/31/99. Services are listed on the following pages.

CHARGES:

Labor (Summary & Activity Logs attached):

Principal Engineer:	
109 man-hours @ $79.00 per man-hour	$ 8,611.00
Senior Engineers:	
64½ man-hours @ $52.50 per man-hour	3,386.25
Senior Drafters:	
10 man-hours @ $40.00 per man-hour	400.00
Drafter technicians:	
3 man-hours @ $31.50 per man-hour	94.50
TOTAL AMOUNT DUE (186½ man-hours)	$12,491.75

TERMS: Net cash

Cont'd . . .

Koppers Industries, Inc. (Attention: WM. Meisinger) April 3, 1999
Portland Pitch Ship Terminal - Purchase Order # 300-8-13016
McKernan Engineering Service Invoice No: PI99-17

DESCRIPTION AMOUNT

SERVICES:

COPY

1. Visited the pier site on 1/11, 1/12, 1/13, & 1/14 to witness pile driving.

2. Attended meetings at Koppers with Amos Kamerer, Bill Meisinger and prospective contractor personnel on 1/18, 1/19, & 1/20. The purpose of these meetings was to figure ways to reduce costs on the project. In particular consulted with McDowell Welding and Tice Electric personnel.

3. Prepared the following preliminary plans for hose handling interface between pier and ship:

PLAN NO.	REV.	TITLE
97010-74	-	SHIP UNLOADING HOSE STUDY PLAN - HIGH WATER
97010-75	-	SHIP UNLOADING HOSE STUDY PLAN - LOW WATER

4. Visited pier site on 2/8, 2/10, & 2/12. Inspected work on the shore bridge foundation platform. In particular the rebar placement, setting of forms and concrete pour.

5. Visited DMI on 2/11. Inspected shop fabrication of the bridge sections.

6. Responded to the City of Portland "Check Sheets" in support of the new tank & piping building permit application. The following items were submitted to the City of Portland on 2/11/99:

   - Submitted four copies of the previously approved "ROADWAY & PARKING AREA ARRANGEMENT PLAN" Plan No. 97010-41, Rev. - 0 per Zoning Check Sheet dated 1/23/99.
   - Prepared and submitted Soils Special Inspections form per Site Development Plan Examination Sheet Review Date February 2, 1999.
   - Revised the "GENERAL ARRANGEMENT PLAN" No. G002, Rev. 1 to include notes on containment drains per telecon with Rondi Felton of the City Environmental Group.

7. Visited site on 2/16. Met with T.J. Turner, the Plant Superintendent. Did a walk through to review existing electrical systems against the new system changes.

8. Visited site on 2/16. Inspected the completed bridge foundation and looked at the walkways. Visited DMI also. Prepared sketches to change design of defective walkway kick plates.

Cont'd . . .

DESCRIPTION AMOUNT

SERVICES: (continued)

9. Visited site on 2/24. Inspected installation of concrete anchor bolts. Did some calculations to resolve discrepancy in the installation of the anchor bolts.

10. Revised the following plans. Plans were revised to show the reduction in the work scope of the project to only building one tank and one foundation. Submitted four copies of the plans to the City of Portland with letter dated 2/24/99.

PLAN NO.	REV.	TITLE
98567-S09	1	STRUCTURAL FOUNDATION PLAN
98567-S10	1	STRUCTURAL FOUNDATION PLAN
98567-S11	1	STRUCTURAL DETAILS

COPY

11. Prepared a letter to the City of Portland Chief Plan Examiner outlining the reduction in the work scope and requesting an adjustment of Plan Review Fee and the Building Permit Fee. Submitted letter dated 2/24/99.

12. Visited site on 2/25/99. Inspected progress of work such as the gangway ramps, the service platform rearrangement, the walkway, and the pilings.

13. Visited shore site on 3/8. Inspected completed work in particular the walkway details and the new gangway storage.

14. Received comments on the new tank and piping building permit application from the City of Portland Structural Department dated 3/5/99. Distributed pertinent comments to parties involved such as Koppers, KPFF, GeoEngineer, Roberts Engineers, & Morse Construction. . Coordinated with them by telephone and FAX.

15. Visited site on 3/15 & 3/16 to review pipe line lay out and staking. Met with Amos Kamerer and McDowell Welding personnel. Resolved interference's and adjusted pipe support locations to suit field conditions.

16. Visited DMI on 3/18/99. Inspected shop fabrication of the walkways.

17. Reviewed, approved and delivered McDowell pipe support plans to McDowell and Koppers on 3/19/99.

Cont'd . . .

DESCRIPTION AMOUNT

COPY

SERVICES: (continued)

18. Revised electrical plans to show "existing" and "new." Delivered and reviewed preliminary copy with T. J. Turner on 3/15/99. Delivered finished copies of revisions on 3/19/99.

19. Attended meeting at the plant with Koppers and McDowell Welding personnel on 3/23/99.

20. Visited shore site on 3/23. Inspected DMI work in progress.

21. Attended two meetings at the plant on 3/24/99: Koppers & Harder Mechanical and Koppers & electrician Dave Chandler.

22. Worked with other engineers involved in the project to resolve comments in the City of Portland Structural Plan Examination Sheet Review Date March 5, 1999 in support of the building permit application. The following items were prepared (as indicated) and submitted to the City of Portland on 3/26/99:

- Letter responding to the plan review comments. (prepared by McKernan)
- Structural Special Inspection and Observation Program (prepared by McKernan)
- GeoEngineers Letter to McKernan dated March 22, 1999
- KPFF Consulting Engineers Pitch Tank Design Calculations dated March 15, 1999
- Roberts Engineers Design Calculations for Pitch Tank T200 Updated 3/15/99
- Revised drawings:

PLAN NO.	REV.	TITLE	
97010-21	3	SITE PLAN	Revised by: McKernan
97010-69	1	ROAD CROSSOVER BRIDGE	
97010-70	1	DOORWAY CROSSOVER BRIDGE	
6526-G001	1	DRAWING INDEX	
6526-A006	1	SUPPORT CLIP DETAILS	
98567-S09	2	GENERAL STRUCTURAL NOTES	Revised by: KPFF
98567-S10	2	STRUCTURAL FOUNDATIONS	
98567-S11	2	STRUCTURAL DETAILS	
98567-S12	2	STRUCTURAL DETAILS	

- New Drawings:
  Morse No. 2380-P0-6158, 50 sheets, Dwg. #'s 23800101 through 28300149

DESCRIPTION AMOUNT

SERVICES: (continued)

COPY

23. Visited McDowell Welding on 3/29. Met with Gray Johnson to resolve the sequence of installing the piping and tracing.

24. Visited shore site on 3/29, 3/30, & 31. Inspected installation of the bridge and reviewed with DMI personnel items left to do to complete the job.

END

Koppers Industries, Inc. (Attention: WM. Meisinger) April 5, 1999
Portland Pitch Ship Terminal - Purchase Order # 300-8-13016
McKernan Engineering Service Invoice No: PI99-17

LABOR SUMMARY:

Period ending:	1/15	1/31	2/15	2/28	3/15	3/31	TOTAL
Principal Engineer:							
McKernan	12½	15½	11½	12	11	46½	109
Senior Engineers:							
Parham	½	21	14	6	3	14½	59
Jeffries	0	0	0	0	0	5½	5½
Senior Drafter:							
Kincaid	0	0	1½	0	2	6½	10
Drafting technicians:							
O'Donnell	0	1	0	0	0	0	1
Krug	0	0	2	0	0	0	2
							186½ man-hours

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING JANUARY 15, 1999

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
1-7	N/C	Went down to the office and met with Amos Kamerer. Returned to him a copy of the Geo Engineer's report. Also got from him another copy of the specifications. I seem to have misplaced my book some place.
1-11	1½	Went to construction site. Met with Jim Glad and Amos Kamerer and looked at the set up for driving the pilings. Looked at how they have the cable strung across from the dolphin over to the shore bridge footing. They had apparently attempted to drive a piling and it twisted on them so they are now making a driving frame so they can get the pilings in straight. I left there without them having done any pile driving.
1-12	4	Made one trip in the morning to the site. They had set up a driving frame to drive the two pilings on the inshore bent. While I was there they vibrated both those pilings into about 50' down with about 10' sticking up so they can make the splice. I didn't wait for them to set up on the other bent, the one closer to the dolphin. Went back later during the day. They had finished splicing one of the pilings, the one that is closest to the dolphin, the upstream one. They were working on the piling closest to shore, upstream one, and they finished that welding out while I was there. They are going to wait until tomorrow morning to drive those pilings. I conferred with Dave Davis while I was there and told him how I wanted to get the data for the driving and he is going to vibro one piling in far enough to get the hammer on it and then drive the remainder down with the hammer.
1-13	4½	Went to the bridge site. Was there to witness the driving of the pilings for the bridge.
1-14	2 ½	Went down to the pier first thing. It looked like they were finished with the steel pilings from the day before and they were just moving the rig over to the dock, the pier part, to drive the wood piling. Jim Glad called me a little later and said they were going to be driving the wood piling and I rushed down there to get there but they had already finished it. It apparently drove to refusal and didn't go any farther. Checked those drawing that we got from email by Bill Meisinger after they had been plotted and the plots looked all right.

SIGNED JCMcK DATE 1/19/99

12½ MK

ACTIVITY LOG

NAME JEROME PARHAM PERIOD ENDING 15 JAN 1999

JOB NO: 97-10 NAME KOPPERS PITCH SHIP TERM.

DATE	HOURS	DESCRIPTION OF ACTIVITY
1-13	½	WITNESS FIT-UP OF SPLICE PLATES OF 2ND & 3RD SECTIONS OF DOLPHIN TO WORK PIER BRIDGE

SIGNED Jerome J. Parham DATE 1-17-99

½ mh

ACTIVITY LOG

NAME Jerome Parham PERIOD ENDING 31 Jan 1999

JOB NO: 99-06 NAME Koppers - Ship Unloading Hose

DATE	HOURS	DESCRIPTION OF ACTIVITY
1-22	1/2	Discuss Hose Handling w/Cam & start sketch for Geometry
1-25	8	Continue Hose Arrgt for 2 W.L.'s @ Arrival
1-26	8	Plotted & checked Dwg & started new Dwg for Departure Draft
1-27	2 1/2	Plot 2 Dwgs & correct Hose Length
1-28	2	Discuss Briefly w/Cam & start changes

S SIGNED Jerome J. Parham DATE 1-31-99

21 mi

ACTIVITY LOG

NAME KARON O'DONNELL PERIOD ENDING 1-31-99

JOB NO: 97010 NAME KOPPERS

DATE	HOURS	DESCRIPTION OF ACTIVITY
1-28	1	REDONE MARKED UP 6526-G002 THINGS THAT ROB MISSED PLOTTED AND RAN BLUE LINE

SIGNED Karon O'Donnell 1 mb DATE 2/1/99

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING FEBRUARY 15, 1999

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
2-4	1	Telephone conversation with Bill Meisinger about plans and the need for us to have the Chem Tech protocol on line weights for plotting so that are plots look like theirs and other matters about the permits and the value of the contracts and so forth. Had a brief telephone conversation with Amos about the pit for the bridge footing on shore.
2-5	2	Worked with Jerome on ship unloading plans. Got them off in the mail to Bill Meisinger. Also sent him revised Chem Tech General Arrangement Plan revised as requested by "City."
2-8	1	Went over to the Pacific Northern Pier. Met with Jim Glad. Looked at the work platform where he has chipped out the concrete step. Also was up on the bank and looked at his excavation for his bridge footing and the making of the concrete forms and the setting of the concrete rebar.
2-10	1½	Went over to the site and inspected the placement of the rebar and the setting of the forms.
2-11	2½	Worked with Mary to get the City of Portland comments resolved. Had Mary make copies of the revised plan we are going to send and the landscaping plan. Had a telephone conversation with Don Fairbanks the City Building Inspector and discussed what we are doing over there and he was going to go over and look at the rebar and form work.
	½	Went over to DMI to inspect the bridge section. They had two sections basically fabricated without handrails, kick plates, or gratings. The first section that sits on the footing on shore and the next section out were completed.
2-12	2	Went over to the site and watched them pour the shore concrete foundation for the bridge. Reviewed the testing lab's preliminary report which indicated there was too much air in the concrete per spec. Told them to go ahead with it because it didn't make any difference for this concrete.
2-15	1	Worked up the cost for the different parts of the project so we can get the revision in the City of Portland Building fees or at least a redistribution of it. Also gathered up plans and some note pads and pencils so I can go over tomorrow and work with TJ Turner on understanding the electrical system.

SIGNED JCMcK DATE 2/17/99

ACTIVITY LOG

NAME JEROME PARHAM PERIOD ENDING 15 FEB 1999

JOB NO: 97-10 NAME KOPPERS UNLOADING HOSE

DATE	HOURS	DESCRIPTION OF ACTIVITY
2-4	6	REDO LAYOUT OF HOSE, PLOT & CHECK w/CAM NEED TO FIX SLING & GEOMETRY
2-5	8	WORKED on -74 & -75 TO DEVELOP HIGH & LOW WATER HOSE GEOMETRY. ADDED NEW SLING DESIGN & FIXED HOSE RUNS. MADE COPIES TO SEND TO KOPPERS

SIGNED Jerome J. Parham DATE 2-15-99

14 m/h

ACTIVITY LOG

NAME MICHAEL H. KINCAID PERIOD ENDING FEBRUARY 15, 1999

JOB NO: P97-10 NAME KOPPERS PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
2-10-99	(1½)	WENT OVER TO KOPPERS TO SEE HOW THE PROJECT WAS GOING ALONG (AT THE TIME THEY WERE DOING THE CONCRETE PAD FOR THE BRIDGE)

SIGNED [signature] DATE FEBRUARY 15, 1999

1½ mh

ACTIVITY LOG

NAME Robert Krug PERIOD ENDING 2-15-99

JOB NO: P97-10 NAME Koppers

DATE	HOURS	DESCRIPTION OF ACTIVITY
2-3-99	½	fixed new revision note
2-10-99	(1½)	Went to job site to see new foundation for bridge.

SIGNED [signature] DATE 2-16-99

2mh

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING FEBRUARY 28, 1999

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
2-16	3	Went over and met with TJ Turner the Plant Superintendent and walked through all their existing electrical systems and walked through the new electrical systems using the plans. Became familiar with the installation that is actually there and what is going to be added and changed. Went out to the dock and inspected the foundation that is finished. They had done everything except place the final gravel and the rail road tie bulkhead at the sides. While I was there I also looked at the walkways that have the damaged kick plates. Took some photographs of them and inspected them pretty carefully. Also noted that two of the sections have the handrails in place although they have not been driven home yet. To me it looked like it was going to fit.
	1	Went over to DMI and met with Kurt Redd. Made some sketches of how to fix the defective or damaged kick plate and discussed a change on fixing the ones that have not been built or installed yet.
2-17	1	Made some telephone calls about pipe bending. Talked to George Riddle Cascade General and to E. M. Jones at a pipe vending company in Tacoma and tried to call Todd Shipyard in Seattle. Put a phone call in to Grant Davis at KPFF.
2-24	3	Had Jerome go over and inspect the concrete anchor bolts for support of the walkway between the service platform and the upstream dolphin. He found out the bolts had not been properly installed. The embedment was only about 3½" instead of the 5" specified on the drawing. Went back and reviewed my calculations and reviewed the literature from the bolt manufacturer. Determined that 3½" of embedment would be all right. Gave instructions to Jerome and Jim Glad, the Contractor's Supervisor, about installing the bolts. To make sure at least the top ones are installed to the 3½" embedment and that they develop the torque or the turn of the nut method called out in the bolt manufacturer's instructions.
	2	Prepared a letter to the City plan review chief regarding the fees for the building permit. Also prepared a letter to forward the revised foundation drawings. Mary made the prints and she will deliver these things tomorrow.
2-25	2	Went to the pier. Met with Jim Glad. Also talked with Mike of Pacific Northern Oil. Looked at the completion of the gangway ramp support ramp. Looked at the two posts that are anchor bolted into the concrete on the service platform and the upstream dolphin. Generally looked at the bolted up sections of the walkway. Looked at how he has cut off the wood piling and is going to set the new piling cap on top of the pilings. Also during the day reviewed the sheet Mary got back from the City showing the status of the plan review.

SIGNED [signature] DATE 3-9-99

12 mh

ACTIVITY LOG

NAME JEROME PARHAM PERIOD ENDING 28 FEB 1999

JOB NO: 97-10 NAME KOPPERS PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
2-24	6	WENT TO KOPPERS TO WITNESS INSTALLATION OF ANCHOR BOLTS IN SERVICE PLATFORM & U/S DOLPHIN WALKWAY & BRIDGE SUPPORTS

SIGNED Jerome J. Parham DATE 2-28-99

6 hrs

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING MARCH 15, 1999

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
3-8	4	Went over and visited the Koppers site. Met with Amos Kamerer and Jim Glad. The fundamental problem is that the shore footing was off; that is, low by 3". Got that exact dimension later in the afternoon from Ed DeWild and a FAX he sent us. While I was there at the pier I went and inspected the other work that was done. The walkway between the service platform and the upstream dolphin has been set in place. It looks like everything came out the way we planned it. They haven't quite finished the bracing of the intermediate pilings. The water has been too high. All the hand rails and kick plates and the grating look good. The clearances at each end look okay. Looked at the ship gangway stowage. Talked about putting a small kevel cleat on the gangway so they can tie it down so the wind won't pick it up. Also talked to Mike about getting a longer sling so the sling can hang over and you don't have to have somebody stand up to hook onto it. Later in the day went back and re-analyzed the addition of the two inches of camber that were set into it and verified that was more or less ideal amount of camber to minimize the deflection of the walkway and the slope at the dolphin end. Had a couple telephone conversations with Sam Moss over at KPFF. He reported he has received The City of Portland comments. He later Faxed it to me. I had Mary-Anne send FAX copies to Amos, Bill Meisinger, Steve Adolphsen and Fai AuYoung at Roberts Engineers.
3-10	1½	Telephoned Morse Tank and talked to Steve Adolphsen about the City of Portland comments. Wanted to get from him a set of construction drawings to satisfy the City of Portland as far as plan requirements. They are looking for details but we need to be sure that these drawings are stamped by some Oregon Engineer. Telephone conversation with Sam Moss about getting the City of Portland comments resolved and in particular those that interface with the Roberts Engineering Calculations for Morse Tank. Asked him to coordinate that and work directly with the Morse Tank person to get that resolved.
3-12	2½	Quite a bit of coordination for the City of Portland plan review. Telephone conversations with Amos Kamerer, Bill Meisinger, Sam Moss, and attempted to get a hold of Jack Tuttle at GeoEngineers but was only able to leave a message at his office. Marked up four or five sheets of the electrical drawings for revision to show what is existing and what is new work.
3-15	3	Checked Michael's plots of the electrical revisions. Took the plots with me when I went over to Koppers and reviewed the revisions with T. J. Turner, the Foreman at Koppers. Met at Koppers with Amos and Gray Johnson, of McDowell Welding, and we reviewed their lay out on the ground of the pipe line traverse with locations of the pipe supports. Suggested they relocate Segments 6 and 7 so the corner between them does not land so far out into the roadway and it goes closer to the ponds just to the east of pipeline. Agreed to go back the next day and look at it again after they re-stake that portion of it.

SIGNED JCMK DATE 3-19-99

11 mh

ACTIVITY LOG

NAME JEROME PARHAM PERIOD ENDING 15 MAR 1999

JOB NO: 97-10 NAME KOPPERS

DATE	HOURS	DESCRIPTION OF ACTIVITY
3-8	3	PULL OUT KOPPERS CALCS ON BRIDGE & DISCUSS W/CAM & MIKE. ANALYZE LOWER FDN END ON SHORE & CALC BENDING STRESSES FOR 2" CAMBER

SIGNED Jerome J. Parham DATE 3-16-99

3 mh

ACTIVITY LOG

NAME MICHAEL H. KINCAID PERIOD ENDING MARCH 15, 1999

JOB NO: P97-10 NAME KOPPERS PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
3-15-99	2	REVIEWED 6526E001, 002, 003, 004, & 006 w/ CAM. PROCEEDED TO MAKE CHANGES ACCORDINGLY AND PLOT THEM OUT FOR CAM TO TAKE TO KOPPERS.

SIGNED [signature] DATE MARCH 15, 1999

2 wk

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING MARCH 31, 1999

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL (1 of 3)

DATE	HOURS	DESCRIPTION OF ACTIVITY
3-16	2	Met at the site with Amos and Gray Johnson. Looked at the re-staking of Segments 6 and 7. After they readjusted it there is a significant gap right at the corner in Segment 7 and indicated we will have to put another pipe support at that location. They way they are going to do that is by equaling up all the spacing on those support between the expansion joint and the corner where the anchor is.
3-17	½	Marked up electrical drawings for revision. Gave to Mike for revision.
3-18	1	On the way back from Hayden Island I stopped at DMI and inspected the two sections that were in the shop that were not quite complete. They have all the steel work fit up on these two sections and they were doing a final weld out. The hand rails were partially fit on one section. No gratings were fit and no hand rails fit on the second section.
	½	Reviewed final plot of electrical drawings and stamped them
	4	Marked up the pipe bridge plans per the City of Portland comments and instructed Ben to make those corrections. Reviewed the City of Portland comment letter dated March 5th and started writing the response to it. Got through the first 5 items.
3-19	2½	Checked Ben's revision of the piping cross over bridges. Checked Michael's revision of the pipe supports on the Chem Tech tank drawing. Telephone conversation with Sam Moss regarding the status of getting the plans revised and submitted to the City. He told me Monday we would be able to get the letters from Jack Tuttle of GeoEngineers. Instructed Mary to type the draft beginning of the letter in response to their comments.
	1½	Reviewed and approved McDowell Welding's pre-cast pipe support plan. Delivered pipe support plan to McDowell and to Koppers. Also delivered revised electrical plans to Koppers.
3-22	2½	Drafted the Special Inspections Program. Checked with Sam Moss about it and he said they will not do any special inspections, they will do the observations and we will have to hire somebody qualified with the City to do the special inspections. Redrafted it and had Mary retype it. Further telephone conversation with Sam Moss about the coordination of the City Building Permit. He said he had talked with Jack Tuttle and was going to receive the FAX from Jack on the letter from GeoEngineers. After the telephone conversation with Sam Moss about special inspections, called Braun Intertech to see if they would be able to do the special inspections and the dispatcher there said yes but he would have somebody in his firm telephone me and outline what they can do for us. Also tried to find Carlson Testing and I was finally able to locate them but it was past quitting time. Couple telephone conversations with Ray Maw at Morse Tank. Spent some time with him on the requirement for special inspections. He said he would hire Pacific Technical Industries to do the X Ray testing and I asked him to revise his test program and to send me a FAX copy of it which he did. Received Fax from Jack Tuttle with the response to the City of Portland's comments. Briefly read it.
3-23	½	Made several telephone calls trying to get information for the special inspections. Got a hold of psi and got a hold of Ray Maw at Morse to find out who their special inspection people were. Contacted them and got the contact person and the address.
	15	Cont'd . . .

SIGNED JCMcK DATE 4-3-99

46½ (illegible) 1/3

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING MARCH 31, 1999

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL (2 of3)

DATE	HOURS	DESCRIPTION OF ACTIVITY
3-23	2	Went over to the plant and met with Bill Meisinger and Amos Kamerer and met with McDowell Welding.
	1	Came back from lunch with Amos. Toured the outside plant. When we finished that I went over to the pier and just looked at the pier to see how far along they were and I was particularly was looking at the light standards whether they had some brackets made they could put up.
3-24	1½	Attended morning meeting at Koppers with Bill Meisinger and the people from Harder Mechanical. Discussed some of the administrative things on the contract and who is going to do what. Met the foreman Bill and discussed how the HAZOP personnel will work on this project.
	3	Went to another meeting later in the afternoon. Met with Dave Chandler, the electrical contractor, and discussed some of the issues regarding the bonding of the bridge, the pipe line, his running the cables on the dock, and also discussed getting the electrical permit on this project. He agreed to take it and fill it out. I would supply him with the plans.
3-25	6 ½	Hand delivered drawings for the tank brackets to Bill Meisinger at the Koppers office. Worked on preparing the City of Portland Special Inspections and Structural Observations listing and contractors that will do them. Sent a copy of it over to Sam Moss by FAX. Continued drafting the reply and responses to the City of Portland Plan Review Letter dated March 5th. Completed the draft and sent it to Sam Moss by FAX. All items completed except for number 16. Started making a list of enclosures for the response letter. Marked up the Site Plan and the Chem Tech drawing index for revision to update the revisions on the plan list. Pretty much got everything ready to go.
3-26	4	Hand delivered to Amos Kamerer the schedule of Special Inspections and Structural Observations. Had him sign it. Came back to the office. Had a telephone conversation with Sam Moss regarding the FAXes I sent him yesterday. He said that KPFF doesn't want to do the structural observations on the miscellaneous steel. Other than that they agreed with what I put down for special inspections. Discussed the responses to the City of Portland comments. In particular Item 16 and he gave me the information I needed to fill that in. Sam said those were the only comments he had on our responses. Helped Mary get the packs ready to take up to the City. Signed the forwarding letter. Checked the revised drawings that Michael had done. Marked up for further revision. That is the G001 plan and the McKernan site plan. Michael went back and revised and plotted them on vellum. I went back stamped the site plan.
	½	Instructed Jerome in getting a hose for our ship unloading. Talked to one of the vendors about it. Asked Jerome to revise the drawing so it shows how we are going to handle part of it with the crane and also to make a new drawing showing the stowage of the hose.

Cont'd . . .

SIGNED JCMK DATE 4-3-99

ACTIVITY LOG

NAME J. CAMERON MCKERNAN PERIOD ENDING MARCH 31, 1999

JOB NO: P97-10 NAME KOPPER'S PITCH SHIP TERMINAL (3 of 3)

DATE	HOURS	DESCRIPTION OF ACTIVITY
3-29	3	Went over to the dock in anticipation that DMI would be lifting the last bridge section onto the upstream dolphin. Waited around through a rain squall and heavy wind and Jim Glad, DMI Superintendent, decided he didn't want to lift it with such strong wind. Went and visited Gray Johnson over at McDowell welding to discuss the communication I got from him last week regarding the sequence of installing the piping and the tracing. After quite a bit of discussion and his consultation with his production people they decided they would not change the design or change the sequence, ~~that~~ They would set up temporary supports to hold the piping as they progressed. Went back to the pier conferred with Amos and Jim Glad and decided the wind was still too strong then returned to the office.
	½	Went over to look at the pier on the way home. Noted they had landed the last section, that it was partially bolted up and that it tipped a little bit at the dolphin but the levels of the walkway and the bridge intersection were almost perfect.
3-30	N/C	Went over to the plant and looked at the bridge on the way in from home. Didn't stop very long because nobody was working there.
	2 ½	Made replies to McDowell's inquiries regarding another substitution on rebar and suitability or changes of the cargo pipe support clamp and system. Also prepared a FAX and sent it about a fire main on the east side of the pitch building along side the fence to warn them of a possible interference with the cross over bridge foundation.
	4	Went through all the Koppers papers that I have scattered about the office. Collected them together and sorted them into different files and filed them chronologically so I can keep track of what is going on and I can find things when I need to.
	½	Worked with Jerome on the ship shore connection hose. Reviewed the proposals he has received. Noted that some of them were offering corrugated metal. Told Jerome that was basically unacceptable unless there is some kind of liner that will keep it from getting the corrugations packed with product.
3-31	2	Went to the pier and met with Jim Glad. Went over the things that need to be done for completion: getting the anchor bolts in and that end of the plate grouted, remodeling the little walkway section that is on the service platform at the end of the walkway, adding the five lights on the bridge or just the post and stanchions for them, extending the dry fire pipe out to the end of the bridge, getting the fire pipe tested and witnessed by the fire bureau, getting the grating clips down and adding more studs to replace the ones that were broken off. Telephone conversation with Amit ~~Kamis~~ KUMAR at the City of Portland plan review section. Telephone conversation with Amos Kamerer about the gas company and their changed stance about excavating in way of the tanks.
	½	Read FAX from Harder Electric and forwarded to KPFF and GeoEngineers by FAX.
	13	

SIGNED JCMK DATE 4-3-99

3/5

ACTIVITY LOG

NAME Jerome Parham PERIOD ENDING 31 Mar 1999

JOB NO: 97-10 NAME Koppers Pitch Ship Terminal

DATE	HOURS	DESCRIPTION OF ACTIVITY
3-26	5	Work on Ship unloading Hose - call vendors for info & Fax sketch to vendor, start arrgt dwg - 76 w/ dock crane
3-30	6½	Talk w/ Hose vendors to set up meeting Continue work on Hose dwg.
3-31	3	Work on arrgt dwg & Plot

SIGNED Jerome J. Parham DATE 3-31-99

14½ mh

ACTIVITY LOG

NAME BEN JEFFRIES PERIOD ENDING 3/31/99

JOB NO: 97-10 NAME KOPPERS

DATE	HOURS	DESCRIPTION OF ACTIVITY
3-18	3½	REVISIONS TO 9710-69, -70 FOR CITY OF PORTLAND
3-19	2	FINISHING REVISIONS & PLOTTING

8:30-3:30

6

SIGNED Benjamin Jeffries DATE 3-31-99

5½ hrs

ACTIVITY LOG

NAME MICHAEL H. KINCAID PERIOD ENDING MARCH 31, 1999

JOB NO: P97-10 NAME KOPPERS PITCH SHIP TERMINAL

DATE	HOURS	DESCRIPTION OF ACTIVITY
3-16-99	1	WORKED ON PLANS 6526E001, 2, 3, 4, & -6. PLOTTED THEM OUT FOR CAM TO HAVE.
3-17-99	1	MADE SOME SMALL CHANGES TO PLANS 6526E004 & 6526E006. MADE PLOTS ON VELLUM.
3-19-99	1½	WORKED ON PLAN No. 6526A006. ADDED WELDS AND CALLOUTS TO THE DETAILS. PLOTTED THE DRAWING ON BOND FOR CAM TO REVIEW.
3-25-99	1½	WORKED ON PLAN NO 6256G001 AND 97010-21. ADDED PLAN CALLOUTS ON 6526G001 AND REV SYMBOLS. ADDED REVS TO 97010-21. PLOTTED THE DRAWINGS FOR CAM TO REVIEW.
3-26-99	1	WORKED ON 6526G001. MADE THE CHANGES THAT I MISSED ON THE PREVIOUS MARKUP. PLOTTED BOTH 6526G001 AND 97010-21 ON VELLUM.
3-30-99	½	DISCUSSED CHANGES THAT NEEDS TO BE MADE TO PLAN 65265002 W/ CAM.

SIGNED [signature] DATE MARCH 31, 1999

6½ mh

J. CAMERON McKERNAN COMPANY

Engineering & Naval Architecture

825 NE 20th Avenue, Suite 110 • Portland, Oregon 97232 • (503) 232-7211 • FAX (503) 232-7658

File No. P97-10
April 5, 1999

Koppers Industries, Inc.
7540 NW St. Helens Road
Portland, Oregon 97210-3663

Attention: Amos Kamerer

Subject: City of Portland Plan Review
SECOND CHECK SHEET

Gentlemen:

The following is a summary of the action/status of the items as of today April 5, 1999:

1 (a) No further action required. However, we will submit a revised Special Inspection Program to incorporate their amendment.

1 (b) Sent letter by FAX to Pacific Technical Industries, Inc. requesting information required by City of Portland. Waiting for response.

2 McKernan adding two more detail sheets for pipe cross over bridges to show arrangement of rebar in detail. Will be done Friday, April 9th.

3 McKernan will review the tank miscellaneous structure shown on Morse detail plans and provide the appropriate stamp. Probably won't be done until Monday April 12th.

6 McKernan personnel will mark drawings as requested. Will be done on Tuesday April 6th.

8 Response not required at this time.

9 KPFF (Sam Moss) is revising drawing to eliminate interference between rebar and piling. Revised drawing will be sent to McKernan for printing and inserting in City of Portland plan package. Will be done on Tuesday April 9th.

Cont'd . . .

File No. P97-10
April 5, 1999

Koppers Industries, Inc. (Amos Kamerer)
City of Portland Plan Review
SECOND CHECK SHEET
McKernan Letter Page 2 of 2

10 KPFF (Sam Moss) is revising drawing to correct edge distance. . Revised drawing will be sent to McKernan for printing and inserting in City of Portland plan package. Will be done on Tuesday April 9th.

Cameron McKernan will be away from the office beginning Monday, April 5th and returning Friday, April 9th. A couple of these items (2 & 3) cannot be done until his return. McKernan office personnel will follow-up on other items during his absence.

Very truly yours,

J. CAMERON MCKERNAN COMPANY

By: Cameron McKernan

J. Cameron McKernan, President

cc: Wm. Meisinger

RECEIVED

APR - 6 1999

KOPPERS INDS, INC.
PORTLAND OR

DIVERSIFIED MARINE INCORPORATED
DMI

P.O. Box 83719 Portland, OR 97283-0723
(503) 289-2669 / FAX 289-2825

Feb 18, 1999

Amos Kamerer
Koppers Industries
7540 NW St. Helens Road
Portland, OR. 97210

RE: Pier modifications

Dear Amos,

As per our conversation sketch provided by Cameron McKernan Diversified Marine Inc. submits the following price modification for your consideration. DMI will provide necessary labor, tools, material, equipment and supplies to modify toe plate on new walkways as follows:

Repair toe kick on 100' section already fabricated

Material and supplies

- Supplies cold glav, bandsaw blades and ½" bolts. $ 121.46

Labor costs

- Cut and re-weld flat bar – ***16hr x $42.00pr/hr*** $ 672.00

Total cost for this change ----------→ $ 793.46

Modification to walkway under construction

Material and supplies

- Supplies bandsaw blades and ½" bolts. $ 86.32

Labor cost

- Attach flat bar clip + bolt – ***18hr x $42.00pr/hr*** $ 756.00

Total cost for this change ----------→ $ 842.32

Thank you for the opportunity to submit our quotation.

With regards,

Jim Glad
Superintendent

Post-it® Fax Note 7671	Date 2/19/99	# of pages ▶ 1
To B. Meisinger	From Amos	
Co./Dept.	~~Co.~~	
Phone #	~~Phone #~~ F.Y.I.	
Fax #	~~Fax #~~	

Author: AMOS KAMERER at PITT
Date: 2/2/99 1:16 PM
Priority: Normal
TO: BILL MEISINGER at TECHCTR
TO: Jack Stephenson at TECHCTR
CC: Kevin Fitzgerald at PITT
Subject: kiquid project

---------- Message Contents ----------

Just to let you know; Diversified has been in this AM to dig the hole for the shore side foundation of the new bridge. N W Natural sent their environmental consultant to inspect the soils with us, nothing was noticed that was a problem, so Diversified will just re-spread the excavated material back into the adjacent area, and then will cover it with gravel that is already on site..

According to N W Natural, this portion of the property is the worst and they felt that if we had any problems, this would be where we would have them. So, good news.

Amos

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

KOPPERS INDUSTRIES

Date: December 17, 1998 Purchase Order # 3000-8-13022

Page: 1 Contact: JACK L. STEPHENSON 412/826-3907

To: Diversified Marine, Inc.
1801 N. Marine Drive
P.O. Box 83723
Portland OR 97283

Ship To: Koppers Industries, Inc.
7540 N.W. Street, St. Helens Rd.
Portland, OR 97210-3663

Koppers requests that Seller furnish the material and/or services listed below. Acceptance of this purchase order is expressly limited to the terms and conditions on the face and on the reverse side hereof.

The purchase order number must be shown on all correspondence, shipping papers, invoices, etc.

QUANTITY	DESCRIPTION	PRICE
	REQUEST: W. MEISINGER, 12/03/98 ACCOUNT: **PIER MODIFICATIONS** **Specification for Modification of Pier for Liquid Pitch Unloading Rev. A., Nov. 1998** **KI-63, REV. 6** **SAFETY REGULATIONS FOR CONTRACTORS' EMPLOYEES WORKING IN KOPPERS INDUSTRIES, INC. PLANTS** **EXHIBIT A - OSHA COMPLIANCE** Contractor is to supply all labor, tools, materials, equipment, insurance and supervision necessary to provide modifications to the existing pier, in accordance with the above referenced specification, at Koppers Industries, Inc. Portland, OR facility. All performance of work must be authorized by Koppers Industries' plant representative before the outlined work or any new non-outlined work is started. Should contractor encounter what he feels is an extra, no work is to be performed until the undersigned is contacted, confirms the validity of the extra and authorizes the extra work. Work will be done as dictated by construction superintendent, either on lump sum add-on, or time and material cost plus at current rates with time sheets approved and signed daily. In the event time and material work is utilized, one copy of the signed time sheet must be left with Koppers Industries' Superintendent. All T&M work must be invoiced separately from lump sum work. Insurance certificate(s) showing limits of liability as per form KI-63 are to be presented to the local plant manager and the undersigned prior to commencing field work. **CONTRACTOR AGREES TO COMPLY WITH THE FOLLOWING:** The above work will be done when, where and as instructed by KOPPERS INDUSTRIES' Representative. This work has been accepted by Seller subject to all the terms and conditions as set forth and contained in Form KI-63, Revision 6. In the event there are conflicting statements between the several documents incorporated in this purchase order, the following order of priority shall apply: 1. Typed portion of the purchase order. 2. Drawings, notes thereon and technical specifications. 3. Form KI-63, Revision 6. 4. Terms and conditions printed on the back of Sheet 1 of the purchase order form.	$259,725.00 Lump Sum

COPY

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

Purchase Order

KOPPERS INDUSTRIES

Date: December 17, 1998 Purchase Order # 3000-8-13022

Page: 2 Contact: JACK L. STEPHENSON 412/826-3907

To: Diversified Marine, Inc.
1801 N. Marine Drive
P.O. Box 83723
Portland OR 97283

Ship To: Koppers Industries, Inc.
7540 N.W. Street, St. Helens Rd.
Portland, OR 97210-3663

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QUANTITY	DESCRIPTION	PRICE
	Contractor is an independent contractor and not an agent of KOPPERS INDUSTRIES, INC. Labor is to be used to the extent lawful, which will be harmonious with that labor now employed by KOPPERS INDUSTRIES at its plant. Contractor and/or Seller agrees to be governed and abide by the rules and regulations as set forth in pamphlet entitled "Safety Regulations for Contractor Working in KOPPERS INDUSTRIES' Plants." A copy of this pamphlet is to be obtained from the local plant manager. **PRIOR TO PERFORMING ON-SITE WORK ON OR ASSOCIATED WITH THIS ORDER, CONTRACTOR IS REQUIRED TO SUBMIT ONE COPY OF AN INSURANCE CERTIFICATE (HIS AND ALL OF HIS SUBCONTRACTORS) CLEARLY SHOWING KOPPERS INDUSTRIES AS ADDITIONAL INSURED TO KOPPERS INDUSTRIES PLANT, ATTENTION PLANT MANAGER. FAILURE TO COMPLY WITH THIS REQUIREMENT WILL CAUSE A DELAY IN START OF WORK AND/OR THIS ORDER TO BE TERMINATED.** Send one copy to: Koppers Industries, Inc. 1005 William Pitt Way Pittsburgh, PA 15238-1362 ATTENTION: JACK L. STEPHENSON Seller shall not assign, transfer, convey, subcontract or authorize disposition of this agreement or its right, title, or interest in or to the same or any part thereof without the previous consent in writing of KOPPERS INDUSTRIES, and it shall not assign by power of attorney or otherwise any of the monies to become due and payable under this agreement without like consent. In the event of an approved subcontractor, Seller shall be fully responsible for the performance of his contractors in all matters including, but not limited to, accounting, cost distribution, purchasing, labor and material control, and proper and economical performance of the work. **WAIVER OF LIEN** SELLER SHALL SUBMIT WITH FINAL BILLING ONE EXECUTED NOTARIZED COPY OF THE ATTACHED AFFIDAVIT AND WAIVER OF LIEN. ALL FEDERAL EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION REQUIREMENTS IN REGARD TO RACE, SEX, RELIGION, NATIONAL ORIGIN, HANDICAP AND VIETNAM VETERAN OR DISABLED VETERAN STATUS, AS FOUND IN 41 CFR 60-1.4, 41 CFR 60-250.3 AND 41 CFR 741.3, ARE HEREIN INCORPORATED BY REFERENCE.	

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

Purchase Order

KOPPERS INDUSTRIES

Date: December 17, 1998 Purchase Order # 3000-8-13022

Page: 3 Contact: JACK L. STEPHENSON 412/826-3907

To: Diversified Marine, Inc.
1801 N. Marine Drive
P.O. Box 83723
Portland OR 97283

Ship To: Koppers Industries, Inc.
7540 N.W. Street, St. Helens Rd.
Portland, OR 97210-3663

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QUANTITY	DESCRIPTION	PRICE
	KOPPERS INDUSTRIES IS ENTITLED TO ALL REMEDIES PURSUANT TO THE UNIFORM COMMERCIAL CODE. **FORCE MAJEURE:** Neither party hereto shall be liable for its failure to perform hereunder due to contingencies beyond its reasonable control including, but not limited to strikes, riots, wars, fire, acts of God, compliance with any law, regulation or order, whether valid or invalid, of the United States of America or any other governmental body or instrumentality thereof, whether now existing or hereafter created. All costs herein described shall be subject to Koppers Industries' audit and all records pertaining thereto shall be made available to Koppers Industries upon request. The Seller agrees to observe and abide by all applicable laws, regulations, ordinances and other rules of the state, territory or political subdivision thereof wherein the work is done or any other duly constituted public authority. **CONTACTS:** Portland, Oregon (Plant) – Amos Kamerer Pittsburgh (Technical) – Wm. Meisinger 412/826-3962 Pittsburgh (Commercial) - J. L. Stephenson 412/826-3907 Send original and two copies of all invoices to: KOPPERS INDUSTRIES, INC. 7540 NW ST. HELENS ROAD PORTLAND, OR 97210-3663 Send one copy of all invoices to: KOPPERS INDUSTRIES, INC. PURCHASING DEPARTMENT 1005 WILLIAM PITT WAY PITTSBURGH, PA 15238-1362 ATTENTION: JACK L. STEPHENSON **NOTE:** Failure to follow above invoice instructions will result in delay of payment. Confirming verbal order to Kurt Redd – DO NOT DUPLICATE **PRICE:** Based on Seller's quotation dated 11/20/98 **FOB:** Installed **SHIP:** Complete by 1/31/98 **TERMS:** Net 45 days – 15% down-payment to be invoiced immediately	

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

Purchase Order

KOPPERS INDUSTRIES

Date: December 17, 1998
Page: 4

Purchase Order # 3000-8-13022

Contact: JACK L. STEPHENSON 412/826-3907

To: Diversified Marine, Inc.
1801 N. Marine Drive
P.O. Box 83723
Portland OR 97283

Ship To: Koppers Industries, Inc.
7540 N.W. Street, St. Helens Rd.
Portland, OR 97210-3663

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The purchase order number must be shown on all correspondence, shipping papers, invoices, etc.

QUANTITY	DESCRIPTION	PRICE
	PLEASE ACKNOWLEDGE YOUR ACCEPTANCE OF THIS ORDER BY SIGNING AND RETURNING THE ATTACHED COPY.	

ACCEPTED BY:

KOPPERS INDUSTRIES, INC.
AUTHORIZED SIGNATURE
JACK L. STEPHENSON/sad
CC: Wm. Meisinger - HTC

SELLER'S AUTHORIZED SIGNATURE

TITLE _____

DATE _____

Fax to Carla Anderson, 503/232-7658

TOTAL: $259,725.00

J. CAMERON McKERNAN COMPANY

Engineering & Naval Architecture

825 NE 20th Avenue, Suite 110 • Portland, Oregon 97232 • (503) 232-7211 • FAX (503) 232-7658

File No. P97-10
November 11, 1998

Thompson Metal Fab
3000 SE Hidden Way
Vancouver, Washington 98687

Attention: Carl Stuart

Subject: Modification of Pier for Liquid Pitch Unloading

COPY

Enclosures:

* Specification dated November 1998
* Plans as listed in Specification
* Koppers Industries, Inc. "Terms & Conditions . . ." K1-64, Rev. 6 (3 sheets)
* Safety Regulations for Contractors Employee Working in Koppers Industries, Inc. Plants (4 pages, safereq2)
* Safety Regulations for Visitors Entering Koppers Industries, Inc. Plants
* Safety Regulations for Truck Drivers Entering Koppers Industries, Inc. Plants

Gentlemen:

We send the Enclosures for your information and use in working with General Construction to prepare a quotation to do the work.

If you have any questions or are interested in visiting and inspecting the site, you may contact Cameron McKernan at (503) 232-7211.

RECEIVED
1998
KOPPERS INDS. INC.
PORTLAND OR

Very truly yours,

J. CAMERON MCKERNAN COMPANY
AGENT FOR KOPPERS INDUSTRIES, INC.

By: Cameron McKernan

J. Cameron McKernan, President

cc: Koppers Industries, Inc. (Amos Kamerer)
General Construction (Ben G. Hugel)

MATERIAL SAFETY DATA SHEET

KOPPERS

MEDICAL EMERGENCIES: 1 800 333-3631
OUTSIDE U.S.A.: 412 227-2001
GENERAL INFORMATION: 412 826-3967

6/95

KOPPERS INDUSTRIES, INC.
1005 WILLIAM PITT WAY
PITTSBURGH, PA. 15238

CHEMTREC ASSISTANCE 1 800 424-9300
CANUTEC: 1 613 996-6666

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: Carbon Pitch Liquid

COMMODITY NUMBER: 42600001

SYNONYMS: None

PRODUCT USE: Distilled to produce naphthalene, creosote & pitch

CHEMICAL FAMILY: Polynuclear aromatic hydrocarbons

FORMULA: Complex mixture of hydrocarbons

CAS NUMBER: 65996-89-6

NFPA 704M/HMIS RATING: 2/2 HEALTH 2/2 FLAMMABILITY 1/1 REACTIVITY
0 = Least 1 = Slight 2 = Moderate 3 = High 4 = Extreme

CANADIAN PRODUCT CLASSIFICATION: Class D, Division 2, Subdivision A, Very Toxic Material - Class B, Division 3, Combustible Liquid

SECTION II - HEALTH/SAFETY ALERT

CHRONIC OVEREXPOSURE (as defined by OSHA recommended standards)
MAY CAUSE CANCER
WARNING
HARMFUL TO THE SKIN, OR IF INHALED OR SWALLOWED
CAUSES EYE AND SKIN IRRITATION
AVOID PROLONGED AND/OR REPEATED CONTACT INCLUDING VAPORS
OBSERVE GOOD HYGIENE AND SAFETY PRACTICES WHEN HANDLING THIS PRODUCT
DO NOT USE THIS PRODUCT UNTIL MSDS HAS BEEN READ AND UNDERSTOOD

listed in Subchapter D Part 153 Table 1 Pollution Category D Hazard 5

SECTION III - HEALTH HAZARD INFORMATION

EYE: Overexposure to vapor can result in irritation and/or corneal changes. Direct eye contact may cause irritation. Contact with heated material may cause thermal burns.

SKIN: Contact with skin can result in irritation which when accentuated by sunlight may result in a phototoxic skin reaction. Repeated and/or prolonged contact may cause more serious skin disorders including cancer. Contact with heated material may cause thermal burns. See Section XIII for additional information.

INHALATION: Overexposure to vapor may result in respiratory tract irritation.

Repeated and/or prolonged contact to high concentrations of vapor may result in respiratory difficulties, central nervous system (CNS) effects and possible cardiovascular collapse.

INGESTION: Ingestion of material are unlikely, but may cause gastrointestinal disturbances including irritation, nausea, vomiting, abdominal pain.

OTHER: See Section XIII (Comments) for additional information on health effects.

SECTION IV - EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT: Immediately flush with large amounts of water for 15 minutes. Immediately seek medical aid.

SKIN CONTACT: Wash thoroughly with waterless hand cleaner. For contact with molten product, do not remove contaminated clothing. Flush skin immediately with large amounts of cold water. If possible, submerge area in cold water. Pack with ice. Seek medical aid.

INHALATION: Remove from exposure. If breathing has stopped or is difficult, administer artificial respiration or oxygen as indicated. Seek medical aid.

INGESTION: If victim is conscious and alert, give 1-2 glasses of water or milk. Induce vomiting using ipecac syrup as directed on the label. After vomiting, the victim may be given a slurry of 100 g of activated charcoal in 8 oz. of water. Seek medical aid.

NOTE TO PHYSICIAN: DO NOT INDUCE VOMITING OR ATTEMPT TO GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Individuals with erythrocyte glucose-6-phosphate dehydrogenase deficiency may be particularly sensitive to possible hemolytic effects.

SECTION V - FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT & METHOD: >65C (>150F) PMCC AUTOIGNITION TEMP: ND

FLAMMABLE LIMITS (% BY VOLUME/AIR): LOWER: ND UPPER: ND

TDG FLAMMABILITY CLASSIFICATION: None

EXTINGUISHING MEDIA: Use dry chemical, carbon dioxide, foam or water spray. Water or foam may cause frothing, if molten.

FIRE-FIGHTING PROCEDURES: Wear complete fire service protective equipment, including full-face MSHA/NIOSH approved self-contained breathing apparatus. Use water to cool fire-exposed container/structure/protect personnel. Toxic vapors may be given off in a fire.

FIRE AND EXPLOSION HAZARDS: When heated (fire conditions), vapors/decomposition products may be released forming flammable/explosive mixtures in air. Closed containers may explode when exposed to extreme heat(fire).

SENSITIVITY TO MECHANICAL IMPACT: ND

SENSITIVITY TO STATIC DISCHARGE: ND

SECTION VI - SPILL, LEAK AND DISPOSAL INFORMATION

SPILL OR LEAK PROCEDURES (PRODUCT): Stop leak if no risk involved. Stay upwind. Solidified spills: Shovel into dry containers and cover. Flush area with water. Small wet spills: Take up with sand or other noncombustible absorbent material. Flush area with water. Dike large spills for later disposal. Contain runoff from fire control and dilution water.

DOT REPORTABLE QUANTITIES

10 lbs. Benzene

WASTE DISPOSAL: Dispose of in accordance with local, state, and federal regulations. If disposing in a state other than California, dispose of as an industrial waste in accordance with local, state, and federal regulations. This product contains coal tar constituents, which have been determined by IARC to be a carcinogen. According to California hazardous waste regulations, substances posing a hazard to human health because of carcinogenicity are hazardous wastes. Dispose of as a hazardous waste in the state of California.

SECTION VII - RECOMMENDED EXPOSURE LIMIT/HAZARDOUS INGREDIENTS

EXPOSURE LIMIT (PRODUCT):

[illegible] coal tar pitch volatiles, OSHA-PEL is 0.2 mg/m3 averaged over an 8 hour wo. shift, benzene soluble fraction of total particulate including dust, fumes and mists.

**skin

***OSHA Action Level - 0.5 ppm 8-hr. TWA

#Suspected Human Carcinogen

HAZARDOUS INGREDIENTS	CAS NUMBER	%BY WT.	EXPOSURE LIMIT (PPM;MG/M3)		
			OSHA-STEL	15	75
			NIOSH-TWA	10	50
			NIOSH-STEL	15	75
Cresol	1319-77-3	<5	ACGIH-TWA	5	22**
			OSHA-TWA	5	22**
			NIOSH-TWA	2.3	10
Indene	95-13-6	<5	ACGIH-TWA	10	48
			OSHA-TWA	10	45
Benz(a)anthracene	56-55-3	<1	NONE		
Benzo(b)fluoranthene	205-99-2	<1	NONE		
Benzo(k)fluoranthene	207-08-9	<1	NONE		
Benzo(j)fluoranthene	205-82-3	<0.5	NONE		
Benzo(a)pyrene	50-32-8	<1	NONE		
Dibenzo(a,h)anthracene	53-70-3	<0.5	NONE		
Indeno(1,2,3-cd)pyrene	193-39-5	<0.5	NONE		
Phenanthrene	85-01-8	<2	NONE		

---------- SARA TITLE III SECTION 313 CHEMICALS ----------
(SEE SECTION VII FOR CAS NUMBERS AND PERCENTAGES)

Naphthalene
Cresol
Benzene
Benz(a)anthracene
Benzo(b)fluoranthene/Benzo(k)fluoranthene
Phyenanthrene
Benzo(j)fluoranthene
Benzo(a)pyrene
Dibenzo(a,h)anthracene
Indeno(1,2,3-cd)pyrene

SECTION VIII - PERSONAL PROTECTION INFORMATION

EYE PROTECTION: Industrial safety glasses, minimum. As necessary to comply with 29 CFR 1910.133 and work area conditions: use side shields, goggles or face shield.

SKIN PROTECTION: As required, industrial resistant flexible-type gloves. Depending on working conditions, i.e., contact potential, wear impervious protective garments such as head/neck cover, aprons, jackets, pants, coveralls, boots, etc. See "Guidelines" noted previously. Wear industrial-type work clothing and safety footwear. See Sect. XIII-Comments for additional information on skin protection recommendations.

RESPIRATORY PROTECTION: Not required under normal use conditions. If ventilation does not maintain inhalation exposures below TLV(PEL), use MSHA/NIOSH approved units as per current 29 CFR1910.134 and manufacturers' "Instructions" and "Warnings". Combination filter/organic vapor cartridges or canisters may be used.

VENTILATION: Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation exposures below current exposure limits and areas below flammable vapor concentrations.

SECTION IX - PERSONAL HANDLING INSTRUCTIONS

HANDLING: Avoid prolonged or repeated breathing of vapors, mists or fumes. Avoid prolonged or repeated contact with skin or eyes. Observe good personal hygiene practices and recommended procedures. Application of certain protective creams (sun screens for coal tar products) before working/several times during work may be beneficial.

STORAGE: Store in areas/buildings designed to comply with OSHA 1910.106. Keep in a closed, labeled container within a cool (well shaded), dry ventilated area. Protect from physical damage. Keep containers closed when material is not in use. Maintain good housekeeping.

OTHER: Not for use or storage in or around the home. DO NOT TAKE INTERNALLY. Do not use until manufacturer's precautions have been read/understood. Wash exposed

areas promptly and thoroughly after skin contact and before eating, drinking, using tobacco products or rest rooms.

SECTION X - REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: None known

INCOMPATIBILITY: None known

HAZARDOUS REACTIONS/DECOMPOSITION/COMBUSTION PRODUCTS: Toxic fumes may be emitted when burned.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION: None

SECTION XI - PHYSICAL DATA

BOILING POINT: >100C (>212F) IBP

SPECIFIC GRAVITY: >1.050

MELTING POINT: NA

% VOLATILE BY VOL: Negligible.

VAPOR PRESSURE: <5mm Hg

EVAPORATION RATE(ETHER=1): <1 Butylacetate=1

VAPOR DENSITY(AIR=1):>1

VISCOSITY: ND

SOLUBILITY: Negligible (WATER)

pH: ND

VOC: NA

COEFFICIENT OF WATER/OIL DISTRIBUTION: negligible water*

APPEARANCE/ODOR: Black viscous liquid with aromatic odor.

*solubility

SECTION XII - TRANSPORT INFORMATION

--------- PRODUCT PACKAGED IN TANK CAR ---------

RQ ELEVATED TEMPERATURE MATERIAL, LIQUID, N.O.S.
(CONTAINS BENZO(A)PYRENE, DIBENZO(A,H)ANTHRACENE)
CLASS 9 NA9259 PG III
ELECTRODE BINDER
MARKED: HOT 9259

--------- PRODUCT PACKAGED IN TANK TRUCK ---------

RQ ELEVATED TEMPERATURE MATERIAL, LIQUID, N.O.S.
(CONTAINS BENZO(A)PYRENE, DIBENZO(A,H)ANTHRACENE)
CLASS 9 NA9259 PG III
PITCH, COAL
MARKED: HOT 9259

SECTION XIII - COMMENTS

This product contains coal tar pitch. The IARC monographs (Vol. 35) state that there is sufficient evidence that coal tar pitches are carcinogenic in humans and that there is sufficient evidence that occupational exposure to coal tars as it occurs during the destructive distillation of coal is causally associated with the occurrence of skin cancers in humans. It is also listed in NTP Report on Carcinogens & in OSHA Subpart Z.

Persons with a history of liver/kidney/skin/CNS/respiratory disease/blood forming organs, cataracts or exposure to materials harmful to these systems are at a greater than normal risk of developing adverse effects when working with this product.

This product contains benzene. The IARC monographs (Vol. 29) states that there is sufficient evidence for the carcinogenicity in humans and limited evidence for the carcinogenicity in animals. Benzene is also listed in the NTP Annual Report on Carcinogens and in the OSHA Subpart Z Table (Specifically Regulated Substances).

May be absorbed through the skin including mucous membranes and eye either by airborne mist, or more particularly, by direct contact. Skin contact should be avoided. To the extent necessary, the use coveralls, goggles or other appropriate personal protective equipment, engineering controls or work practices should be utilized to prevent or reduce skin absorption.

No known ingredients which occur at greater than 0.1%, other than those listed above, are listed as a carcinogen in the IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, the NTP Annual Report on Carcinogens or OSHA 29 CFR 1910.1001-1047 subpart Z Toxic and Hazardous Substances (Specifically Regulated Substances).

SKIN PROTECTION (protective material): Permeation/degradation values of chemical mixtures cannot be predicted from pure components or chemical classes. Thus, these materials are normally best estimates based on available pure component data. A significant difference in chemical breakthrough time has been reported for generically similar gloves from different manufacturers (AIHA J., 48, 941-947 1987).

Do not use until manufacturer's precautions have been read/understood. Wash exposed areas promptly and thoroughly after skin contact from working with this product and before eating, drinking, using tobacco products or rest rooms.

Do not wear contact lens without proper eye protection when using this product.

Prepared By: Occupational Health and Product Safety Department

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REVISION DATE: 06/95 CODE NUMBER: IND00196JU9507
SPECIFICATION SHEET NUMBER: none REPLACES SHEET: IND00196DE9406
COMMODITY NUMBER: 42600001

SUPPLIER INFORMATION: Same as manufacturer.

NOTICE: While the information and recommendations set forth herein are believed to be accurate as of the date hereof, Koppers Industries makes no warranty with respect thereto and disclaims all liability from reliance thereon.

CALORIA HT 43
EXXON COMPANY, U.S.A

DATE ISSUED: 02/22/95
SUPERSEDES DATE: 09/15/93

MATERIAL SAFETY DATA SHEET

EXXON COMPANY, U.S.A. P.O. BOX 2180 HOUSTON, TX 77252-2180

A. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
CALORIA HT 43

PRODUCT CODE
333296

PRODUCT CATEGORY
Petroleum Process Oil

PRODUCT APPEARANCE AND ODOR
Clear liquid, light yellow color
Faint petroleum hydrocarbon odor

MEDICAL EMERGENCY TELEPHONE NUMBER
(713) 656-3424

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION
Distillates (petroleum), hydrotreated heavy paraffinic	64742-54-7	Greater than 99%
or Distillates (petroleum), solvent-dewaxed heavy paraffinic	or 64742-65-0	
Proprietary additives	Mixture	Less than 1%

This product, as manufactured by Exxon, does not contain polychlorinated biphenyls (PCB's).

All components of this product are listed on the U.S. TSCA inventory.

See Section E for Health and Hazard Information.

See Section H for additional Environmental Information.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

Health	Flammability	Reactivity	BASIS
1	1	0	Recommended by Exxon

EXPOSURE LIMIT FOR TOTAL PRODUCT
5 mg/m3 for oil mist (as oil) for an 8-hour workday

BASIS
OSHA Regulation 29 CFR 1910.1000 and recommended by the American Conference of Governmental Industrial Hygienists

(ACGIH). ACGIH states that the air is to be sampled by a method that does not collect vapor; in addition, it lists a 10 mg/m3 STEL.

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
If splashed into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN
In case of skin contact, remove any contaminated clothing and wash skin with soap and water. Launder or dry-clean clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

INHALATION
Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician. If breathing is irregular or has stopped, start resuscitation; administer oxygen, if available. If overexposed to oil mist, remove from further exposure until excessive oil mist condition subsides.

INGESTION
If ingested, DO NOT induce vomiting; call a physician immediately.

D. FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM)
199~C (390~F)
ASTM D 92, Cleveland Open Cup

AUTOIGNITION TEMPERATURE
Greater than 315~C (600~F)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION

Health	Flammability	Reactivity	BASIS
1	1	0	Recommended by Exxon

HANDLING PRECAUTIONS
Use product with caution around heat, sparks, pilot lights, static electricity, and open flame.

FLAMMABLE OR EXPLOSIVE LIMITS (APPROXIMATE PERCENT BY VOLUME IN AIR)
Estimated values: Lower Flammable Limit 0.9% Upper Flammable Limit 7%

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES
Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires

involving this type of p. duct, depending on size of potential size of fire and circumstances related to the situation. Plan fire protection and respons strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protectic Guide on Hazardous Materials", Tenth Edition (1991):

Use water spray, dry chemical, foam or carbon dioxide to extinguish the fire Use water to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection fo: persons attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing of gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed o confined spaces or as otherwise needed.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS
Fumes, smoke, carbon monoxide, sulfur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING
"Empty" containers retain residue (liquid and/or vapor) and can be dangerous DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to cle since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repair, welding, or other contemplated operations.

B. HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS
Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes shoul: be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)
Prolonged or repeated skin contact may cause skin irritation.

NATURE OF HAZARD AND TOXICITY INFORMATION
Repeated and prolonged overexposure to oil mists may result in droplet deposition, oil granuloma formation, inflammation and increased incidence o infection.

In accordance with the current OSHA Hazard Communication Standard criteria, this product does not require a cancer hazard warning. This is because the product is formulated from base stocks which are severely hydrotreated, severely solvent extracted, and/or processed by mild hydrotreatment and extraction. Alternatively, it may consist of components not otherwise affected by IARC criteria, such as atmospheric distillates or synthetically derived materials, and as such is not characterized by current IARC classification criteria.

Prolonged or repeated skin contact with this product tends to remove skin oils, possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Product contacting the eyes may cause eye irritation.

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE
None recognized

F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE
IBP Approximately 293~C (560~F)
by ASTM D 2887

SPECIFIC GRAVITY (15.6~C/15.6~C)
0.88

MOLECULAR WEIGHT
Approximately 372

pH
Essentially neutral

POUR, CONGEALING OR MELTING POINT
-6~C (20~F)
Pour Point by ASTM D 97

VISCOSITY
160 SSU @ 100~F

VAPOR PRESSURE
Less than 0.01 mm Hg @ 20~C

VAPOR DENSITY (AIR = 1)
Greater than 5

PERCENT VOLATILE BY VOLUME
Negligible from open container in 4 hours @ 38~C (100~F)

EVAPORATION RATE @ 1 ATM. AND 25~C (77~F) (n-BUTYL ACETATE = 1)
Less than 0.01

SOLUBILITY IN WATER @ 1 ATM. AND 25~C (77~F)
Negligible; less than 0.1%

G. REACTIVITY

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc., as this presents a serious explosion hazard.

H. ENVIRONMENTAL INFORMATION

CLEAN WATER ACT / OIL POLLUTION ACT
This product may be classified as an oil under Section 311 of the Clean Water Act, and under the Oil Pollution Act. Discharges or spills into or leading t surface waters that cause a sheen must be reported to the National Response Center (1-800-424-8802).

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Recover free product. Add sand, earth, or other suitable absorbent to spill area. Minimize skin contact. Keep product out of sewers and watercourses b diking or impounding. Advise authorities if product has entered or may ente sewers, watercourses, or extensive land areas.

Assure conformity with applicable governmental regulations.

THE FOLLOWING INFORMATION MAY BE USEFUL IN COMPLYING WITH VARIOUS STATE AND FEDERAL LAWS AND REGULATIONS UNDER VARIOUS ENVIRONMENTAL STATUTES:

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355
(SARA Sections 301-304)
No TPQ for product or any constituent greater than 1% or 0.1% (carcinogen).

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372 (SARA Section 31
No toxic chemical is present greater than 1% or 0.1% (carcinogen).

HAZARDOUS CHEMICAL REPORTING, EPA REGULATION 40 CFR 370 (SARA Sections 311-3

EPA HAZARD CLASSIFICATION CODE:	Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard	Not Applicab XXX

I. PROTECTION AND PRECAUTIONS

VENTILATION
Use local exhaust to capture vapor, mists or fumes, if necessary. Provide ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. No smoking, or use of flame or other ignition sources.

RESPIRATORY PROTECTION
Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES
Use chemical-resistant gloves, if needed, to avoid prolonged or repeated sk contact.

EYE PROTECTION
Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT
Use chemical-resistant apron or other impervious clothing, if needed, to a contaminating regular clothing, which could result in prolonged or repeate skin contact.

WORK PRACTICES / ENGINEERING CONTROLS

Keep containers closed when not in use. Do not store near heat, sparks, flame or strong oxidants.

In order to prevent fire or explosion hazards, use appropriate equipment.

Information on electrical equipment appropriate for use with this product may be found in the latest edition of the National Electrical Code (NFPA-70). This document is available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

PERSONAL HYGIENE

Minimize breathing vapor, mist or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before re-use. Remove contaminated shoes and thoroughly clean before re-use; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION

TRANSPORTATION INCIDENT INFORMATION

For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents.

U.S. DOT HAZARDOUS MATERIALS SHIPPING DESCRIPTION

Not regulated

OSHA REQUIRED LABEL INFORMATION

In compliance with hazard and right-to-know requirements, where applicable OSHA Hazard Warnings may be found on the label, bill of lading or invoice accompanying this shipment.

Note: Product label may contain non-OSHA related information also.

The information and recommendations contained herein are, to the best of Exxon's knowledge and belief, accurate and reliable as of the date issued. Exxon does not warrant or guarantee their accuracy or reliability, and Exxon shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer repackages this product, legal counsel should be consulted to insure proper health, safe and other necessary information is included on the container.

The Environmental Information included under Section H hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by Exxon Company, U.S.A. in order to provide additional health and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these

rating systems, together with Exxon's interpretation of the available data.

FOR LUBRICANTS TECHNICAL ASSISTANCE CALL: 1-800-443-9966

FOR FUELS TECHNICAL ASSISTANCE CALL: 713-656-4955

FOR AN MSDS OR ASSISTANCE WITH AN MSDS, DIRECT INQUIRIES TO THE ADDRESS BELOW OR CALL:

MARKETING TECHNICAL SERVICES
EXXON COMPANY, U.S.A.
ROOM 2344
P. O. BOX 2180
HOUSTON, TX 77252-2180
(713) 656-5949

IF YOU HAVE AN IMMEDIATE NEED FOR AN MSDS, DIAL 1-800-298-4007 FOR A FAXED COPY.

McKernan
File No. P97-10
October 1998

SPECIFICATION
MODIFICATION OF PIER FOR LIQUID PITCH UNLOADING

PREPARED FOR:

Koppers Industries, Inc.
7540 NW St. Helens Road
Portland, Oregon 97210

Phone: (503) 286-3681

PREPARED BY:

J. Cameron McKernan Company
Engineering + Naval Architecture
825 NE 20th Avenue, Suite 110
Portland, Oregon 97232

Phone: (503) 232-7211

Specification
Modification of Pier for Liquid Pitch Unloading

McKernan
File No. P97-10
October 1998

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Specification
Modification of Pier for Liquid Pitch Unloading

McKernan
File No. P97- 10
October 1998

1.0 GENERAL

This specification describes the requirements for modification of an existing pier, known as the Pacific Northern Oil Pier. The pier is located in the City of Portland just upstream of the St. Johns Bridge on the Left Bank of the Willamette River at River Mile No. 6.3. The pier modification is a part of the project at the Koppers Industries Distribution Terminal at 7540 NW St. Helens Road, Portland, Oregon 97210 to convert the plant and terminal from "dry bulk" coal tar (pencil) pitch to "liquid bulk" coal tar pitch. The main aspects of the project are

* Installation of a 2,000,000 gallon capacity storage tank.

* Modification of the pier.

* Installation of a pipeline from the pier to the storage tanks.

Coal tar pitch must be heated to about 400 degrees F to be handled as a liquid. At normal ambient temperatures (70 F) coal tar pitch is a solid.

1.1 The pier modifications require the following work:

1.1.1 Fabrication and installation of a new steel access bridge 208 feet long by 8 feet wide.

1.1.2 Installation of 2 new steel 2 pile bents for support of the new access bridge.

1.1.3 Installation of a reinforced concrete footing for support of the shore end of the new access bridge.

1.1.4 Removal of an existing 120 feet long by 4 feet wide steel access walkway from the existing pier center service platform to the upstream breasting dolphin.

1.1.5 Fabrication and installation of a new steel access walkway to replace the removed access walkway. The new access walkway will be about 120 feet long by 8 feet wide.

1.1.6 Installation of one new wood timber piling at the existing mid-span support piling bent. The existing wood cross bracing shall be removed from the existing wood pilings. New wood cross bracing shall be installed.

1.1.7 Installation of a 4" dry pipe for emergency fire service.

1.0 GENERAL (continued)

The arrangements are shown in the plans listed on the attached Plan List. The Contractor shall furnish all labor and materials required to complete the work as shown on the plans.

1.2.1 All materials and workmanship shall conform to the "State of Oregon's Structural Specialty Code," 1998.

1.2.2 The Contractor shall be responsible for all construction methods, techniques, sequencing, and safety required for the construction.

1.2.3 The Contractor shall furnish all labor and material required.

1.2.4 On completion of the work, the Contractor shall clean up the site and remove all equipment and debris not part of the completed modifications. The site shall be cleaned to the satisfaction of the Owner's Representative.

2.0 PERMITS

2.1 Corps of Engineers

Koppers Industries has obtained a permit from the U. S. Army Corps of Engineers for modifying the pier. Permit 97903 was issued on September 18, 1997.

2.2 City of Portland – Land Use Review

Koppers Industries has received the City of Portland Land Use Review (Willamette Greenway) Decision. The City of Portland approved the development on August 14, 1997, City of Portland File No. LUR-00666 GW (Koppers).

2.3 State of Oregon Division of State Lands

The State of Oregon has assigned State Project No. ML 14315 to the modification of the pier. Because no removal of material and/or fill on the bank is planned a State Permit is not required.

2.4 City of Portland Building Permit

Koppers Industries has applied to the City of Portland for a Building Permit. Koppers Industries will obtain the building permit prior to construction.

3.0 ENVIRONMENTAL CONSIDERATIONS

The river and adjacent ground are environmentally sensitive areas. The work is to be conducted in a manner that minimizes disturbance of the ground or surrounding the water area. In particular the Contractor shall observe the following practices:

3.1 Mooring or moving derricks, pile drivers, and other floating equipment with spuds or anchors set in the bottom mud or sediments is prohibited. Spuds or anchors are not be set in the bottom ground.

3.2 Vessels shall be moored to the existing pier structures and/or to anchors set on the bank well above the water bottom mud and sediments.

3.3 At all times when floating equipment containing and/or using petroleum fuel is engaged in work at the pier, the Contractor shall deploy a suitable oil containing floating barrier system or boom around the equipment and work area. The Contractor shall report and clean up any spill or appearance of contaminates as required by law.

4.0 COORDINATION WITH PACIFIC NORTHERN OIL

Pacific Northern Oil operates a petroleum product distribution business across the existing pier. It is the intention of Koppers Industries to cause the least interference possible with the ongoing business across the pier. Tugs, barges, and occasional ships call at the pier to receive or discharge petroleum. These operations are planned several days in advance. The Contractor doing the pier modifications will coordinate his operation with Pacific Northern Oil so the least interference is caused. This may require the Contractor to occasionally "pull back" or even shut down for a few hours. The pier operation schedule will be furnished so the Contractor can plan his work.

5.0 PLANS

5.1 Contract Plans

The plans listed on the attached Plan List are part of this Specification. The Contractor shall comply with these plans. No changes shall be made without the approval of the Owner.

The Contractor shall at all times keep at the site of the work a copy of the drawings and specifications of this contract. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be the same as if shown and mentioned in both. In case of difference between the drawings and specifications, the specifications shall govern.

5.0 PLANS (continued)

The Contractor is to review and check all plans contained in this specification. This check shall include verification of the suitability of the arrangement and dimensions shown on the plans for construction. The Owner is not responsible for unsuitable or incorrect dimensions on the plans or sketches that can be determined from proper checking and layout. The Contractor shall notify the Owner of any errors or incompatibility found by the Contractor.

5.1.1 Plan List

PLAN NO.	REV.	TITLE
97010-21		SITE PLAN
97010-22		FIRE & SAFETY PLAN
97010-22A		FIRE MAINS & HYDRANTS (EXISTING)
97010-23		WALKWAY PIER TO DOLPHIN – ARRANGEMENT
97010-24		WALKWAY PIER TO DOLPHIN – STRUCTURAL SECTIONS
97010-25		WALKWAY PIER TO DOLPHIN – SEGMENT W1 ASSEMBLY
97010-26		WALKWAY PIER TO DOLPHIN – SEGMENT W2 ASSEMBLY
97010-27		WALKWAY PIER TO DOLPHIN – SEGMENT W3 ASSEMBLY
97010-28		WALKWAY PIER TO DOLPHIN – SEGMENT W4 ASSEMBLY
97010-29		BRIDGE TO SHORE – ARRANGEMENT
97010-30		BRIDGE TO SHORE – STRUCTURAL SECTIONS
97010-31		BRIDGE TO SHORE – SEGMENT B1 ASSEMBLY
97010-32		BRIDGE TO SHORE – SEGMENT B2 ASSEMBLY
97010-33		BRIDGE TO SHORE – SEGMENT B3 ASSEMBLY
97010-34		BRIDGE TO SHORE – SEGMENT B4 ASSEMBLY
97010-35		BRIDGE TO SHORE – SEGMENT B5 ASSEMBLY
97010-36		BRIDGE TO SHORE – SHORE FOOTING
97010-37		WALKWAY & BRIDGE: MISCELLANEOUS DETAILS
97010-38		NOT USED
97010-39		NOT USED
97010-40		PILING PLAN

END OF PLAN LIST

Koppers010142

5.0 PLANS (continued)

5.2 Shop Drawings and Details

In addition to the Owner's plans included in this Specification, the Contractor shall prepare shop drawings, material lists, and layouts as necessary to fabricate the parts. Two copies of these shop drawing and layouts shall be furnished to the Owner for review and approval.

The Owner will review the submitted plans and data and transmit comments, marked-up prints and/or approval within 5 working days after receipt of the Contractor's submittal for review.

On completion of the work, the Contractor shall furnish the Owner with two copies of the shop drawings revised to show the "as-built" arrangements.

6.0 CHANGES

As the construction work progresses, it may become apparent that changes in the work are desirable. Such changes may be proposed by either the Owner or the Contractor. The Contractor shall prepare and submit price and schedule change information all requested changes. The Contractor shall not perform any changed work until the plans or specification are revised and the contract is amended to show the changed work and to incorporate the changed price and/or schedule.

7.0 OWNER'S REPRESENTATIVE

The Owner will designate a representative to work with the Contractor to assist with resolutions of problems that will come up during construction. The Owner's Representative will also assist with processing specification or contract changes as necessary. The Owner's Representative will assist the Contractor with coordination of other project contractors and the operator of the pier. The Owner's Representative will perform inspections for the Owner. The Owner's Representative will not assist the Contractor in planning or supervising the Contractor's work.

8.0 INSPECTIONS AND TESTS

8.1 The Contractor shall be responsible for in process inspections. Prior to acceptance of the work, at the convenience of the Contractor, a complete final inspection of all work will be made jointly by the Contractor and the Owner's Representative. Incomplete work noted during these inspections shall be completed by the Contractor prior to closing the job and demobilization.

8.0 INSPECTIONS AND TESTS (continued)

8.2 The following inspections shall conform to section 306 of the State of Oregon Structural Specialty Code and as may be required by the City of Portland:

* Pile Installation
* Reinforcing Steel Placement
* Concrete Placement
* Welding

8.3 All special inspections and testing with related sampling, whether required by the construction documents or by the governing building code shall be performed by an independent testing agency retained and paid for by the Owner to perform all inspections and tests.

8.4 Contractor shall fully cooperate with and provide assistance to Owner's inspectors and provide proper notices of need for inspections.

8.5 Inspection/testing reports shall be submitted to the Owner's Representative giving observations and results of tests, and indicating compliance on noncompliance with specified standards and with the construction documents. Test results or inspections shall be followed by appropriate inspection/tests or corrective work to show compliance as specified.

9.0 PROJECT/SITE CONDITIONS

9.1 Contractor shall verify all existing conditions. If existing conditions differ from those shown, the Owner's Representative shall be notified prior to continuance of work.

9.2 Contractor shall be responsible to work around or relocate all obstructions during the demolition and the installation of new or replacement materials.

9.3 Smoking will be prohibited for all personnel on the existing pier.

9.4 Heavy construction equipment or trucks will not be allowed onto the existing pier.

10.0 TEMPORARY CONSTRUCTION FACILITIES

10.1 Contractor shall be responsible for design and construction of all temporary shoring, bracing, etc. required for the construction.

11.0 FIRE PREVENTION AND PROTECTION

11.1 Contractor shall comply with all applicable state and local fire prevention regulations and ordinances. Where these regulations do not apply, applicable parts of NFPA No. 241 "Standard for Safeguarding of Building Construction, Alteration, and Demolition Operations" shall be followed.

11.2 Cutting and welding safety procedures shall be in accordance with NFPA No. 51B "Standard for Fire Prevention in Use of Cutting and Welding Operations." Prior to any cutting or welding, the area within 35 feet of cutting/welding operation shall be made fire safe, examined, and approved by the Owner's Representative responsible for authorizing cutting and welding operations.

12.3 A cutting/welding permit shall be obtained each day for each cutting/welding operation from the Owner's Representative responsible for authorizing cutting or welding operations. Cutting or welding without a permit shall not be allowed.

11.4 Contractor shall provide fully charged and operable fire extinguishers at each cutting/welding operation prior to any cutting or welding.

12.0 DEMOLITION AND DISMANTLING

12.1 Contractor shall comply with all applicable state and local regulations and ordinances concerning demolition operations and refuse removal. Where these regulations do not apply, applicable parts of ANSI A10.6 "Safety Required for the Construction" shall be followed.

12.2 Contractor shall be responsible for all demolition methods, techniques, sequencing and safety required for the constructions.

12.3 Contractor shall take all necessary precautions during demolition against damaging systems, especially structural and utilities, not intended to be demolished. Contractor shall take all necessary precautions to protect structures, utilities, and other facilities from damage caused by debris, lateral movement, and other hazards created by demolition operations.

12.4 If adjacent structures appear to be endangered by demolition operations, the Owner's Representative shall be notified prior to continuance of the work.

13.0 EXCAVATIONS & FORMWORK

13.1 Excavations shall be shored as required to prevent personal injuries and subsidence or damage to adjacent existing structures, pavement, utilities, etc.

13.0 EXCAVATIONS & FORMWORK (continued)

13.2 Construction, shoring, and bracing of formwork shall be in accordance with Chapter 4 of ACI 301 "Specifications for Structural Concrete for Building," and ACI 347 "Recommended Practice for Concrete Formwork."

13.3 Contractor shall be responsible for design and construction of all formwork and shoring.

14.0 REINFORCING STEEL

14.1 Reinforcing steel shall be ASTM A615 Grade 60 deformed bars.

14.2 Fabrications and placement of reinforcing steel shall be in accordance with CRSI MSP-1 "Manual of Standard Practice" and Chapter 5 of ACI 301 "Specifications for Structural Concrete for Buildings."

14.3 Unless otherwise indicated, minimum clearance for reinforcing steel and welded wire fabric shall be 3 inches for concrete cast against earth and for concrete exposed to earth or weather; 1½ inches for #5 and smaller bars; 2 inches for #6 and larger bars. Install with proper bar supports prior to concrete placement.

15.0 CONCRETE

15.1 Cast-in-place concrete shall have a compressive strength of 3000 PSI @ 28 days. Slump shall be 4" plus or minus 1". Air entrainment shall be 5% plus or minus 1". Minimum cement content shall be 5 sacks per cubic yard.

15.2 Concrete material and quality shall be in accordance with Chapters 3 and 5 respectively of ACI 318 "Building Code Requirements for Reinforced Concrete."

15.3 Transporting of ready-mix concrete shall be in accordance with ASTM C94 "Standard Specification for Ready-Mixed Concrete" and concrete placement and curing shall be accordance with ACI 301 "Specifications for Structural Concrete for Building."

16.0 PATCHING MORTAR

16.1 Patching mortar shall be polymer modified type "Metatex" as manufactured by Adhesive Engineering Co. or "Sikatop 122" as manufactured by Sika Corp.

16.0 PATCHING MORTAR (continued)

16.2 Install/place in accordance with ACI 593.4-79(86) "Specification for Repairing Concrete with Epoxy Mortars" and the manufacturer's written instructions and specifications.

17.0 STRUCTURAL STEEL AND METAL FABRICATIONS

17.1 Steel shapes, plates, and bars shall be ASTM A36.

17.2 Steel shaped tubing shall be ASTM A500 Grade B.

17.3 Steel pipe shall be ASTM A53 Grade B.

17.4 Fabrication and erection shall be in accordance with AISC "Specification for Structural Steel Building" and AISC "Code of Standard Practice for Steel Building and Bridges."

17.5 Bolts shall be ASTM A307 Grade A or A325 Type 1 as noted on the plans. Galvanize all bolts, nuts, and washers in accordance with ASTM A153. All threads shall be coated with an anti seize compound on assembly. Note: The AISC Commentary on the Specification for using A. S. T. M. A325 Galvanized Bolts recommends that galvanized nuts & bolts be furnished as an assembly.

17.6 Welding shall be in accordance with AWS D1.1 "Structural Welding Code-Steel." Welding filler metal shall be AWS 15.1 or 15.5 E70XX Electrodes, AWS A518 ER70S-X, AWS A5.20 E7XT-X. Welding filler metal at braces and link beams shall be low hydrogen type. Welders shall be AWS certified. Submit copy of all welding procedures and welder certifications to the Owner's Representative prior to any welding.

17.7 The Contractor shall shop assemble the bolted sections prior to galvanizing to insure proper fit-up. The Owner's Representative shall be notified in order to witness the fit-up.

18.0 GALVANIZING

All steel shall be "hot dip" galvanized in accordance with ASTM A-125 after fabrication. The shop drawings shall be developed with consideration for the size of the available dipping kettles and for draining and venting during the galvanizing process.

McKERNAN
FILE NO P97-10
OCTOBER 1998

CALCULATIONS:
PIER MODIFICATIONS - WALKWAY & BRIDGE

PREPARED FOR:

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REGISTERED PROFESSIONAL ENGINEER 10394 OREGON DEC. 14, 1979 J. CAMERON McKERNAN

9/50

CALCULATIONS
PIER MODIFICATIONS
WALKWAY & BRIDGE

P97-10
10/98
~~MK~~

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Y 50

Pier Modifications
Calculations
Narrative

McKernan
File No. P97-10
October 1998

The pier is being modified by removing an existing walkway from the center service platform to the upstream dolphin and replacing this walkway with a new wider walkway to support a new pipeline. A new bridge is being installed from the existing upstream dolphin to the bank on shore.

The walkway is approximately 120' long and the bridge is approximately 210' long. The walkway is supported mid span with a 3 pile bent. The bridge is supported mid span with two 2 pile bents about 64' apart. The ends of the walkways and the offshore end of the bridge are supported on existing pier structures. The existing pier structures are designed to accommodate the load from the mooring forces of large ships along side. Specifically, the dolphins have been designed for a lateral load of about 400,000 pounds. The shore end of the bridge structure is supported with a concrete footing.

The calculations were made to select the structural elements of the new walkway and the new bridge.

For standardization both the new walkway and the new bridge structure have the same basic cross section. The main stringers on both the walkway and the bridge are W24 x 94 beams spaced 8' apart outside to outside.

The calculations are based on the State of Oregon 1998 Edition of the Structural Specialty Code.

The dead load of the walkway and bridge structures was determined by calculation of the weight of the elements and attached permanent parts. These weights were determined as a pound per linear foot of the walkway and bridge. Because the bridge and walkway structures are the same cross section, the uniform dead load for both structures is the same.

After doing the weights, the other loads such as live load, wind load, snow load, and earthquake loads were determined using the requirements of the Oregon Structural Specialty Code. The loads used are as follows:

Live load:	100	psf of walking surface
Wind load:	26.2	psf of side surface
Snow load:	25	psf of total horizontal surface
Seismic load:	.37	of dead load on support

These loads were combined as required by the Structural Specialty Code to determine the worst (that is largest) load for design of the structural elements.

Cont'd . . .

2/50

Pier Modifications
Calculations
Narrative

McKernan
File No. P97-10
October 1998

The main frame elements were selected by using simplified models and structural analysis procedures contained in the AISC Manual of Steel Construction – Allowable Stress Design. In particular, the beam diagrams and formulas in Part 2 were used. On completion of the simplified analysis and determination of accurate weights, a computer model was prepared. A computer analysis of the bridge structure using a continuous beam approach was performed. This analysis shows that the structural sections meet the requirements of the AISC Manual of Steel Construction – Allowable Stress Design.

A computer analysis was not done for the walkway. The walkway has shorter spans and is actually a simpler beam than the bridge. If the walkway had been computer modeled the results would show less stress than in the bridge.

The bridge and walkway supports were analyzed for earthquake resistance using Section 1630.2.3 "Simplified Design Based on Shear" for Zone 3. The load factor was determined to be .37 x dead load. This load was applied to the vertical supports and the horizontal supports including the piling supports. Piling bearing load requirements were based on a combination of vertical loads and the overturning moment based on the earthquake loads. The shore end bridge footing was analyzed to make sure the ground pressure and horizontal earthquake forces were within the limits of the ground capacity.

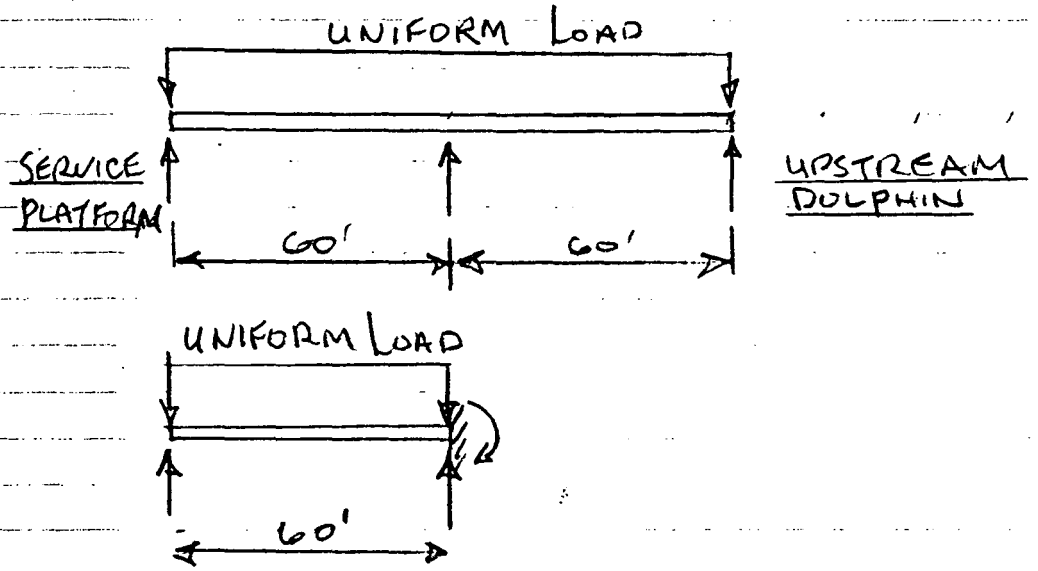
The preceding Contents page is basically an outline of the calculations and can be used as a guide to the calculation development.

3/50

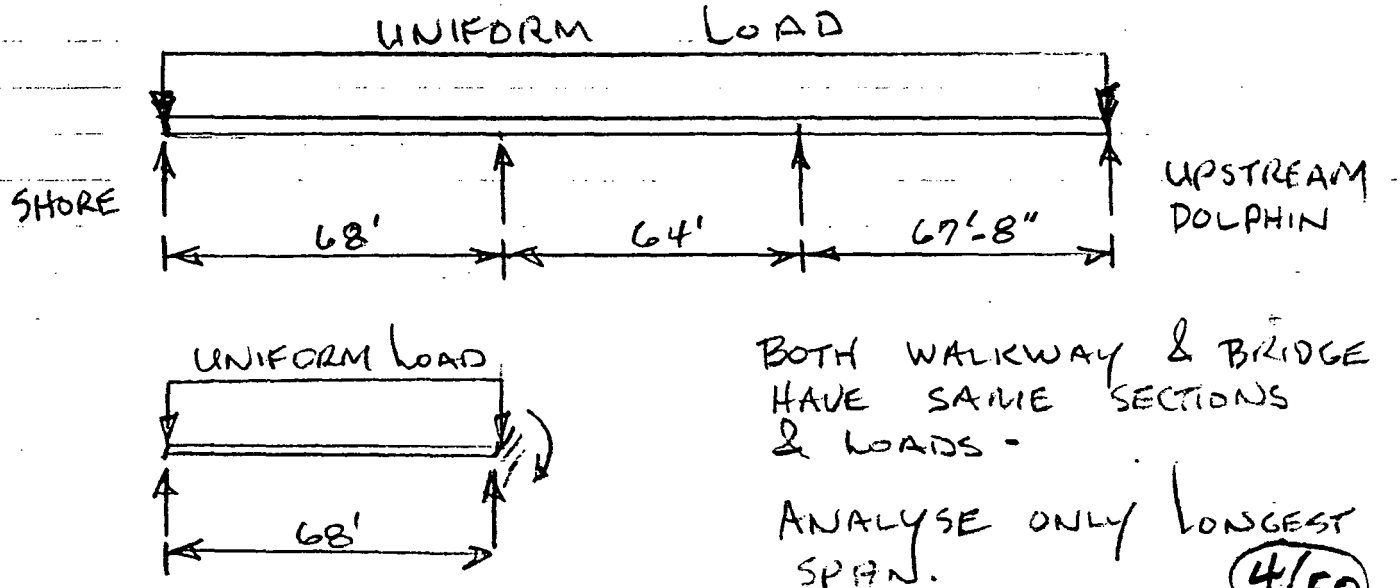
PIER MODIFICATIONS. - STRINGER SELECTION

JCMK 10-5-98

WALKWAY FROM SERVICE PLATFORM TO UPSTREAM DOLPHIN:



BRIDGE FROM UPSTREAM DOLPHIN TO SHORE:



BOTH WALKWAY & BRIDGE HAVE SAME SECTIONS & LOADS -

ANALYSE ONLY LONGEST SPAN.

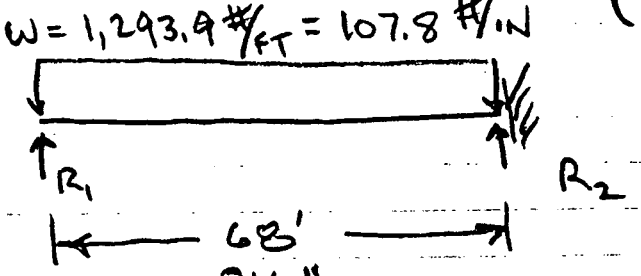
4/50

PIER MODIFICATION

JCM 10-5-9

STRINGER SELECTION

AISC CASE 12 (FROM P. 18)



$w\ell = 1{,}293.9 \times 68 = 87{,}985$ LBS

$R_1 = \frac{3}{8} w\ell = \frac{3}{8} \times 1{,}293.9 \times 68 = 32{,}994$ LBS

$R_2 = \frac{5}{8} w\ell = \frac{5}{8} \times 1{,}293.9 \times 68 = 54{,}991$ LBS

87,985 LBS ✓

$M_{MAX} = \frac{w\ell^2}{8} = \frac{107.8 \times 816^2}{8} = 8{,}972{,}410$ LB-IN

AISC ASD F1.2 (MEMBERS WITH NON-COMPACT SECTIONS)

$F_b = .6\, F_y$ $\qquad F_y = 36{,}000$ (A-36)

$F_b = .6 \times 36{,}000 = 21{,}600$ psi

$SM_{REQ} = \frac{M}{F_b} = \frac{8{,}972{,}410}{21{,}600} = 415.4$ IN^3

$\div 2$

208 IN^3 EA. STRINGER

USE W24 x 94:

SM = 222 IN^3 ; I = 2,700 IN^4.

5/50

PIER MODIFICATIONS.

STRINGER DEFLECTION

10-5-98

$$\Delta x = \frac{wl^4}{185\,EI}$$

INCLUDES SNOW LOAD.

$$= \frac{107.8 \times 816^2}{185 \times 29{,}000{,}000 \times 2{,}700}$$

$$\Delta x = 3.30''$$

UBC 1613 TABLE

$$l/240 = \frac{816}{240} = 3.40 > \Delta x = 3.30''$$

$\therefore$ O.K.

6/50

PIER MODIFICATION
BRIDGE TO SHORE

10-12-98

DOLPHIN END.

IN ORDER TO KEEP WALKING SURFACE SAME LEVEL AS WALKWAY, THE DEPTH OF THE SUPPORT STRINGERS AT THE DOLPHIN IS REDUCED FROM 24" TO 10"

MAIN BRIDGE SECTION STRINGERS

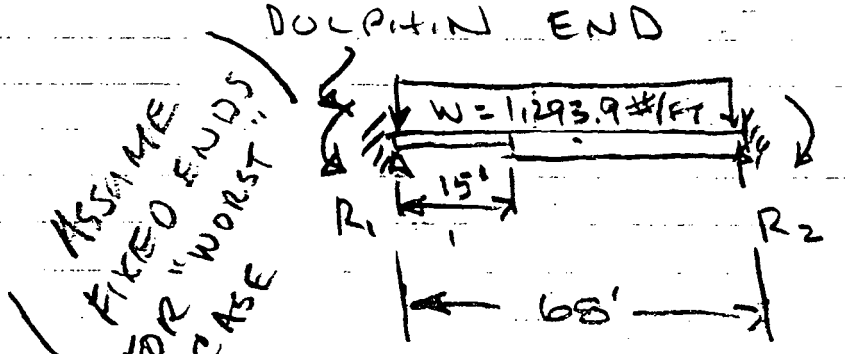
W 24 x 94: $I = 2700\ IN^4$

$SM = 222\ IN^3$

$SM_{REQ} = 208\ IN^3$ / STRINGER

SEE PAGE 5

DOLPHIN END



AISC CASE 15

$$M_x = \frac{w}{12}\left(6\ell x - \ell^2 - 6x^2\right)$$

$x = 15$; $\ell = 68$

$$M_{x=15} = \frac{1,293.9}{12}\left(\underbrace{6 \times 68 \times 15}_{6120} - \underbrace{68^2}_{4624} - \underbrace{6 \times 15^2}_{1350}\right)$$

$$M_{x=15} = 15,742\ \text{LB-FT} = 188,909\ \text{LB-IN.}$$

V50

PIER MODIFICATION
BRIDGE TO SHORE

10-12-98

DOLPHIN END

AT $x = 0$

$$M_{MAX} = \frac{wl^2}{12} = \frac{1293.9}{12}(68)^2$$

$$M_{MAX} = 498{,}583 \text{ LB-FT} = 5{,}982{,}994 \text{ LB-IN}$$

$$SM_{REQ} = \frac{5{,}982{,}994}{21{,}600} = 277.0 \text{ IN}^3$$

$\div$ 4 STRINGERS

69.2 IN^3 EACH.

USE W10X68 $I = 394$ IN^4

$SM = 75.7$ IN^3

$SM_{AVAIL} = 75.7 > SM_{REQ} = 69.2$

OK

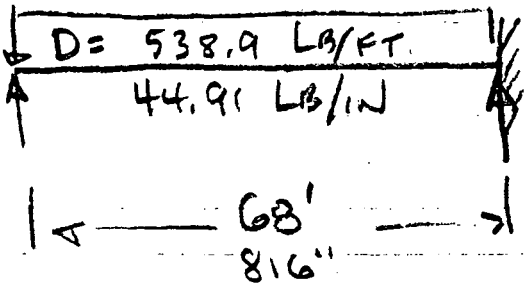
THIS IS "WORST" POSSIBLE CASE.
END IS NOT FIXED. END IS
BASICALLY SIMPLY SUPPORTED WITH
BOLTS IN SHEAR ONLY—

8/50

PIER MODIFICATION
BRIDGE TO SHORE

10-12-98
ACMK

DOLPHIN END.



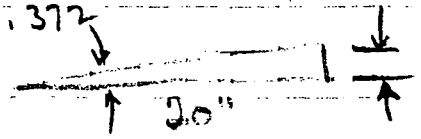
SLOPE @ END: ROARK TABLE 3 CASE 2c

$$\theta_A = -\frac{\omega_a \ell^3}{48EI} \quad \text{radians}$$

$$= \frac{44.91 \times 816^3}{48 \times 29{,}000{,}000 \times 2700}$$

$$= .00649 \text{ radians}$$

$$= .372^\circ$$



: GAP UNDER BASE PLATE

GROUT BASE PL WHEN SETTING DOLPHIN END OF BRIDGE PRIOR TO TIGHTENING BOLTS. BOLTS WILL NOT HAVE TENSION EXCEPT FOR NORMAL TIGHTENING FORCE.

9/50

PIER MODIFICATIONS

10-14-98

BRIDGE – COMPUTER MODEL
DESIGN VERIFICATION

AT MAXIMUM LOAD CONDITION:

$D + L + S = 1{,}293.9$ LB/FT.

$f_{b_{max}} = 18{,}110$ psi $< F_b = 21{,}600$ psi

IN W24X94 STRINGERS.

$f_{b_{max}} = 17{,}630$ psi $< F_b = 21{,}600$ psi

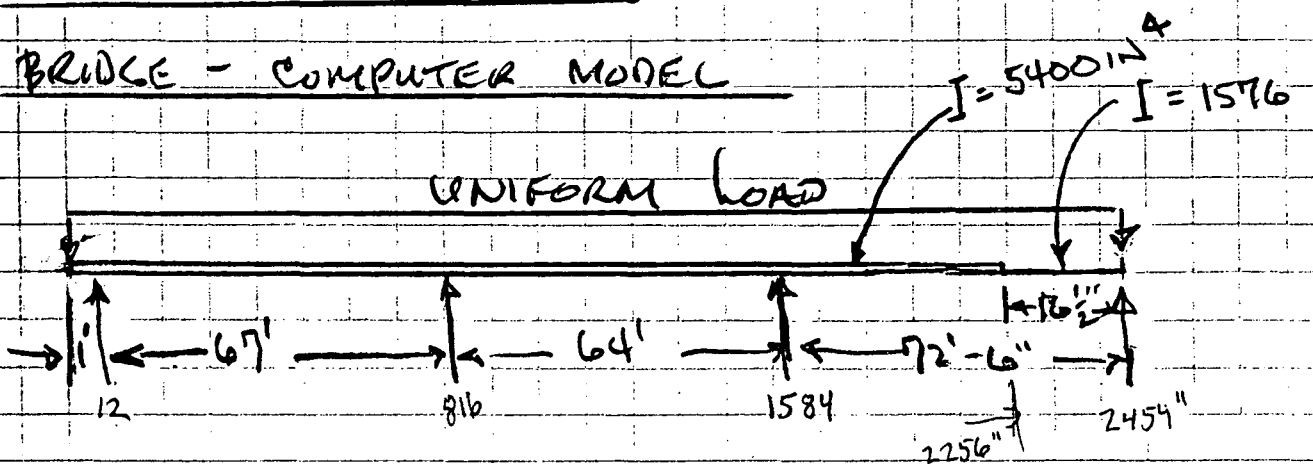
IN W10X68 STRINGERS
AT DOLPHIN END

∴ STRUCTURAL MEMBERS SELECTED ARE SATISFACTORY

SEE FOLLING PAGES FOR COMPUTER MODEL & RESULTS.

PIER MODIFICATIONS

BRIDGE - COMPUTER MODEL



AT DOLPHIN END 4 - W10x68

$I = 394\ IN^4$ EACH

SM = 75.7 EACH

$I = 4 \times 394 = 1576\ IN^4$

$SM = 4 \times 75.7 = 302.8\ IN^3$

$c = 5.20$

MAIN SPANS 2 - W24x94

$I = 2700\ IN^4$

$SM = 222$

$I = 2 \times 2700 = 5400\ IN^4$

$SM = 2 \times 222 = 444\ IN^3$

$c = 12.16$

UNIFORM LOAD

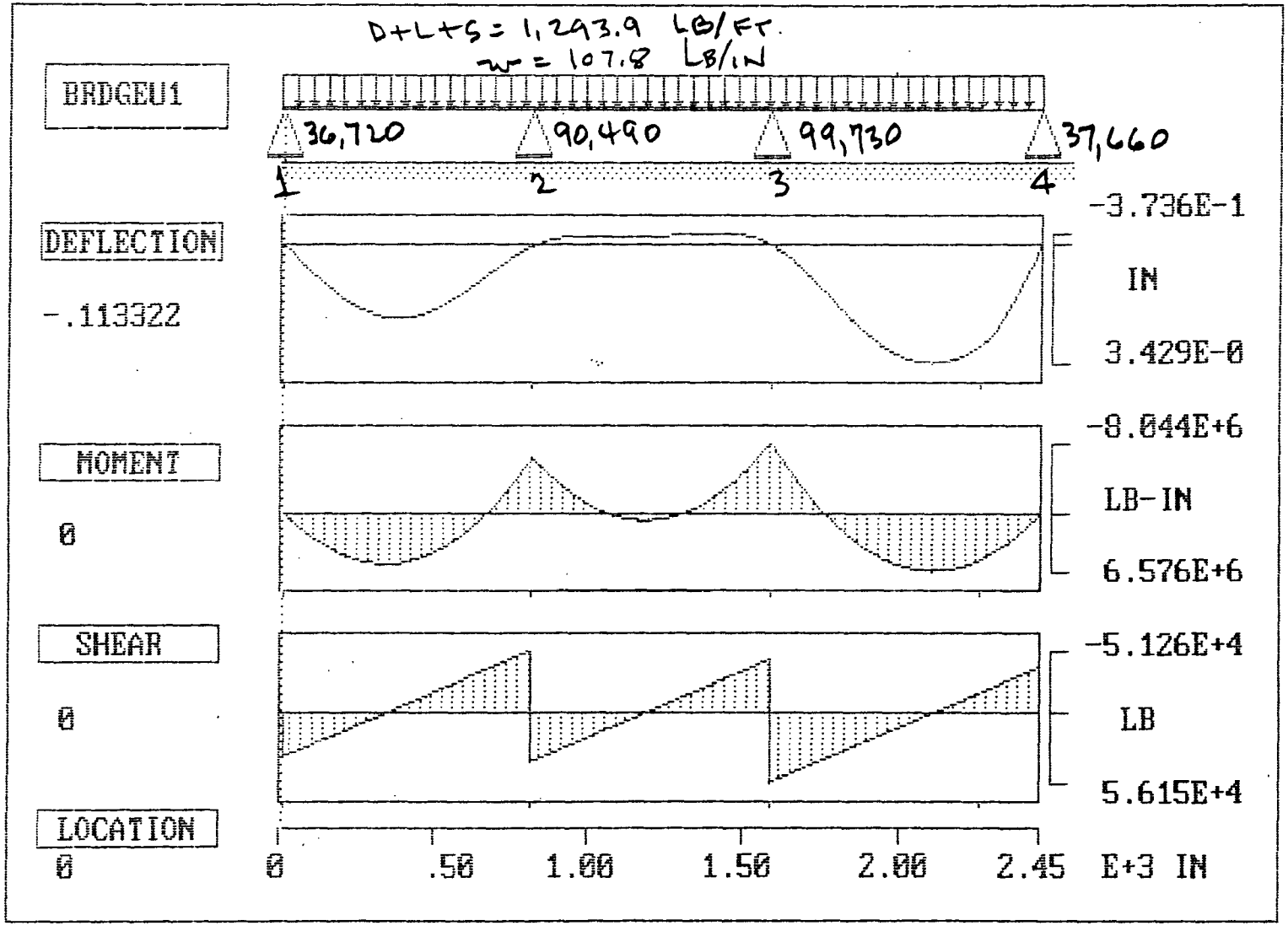
D + L + S = 1,293.9 LB/FT BRIDGE U1

107.825 LB/IN

D = 538.9 LB/FT BRIDGE U2

44.91 LB/IN

11/50



05/21

Koppers010160

** BRGEU1A ** Oct. 13, 1998 **********

GEOMETRY AND MATERIAL PROPERTIES

W/STRESSES

Modulus of elasticity = 2.900E+07 LB/IN^2
Total beam length = 2454 IN

Cross-section moment(s) of inertia:
5.400E+03 IN^4 from 0 IN to 2256 IN
hmax.= 12.16 IN
1.576E+03 IN^4 from 2256 IN to 2454 IN
hmax.= 5.2 IN

Support types and locations:
at 12 IN No.1 - simple
at 816 IN No.2 - simple
at 1584 IN No.3 - simple
at 2454 IN No.4 - simple

EXTERNAL LOADS

D+L+S = 1,293.9 LB/FT.

Uniformly distributed loads:
constant 1.078E+02 LB/IN from 0 to 2454 IN
107.8 LB/IN

R E A C T I O N S **********

at 12 IN RF(1) = -3.672E+04 LB
at 816 IN RF(2) = -9.049E+04 LB
at 1584 IN RF(3) = -9.973E+04 LB
at 2454 IN RF(4) = -3.766E+04 LB

MAXIMUM DEFLECTION **********

3.429E+00 IN at 2.098E+03 IN

MAXIMUM BENDING MOMENT **********

-8.044E+06 LB-IN at 1.584E+03 IN

MAXIMUM BENDING STRESS **********

cross-section		stress	
5.400E+03 IN^4	:	-1.811E+04 LB/IN^2	18,110 PSI
1.576E+03 IN^4	:	1.763E+04 LB/IN^2	17,630 PSI

$< f_b = 21,600$ O.K.

ANALYSIS AT SPECIFIED LOCATIONS **********

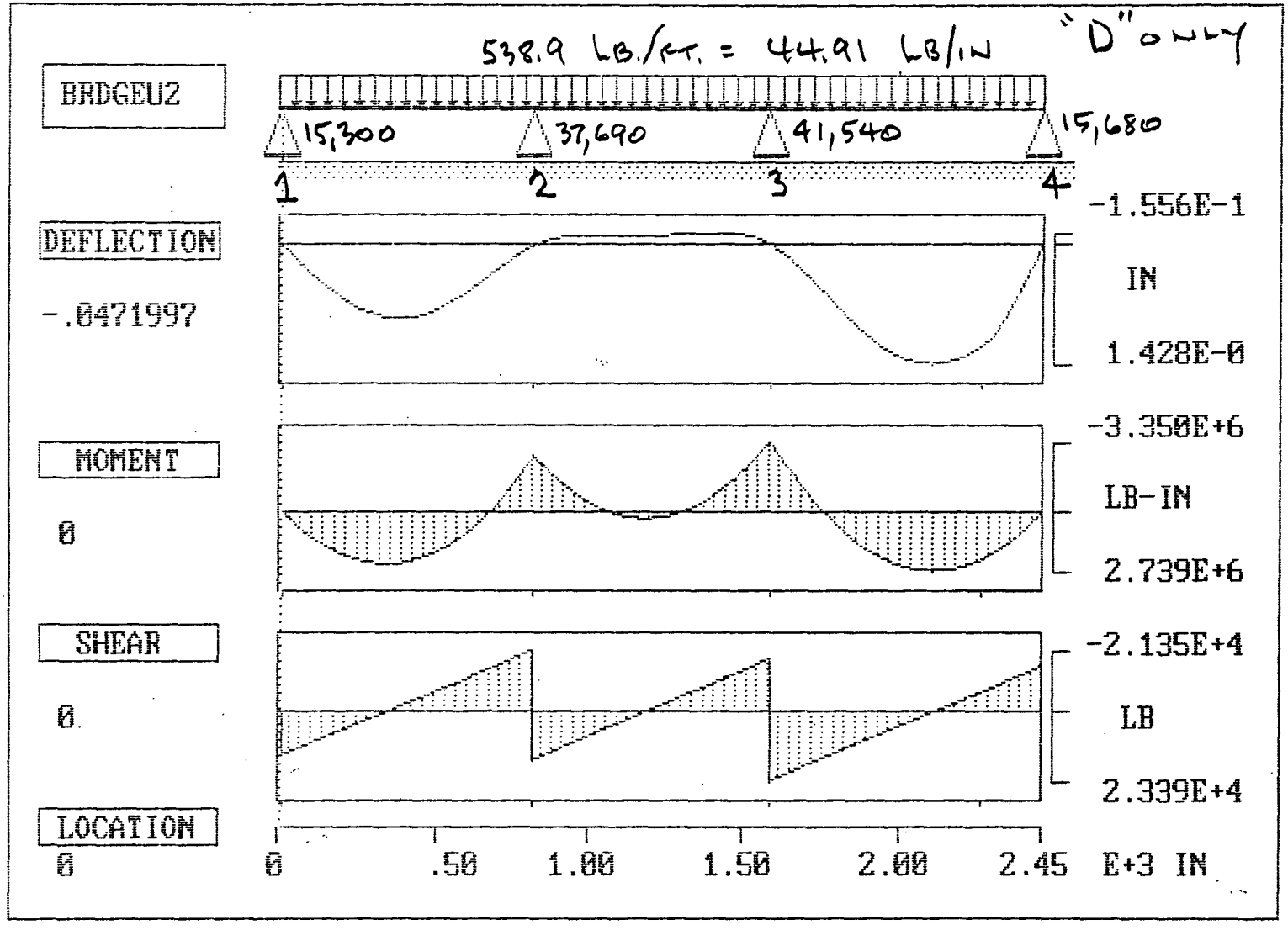
LOCATION [IN]	DEFLECTION [IN]	SLOPE [RAD]	MOMENT [LB-IN]	SHEAR [LB]
0.0	-1.133E-01	9.443E-03	0.0	0.0
1 → 1.200E+01	0.0	9.444E-03	-7.763E+03	-1.294E+03
				3.543E+04
1.080E+02	8.759E-01	8.507E-03	2.897E+06	2.508E+04
2.040E+02	1.586E+00	6.095E-03	4.807E+06	1.473E+04
3.000E+02	2.018E+00	2.817E-03	5.724E+06	4.375E+03

13/5

ANALYSIS AT SPECIFIED LOCATIONS **********

	LOCATION [IN]	DEFLECTION [IN]	SLOPE [RAD]	MOMENT [LB-IN]	SHEAR [LB]
	3.960E+02	2.119E+00	-7.194E-04	.5.647E+06	-5.976E+03
	4.920E+02	1.892E+00	-3.904E-03	4.577E+06	-1.633E+04
	5.880E+02	1.400E+00	-6.127E-03	2.512E+06	-2.668E+04
	6.840E+02	7.654E-01	-6.781E-03	-5.457E+05	-3.703E+04
	7.800E+02	1.678E-01	-5.255E-03	-4.597E+06	-4.738E+04
2 →	8.160E+02	0.0	-3.997E-03	-6.373E+06	-5.126E+04
					3.923E+04
	9.120E+02	-2.307E-01	-1.143E-03	-3.104E+06	2.888E+04
	1.008E+03	-2.739E-01	1.143E-05	-8.284E+05	1.853E+04
	1.104E+03	-2.634E-01	7.560E-05	4.534E+05	8.176E+03
	1.200E+03	-2.747E-01	-3.414E-04	7.414E+05	-2.175E+03
	1.296E+03	-3.248E-01	-6.303E-04	3.572E+04	-1.253E+04
	1.392E+03	-3.722E-01	-1.821E-04	-1.664E+06	-2.288E+04
	1.488E+03	-3.167E-01	1.612E-03	-4.357E+06	-3.323E+04
3 →	1.584E+03	0.0	5.363E-03	-8.044E+06	-4.358E+04
					5.615E+04
	1.680E+03	7.011E-01	8.743E-03	-3.150E+06	4.580E+04
	1.776E+03	1.592E+00	9.428E-03	7.496E+05	3.545E+04
	1.872E+03	2.444E+00	8.027E-03	3.656E+06	2.510E+04
	1.968E+03	3.086E+00	5.149E-03	5.568E+06	1.474E+04
	2.064E+03	3.405E+00	1.403E-03	6.487E+06	4.393E+03
	2.160E+03	3.347E+00	-2.601E-03	6.412E+06	-5.958E+03
	2.256E+03	2.917E+00	-6.255E-03	5.343E+06	-1.631E+04
	2.352E+03	1.839E+00	-1.548E-02	3.280E+06	-2.666E+04
4 →	2.454E+03	0.0	-1.935E-02	0.0	-3.766E+04

14/50



Koppers010163

** BRDGEU2A ** Oct. 13, 1998 **********

GEOMETRY AND MATERIAL PROPERTIES

w/STRESSES

Modulus of elasticity = 2.900E+07 LB/IN^2
Total beam length = 2454 IN

Cross-section moment(s) of inertia:
5.400E+03 IN^4 from 0 IN to 2256 IN
hmax.= 12.16 IN
1.576E+03 IN^4 from 2256 IN to 2454 IN
hmax.= 5.2 IN

Support types and locations:
at 12 IN No.1 - simple
at 816 IN No.2 - simple
at 1584 IN No.3 - simple
at 2454 IN No.4 - simple

EXTERNAL LOADS

Uniformly distributed loads: 538.9 LB/FT.
constant 4.491E+01 LB/IN from 0 to 2454 IN
44.91 LB/IN

R E A C T I O N S **********

at 12 IN RF(1) = -1.530E+04 LB
at 816 IN RF(2) = -3.769E+04 LB
at 1584 IN RF(3) = -4.154E+04 LB
at 2454 IN RF(4) = -1.568E+04 LB

MAXIMUM DEFLECTION **********

1.428E+00 IN at 2.098E+03 IN

MAXIMUM BENDING MOMENT **********

-3.350E+06 LB-IN at 1.584E+03 IN

MAXIMUM BENDING STRESS **********

cross-section		stress
5.400E+03 IN^4	:	-7.544E+03 LB/IN^2
1.576E+03 IN^4	:	7.342E+03 LB/IN^2

7,544 psi
7,342 psi << f_b = 21,600

ANALYSIS AT SPECIFIED LOCATIONS **********

LOCATION [IN]	DEFLECTION [IN]	SLOPE [RAD]	MOMENT [LB-IN]	SHEAR [LB]
0.0	-4.720E-02	3.933E-03	0.0	0.0
1.200E+01	0.0	3.933E-03	-3.234E+03	-5.389E+02
				1.476E+04
1.080E+02	3.648E-01	3.543E-03	1.206E+06	1.044E+04
2.040E+02	6.607E-01	2.539E-03	2.002E+06	6.134E+03
3.000E+02	8.407E-01	1.173E-03	2.384E+06	1.822E+03

1 —

16/50

ANALYSIS AT SPECIFIED LOCATIONS **********

	LOCATION [IN]	DEFLECTION [IN]	SLOPE [RAD]	MOMENT [LB-IN]	SHEAR [LB]
	3.960E+02	8.825E-01	-2.996E-04	2.352E+06	-2.489E+03
	4.920E+02	7.879E-01	-1.626E-03	1.906E+06	-6.800E+03
	5.880E+02	5.831E-01	-2.552E-03	1.046E+06	-1.111E+04
	6.840E+02	3.188E-01	-2.824E-03	-2.273E+05	-1.542E+04
	7.800E+02	6.988E-02	-2.189E-03	-1.915E+06	-1.973E+04
2 →	8.160E+02	0.0	-1.665E-03	-2.654E+06	-2.135E+04
					1.634E+04
	9.120E+02	-9.609E-02	-4.761E-04	-1.293E+06	1.203E+04
	1.008E+03	-1.141E-01	4.759E-06	-3.450E+05	7.717E+03
	1.104E+03	-1.097E-01	3.149E-05	1.888E+05	3.405E+03
	1.200E+03	-1.144E-01	-1.422E-04	3.088E+05	-9.060E+02
	1.296E+03	-1.353E-01	-2.625E-04	1.488E+04	-5.217E+03
	1.392E+03	-1.550E-01	-7.585E-05	-6.929E+05	-9.529E+03
	1.488E+03	-1.319E-01	6.716E-04	-1.815E+06	-1.384E+04
3 →	1.584E+03	0.0	2.234E-03	-3.350E+06	-1.815E+04
					2.339E+04
	1.680E+03	2.920E-01	3.641E-03	-1.312E+06	1.908E+04
	1.776E+03	6.632E-01	3.927E-03	3.122E+05	1.476E+04
	1.872E+03	1.018E+00	3.343E-03	1.523E+06	1.045E+04
	1.968E+03	1.285E+00	2.145E-03	2.319E+06	6.141E+03
	2.064E+03	1.418E+00	5.845E-04	2.702E+06	1.830E+03
	2.160E+03	1.394E+00	-1.083E-03	2.670E+06	-2.481E+03
	2.256E+03	1.215E+00	-2.605E-03	2.225E+06	-6.793E+03
	2.352E+03	7.660E-01	-6.450E-03	1.366E+06	-1.110E+04
4 →	2.454E+03	0.0	-8.061E-03	0.0	-1.568E+04

BRDGEU1

F1 = FILE

F2 = UNITS

F3 = L , E , P

F4 = CROSS-SECTIONS

F5 = SUPPORTS

F6 = FORCES

F7 = MOMENTS

F8 = DISTR. LOADS

F9 = LOCATIONS

F10 = RUN

@R=Results | Esc = Quit

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STRESS AND DEFLECTION ANALYSIS
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17/50

PIER MODIFICATION

10-5-98 JCM

LIVE LOAD : 100 PSF

WALKING AREA: 7.33' WIDE − 2.00' PIPE

$A = 5.55\ FT^2/FT.$

LIVE LOAD = 555 LB/FT.

UBC 1612.3.1 ALLOWABLE STRESS DESIGN

LOAD COMBINATIONS

(12-7): D = 538.9 #/FT

(12-8): D + L + S :

D = 538.9 ← p 21

L = 555.0

S = 200.0 (8'wx 25)

→ = 1,293.9 LB/FT (18/50)

(12-9): $D + \left(W \text{ OR } \frac{E}{1.4}\right)$ (P.30)

W = 2.5 x 26.2 = 65.5 #/FT

$\frac{E}{1.4} = \frac{267.3}{1.4} = 191.0$ ← (P.32)

D + W = 481.7 + 65.5 = 547.2 #/FT

$D + \frac{E}{1.4}$ = 481.7 + 191.0 = 672.7 #/FT (18/5)

PIER MODIFICATION

10-5-98 JCM

LOAD COMBINATIONS CONT'D:

(12-10): $.9D \pm \frac{E}{1.4} = .9 \times 538.9 \pm 191.0$ (485.01)

$= 676.0$ #/FT $(+\frac{E}{1.4})$

$= 294.0$ #/FT $(-\frac{E}{1.4})$

(12-11): $D + .75\left[L + S + \left(W \text{ OR } \frac{E}{1.4}\right)\right]$

$W = 65.5 < \frac{E}{1.4} = 191$

$D = 538.9$ LB/FT

$L = 555$ "

$S = 200$ "

$\frac{E}{1.4} = 191$

$L + S + \frac{E}{1.4} = 946$

$\times .75$

709.5

$D = 538.9$

$= 1{,}248.4$ LB/FT.

FORMULA (12-8) IS MOST SEVERE COMBINATION.

19/50

PIER MODIFICATIONS:

10-5-98

LOADS:

DEADLOAD IS: BRIDGE STRUCTURE
PIPELINE & SUPPORTS
ELECTRICAL & FIREMAIN

LIVE LOAD IS: 100 POUNDS PER SQUARE FOOT OF WALKING AREA.

+ SNOW LOAD: 25 #/FT²

DEAD LOAD - STRUCTURE (REF: PLAN NO 97010-24 SEC 24.)

ITEM	WEIGHT
STRINGERS - 2 - W24x94	188.0 #/FT
CROSS PIECES W18x35 @ 8' O.C x 7.33'	32.1
DIAGONALS L6x6x3/8 (14.9#/FT ÷ .707)	21.0
CHOCKS: 4x3/8 F.B. - 5' @ 8' O.C. 5.10#/FT	3.2
WALK WAY STRINCERS W6x12 x 2	24.0
WALKWAY GRATING 5.15 PSF 7.33'	37.7
KICK PLATE 5x5/16x2 x 5.31 #/FT	10.6
HANDRAILS (SEE p)	13.6
TOTAL STRUCTURE	330.2 #/FT

PITCH PIPE	106.3	
FIRE MAIN	18.5	
ELECTRIC	34.9	
	159.7	159.7
TOTAL		489.9 #/FT.

20/50

PIER MODIFICATIONS

10-5-98 XMM

DEAD LOAD (CONTINUED)

CALCULATED - ESTIMATED = 437.9 LB/FT
(SEE PAGE 20)

NOTE: DOES NOT INCLUDE: GALVANIZING, SPLICE PLATES, BOLTING

FOR DESIGN - INCREASE CALC. DEAD LOAD 10% TO INCLUDE MISC. (ZINC COATING - CLIPS BOLTING, ETC.)

TOTAL DEAD LOAD: 489.9
+ 49.0
538.9 #/FT.

SNOW LOAD.

WIDTH OF BRIDGE = 8'

SEC 16.40

SNOW LOAD = 25 PSF

S = 8 x 25 = 200 LB/FT.

Koppers010169

PIER MODIFICATION

10-5-98 XMM

DEAD LOADS (CONT'D.)

PITCH PIPE.

8" SCHD 40	28.55 #/FT.
CONTENTS	28.18
INSULATION	8.8,
LAGGING	4.10
LAGGING STRAPS	1.3'
SUPPORTS	26.5
HEAT TRACE	8.9
	106.3 #/FT.

FIRE MAIN.

PIPE & SUPPORTS.	13.0 #/FT
CONTENTS	5.5
	18.5 #/FT

ELECTRIC

LIGHTS	5.1 #/FT
CONDUIT, SUPPORTS & CABLE	29.8
	34.9 #/FT.

22/50

PIER MODIFICATION

10-5-98

DEAD LOADS.

PIPE SUPPORTS - 16' O.C.

W18 x 115 x 2' — 1230#

STRAPS 2x1/2 3.4#/FT

2@ 3.5'

WT = 2 x 3.5 x 3.4 — 23.8#

BASE : 3/4 PL 30.6#/FT²

$\frac{24 \times 22}{144} \times 30.6 =$ 112.2#

GUIDES L2x2x3/8 4.7#/FT

4 x 4.7 = 18.8#

CHOCKS - 4 - 2x2x5/16

WT = $4 \times \frac{2 \times 2}{144} \times 12.8 =$ 1.4#

FOUNDATION

1" x 2' x 5/16 PL = 2 x 12.8 = 25.6

1/2' x 2' x 5/16 PL = 1 x 12.8 = 12.8

38.4 38.4#

424.6#

WEIGHT = $\frac{424.6}{16'} =$ 26.5#/FT.

23/50

Koppers010171

10-5-98 KWM

PIER MODIFICATION

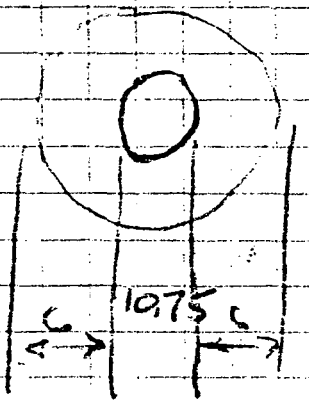
PIPE CONTENTS. 8" SCH 40 $t = .322$

8" PITCH PIPE $V = \frac{\pi}{4}(8.625 - .644)^2 \frac{1}{144} = .347 FT^3$

$WT = .347 \times 62.4 \times 1.3 = 28.18 \#/FT$.

P.L. WEIGHTS

INSULATION.



O.D. = 22.75
I.D. = 10.75

$V = \frac{\pi}{4}(22.75^2 - 10.75^2)\frac{1}{144} = 2.19 FT^3$

$WT = 2.19 \times 4 = 8.77 \#/F$

LAGGING: ALUM. $t = .050$ 165 #/FT.

CIRC = $\pi \times 22.75 / 12 = 5.96 FT^2/FT$

$WT = 5.96 \times .050/12 \times 165 = 4.1 \#/FT$

LAGGING STRAPS. $4.1 \times \frac{1}{3} = 1.3 \#/FT$

24/50

10-5-98
XMH

PIER MODIFICATION

HEAT TRACE - 2 - 1½" PIPES. 2.72 #/FT
t = .145"

W PIPE = 2 × 2.72 = 5.44 #/FT (2 PIPES)

CONTENTS:

$$V/PIPE = \frac{\pi}{4}\left(2.72 - .290\right)^2 \frac{1}{144} = .032 \ FT^3/FT.$$

WT = .032 × 62.4 × .7 × 2 = 2.8 #/FT.

STRAPS. 2 + 1½" F.B. (5/16) 3'½' LONG 1.59 #/FT

WT = 2 × 1.59 × 3.5 × 1/16 = .7 #/FT.
BTWN MAIN SUPPORTS

TOTAL 8.9 #/FT.

25/50

10-5-98 JMR

PIER MODIFICATIONS.

DEAD LOAD.

ELECTRIC - CONT'D.

CONDUIT.

1 @ 2"	3.65 #/FT	3.65 #/FT
2 @ 1½"	2 @ 2.72 #/FT	5.44 #/FT.
		9.09 #/FT.

SUPPORTS. 4' O.C.

1FT TUBE - 1' =	1.7
STRAP	.3
LEGS.	.6
	2.6 #/EA
÷	4
	.7 #/FT

CABLE (EST.)

1 @	8 #/FT =	8
4 @	3 #/FT	12
		20 #/FT.

CONDUIT	=	9.1
SUPPORTS	=	.7
CABLE	=	20.0
		29.8 #/FT.
LIGHTS	=	5.1
		34.9 #/FT.

PIER MODIFICATIONS

10-5-98

DEADLOAD CONT'D

FIRE MAIN = 4" STD = 10.79 #/FT

SUPPORTS = 8' O.C

BKT. 12x12 x 5/16 PL = 12.8 #
STRAP 2x3/8 F.B. 2.55 #/FT = 5.1 #
17.9 #

WT = 17.9 / 8 = 2.2 #/FT

TOTAL = 13.0 #/FT.

ELECTRIC.

LIGHT FIXTURES.

STANCHIONS = 24' O.C FOR LIGHTS.

2 1/2" PIPE 10' : 5.79 x 10 = 57.9 #
LIGHT FIXTURE = 25.0
CABLE & STRAPS = 6.0
MOUNT BKT.
4x3/8 F.B x 2' 5.10 x 2 = 10.2
2 - 12x12 x 3/8 BKT 15.3
BASE PL 1/2 x 12 x 3/8 = 7.7
33.2 = 33.2

TOTAL 122.1
1/1 24
5.1 #/FT.

27/50

PIER MODIFICATIONS.

10-5-98

DEAD LOAD CONT'D.

FIRE MAIN 4" STD.

CONTENTS:

$$V = \frac{\pi}{4}\left(4.5 - 2\times.237\right)^2 \frac{1}{144} = .0884 \text{ FT}^3$$

$$WT = .0884 \times 62.4 = 5.5 \#/\text{FT}.$$

28/50

PIER MODIFICATIONS 10-5-98

DEAD LOADS

HAND RAILS. - 8' SECTION:

SOCKETS 2.625 O.D × t = .313

- .626

2.000 I.D × 8" = .667' L × 2

$$VOL = \pi \frac{2.625^2 - 2.000^2}{4} \times \frac{1}{144} \times .667 \times 2 = .021 \text{ FT}^3$$

$$WT = .021 \times 490 = \underline{10.31} \text{ LB}/2$$

STANCHIONS: 1½ PIPE 2.72#/FT

$$WT = \frac{42}{12} \times 2.72 \times 2 = \underline{19.04} \text{ LB}/2$$

TOP RAIL: 1½ PIPE

$$WT = 8' \times 2.72 \times 2 = \underline{43.52} \text{ LB}/2$$

INTERMEDIATE RAIL 1¼ PIPE 2.27 #/FT

$$WT = 8 \times 2.27 \times 2 = \underline{36.32} \text{ LB/FT}$$

TOTAL 109.19 LB/8'

$$\text{HAND RAILS } WT = \frac{109.19}{8} = 13.6 \text{ LB/FT.}$$

29/50

PIER MODIFICATION

10-5-98
JEWL

WIND LOADS.

UBC 1616 - EXPOSURE C

UBC 1620

$$P = C_e C_q q_s I_w$$

TABLE 16-G

AVG HT = 30'; EXP. C.

$C_e = 1.23$

TABLE 16-H MOST SIMILAR CATAGORY IS TOWER ACCESSORIES; FLAT OR ANGULAR MEMBERS.

$C_q = 1.3$

FIGURE 16-1

BASIC WIND SPEED = 80 MPH

TABLE 16-F

$q_s = 16.4$

TABLE 16-K $I_w = 1.0$

$P = 1.23 \times 1.3 \times 16.4 \times 1.0$

$P = 26.2$ PSF

30/50

PIER MODIFICATION

10-5-98 KMR

EARTHQUAKE DESIGN

FIG 16-2 ZONE 3 TABLE 16.1: Z=.3

UBC 1620.2.3.2

$$V = \frac{3.0\,C_a}{R} W$$

$C_a = .36$ TABLE 16-Q Z=.3; SOIL = S_D

TABLE 16-N STRUCTURAL SYSTEM:
2. BUILDING FRAME
4. ORDINARY BRACED FRAME
a. STEEL

R = 5.6;

$\Omega = 2.2$

HEIGHT LIMIT = 160'

$$V = \frac{3.0 \times .36}{5.6} W = .193\,W$$

TABLE 16-P
11. ALL OTHER SELF SUPPORTING STRUCTURES:

R = 2.9; $\Omega_o = 2.0$

$$V = \frac{3.0 \times .36}{2.9} W = \underline{\underline{.37\,W}}$$ ← USE THIS

31/50

PIER MODIFICATION

EARTHQUAKE DESIGN

10-5-98

UBC 1630.1.1 FIG 16-2 SEISMIC ZONE 3

$E_I = \rho E_H + E_V$

$\rho = 2 - \frac{20}{r_{max}\sqrt{A_B}}$ DOES NOT APPLY =

$\rho = 1.5$ ASSUMED.

$E_H = V = .37\ W.$

W = DEAD LOAD SUPPORTED BY EACH PILE BENT OR END SUPPORT

$W \simeq 481.7$ LBS/FT

$E_H = .37 \times 481.7 =$

$W = 481.7 \times 70 = 33{,}719$ Lbs TOT/SPAN (16.9 S.T. PER PILING BENT)

$E_V = 0$ (ALLOWABLE STRESS DESIGN)

$E = 1.5 \times .37 \times 481.7 = 267.3$ LB/FT.

32/50

PIER MODIFICATIONS
WALKWAY & BRIDGE.

10-5-98

SPLICE PLATES IN STRINGERS -

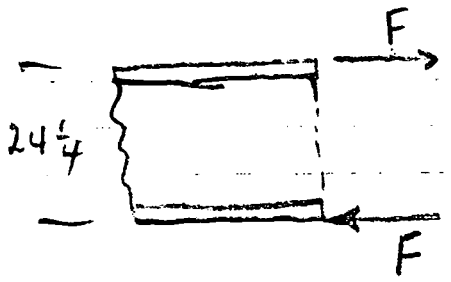
REQUIRED: DEVELOP STRENGTH OF BEAM

BEAM W24 x 94 S.M. = 222

$F_b = .6 \times 36{,}000 = 21{,}600$ psi

$M_{ALLOW} = F_b \times S.M.$

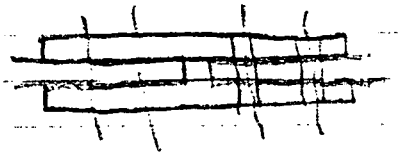
$= 21{,}600 \times 222 = 4{,}795{,}200$ LB-IN.



F = FORCE ON SPLICE.

$24.25F = 4{,}795{,}200$

$F = 197{,}740$ LBS.



BOLTS IN DOUBLE SHEAR.
- THREADS OUTSIDE SHEAR PLANE
- BEARING TYPE CONNECTION

AISC - ASD TABLE 1-D. TYPE X - STD

USE A325

BOLT SIZE	ALLOWABLE LOAD/BOLT	NO. OF BOLTS	LOAD/BOLT
3/4	26.5 KIPS	8	24.7
7/8	36.1	6	33.0
1	47.1	5	39.5

33/50

PIER MODIFICATIONS
WALKWAY & BRIDGE

10-5-98

SPLICES IN STRINGERS

CHECK BEARING
A 325 F_u = 120 KSI
GOVERNS → A 36 F_u = 58 KSI

FLANGE OF W24x94 t_f = 7/8"

3/4" BOLT w/ t = 5/8 f_p = 32.6 > ALLOWABLE IN SHEAR

∴ O.K.

LOAD PER BOLT = $\frac{F}{\text{NUMBER OF BOLTS}}$

3/4" : $\frac{194,740}{8}$ = 24.7 kips

7/8" : $\frac{194,740}{6}$ = 33.0

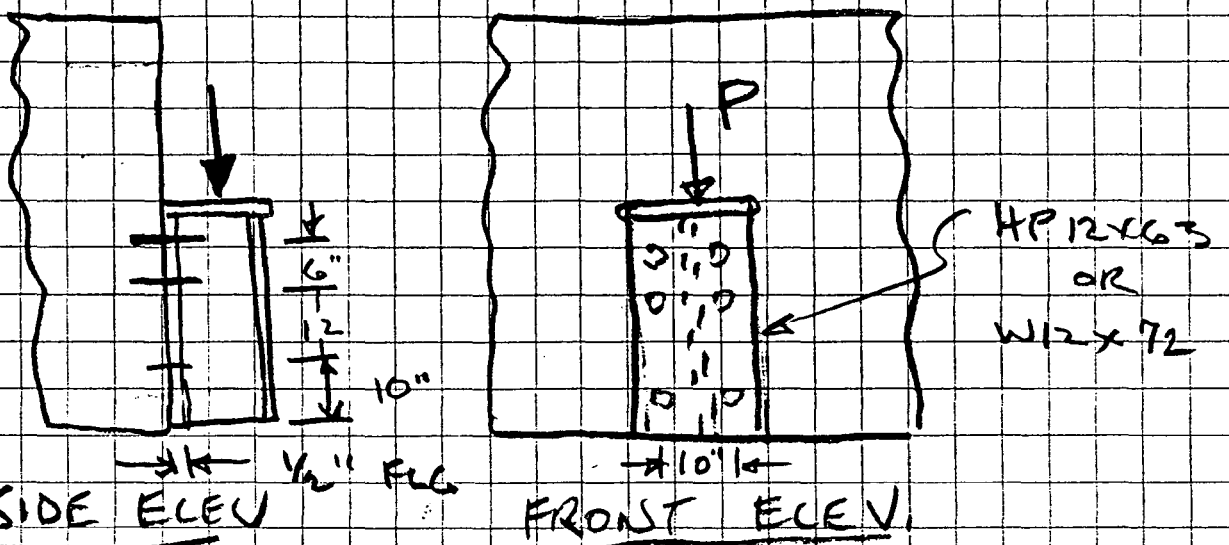
1" : $\frac{194,740}{5}$ = 39.5

34/50

PIER MODIFICATIONS
ANCHOR BOLTS.

10-7-98
JCMR

WALKWAY SUPPORT.



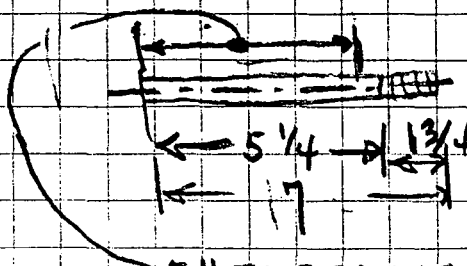
SIDE ELEV

FRONT ELEV.

OREGON STRUCTURAL SPECIALTY CODE OCT 1998
1923.3.3 DESIGN STRENGTH IN SHEAR

$$V_{ss} = .175\, A_b\, f_{ut}$$

USE ¾" RAWL STUD TYPE 303 STAINLESS STEEL
¾ x 7" w/ 1¾" THREAD 5" EMBEDMENT



7 - 5 = 2" PROTRUDING
w/ 1¾" THREAD.

35/50

TOPS FORM 2114

PIER MODIFICATIONS
ANCHOR BOLTS.

10-8-98
JWM

WALKWAY SUPPORT

3/4" D BOLT. = DESIGNED SO THREADS NOT IN SHEAR PLANE - BUT - CALCULATE WITH THREADS IN SHEAR PLANE

$A_b = .3345 \text{ IN}^2$

$f_{ut} = 90{,}000 \text{ psi}$ (A303)

$V_{ss} = .75 \times .3345 \times 90{,}000$

$V_{ss} = 22{,}578 \text{ LBS}$

OR $\phi V_c = \phi\ 800\ A_b\ \lambda \sqrt{f'_c}$; $\phi = .65$

$A_b = .4418 \text{ IN}^2$

$\lambda = 1.0$ (NORMAL WEIGHT CONCRETE)

$f'_c = 3{,}000 \text{ psi}$

$\phi V_c = .65 \times 800 \times .4418 \times 1 \times \sqrt{3000}$

$\phi V_c = 12{,}853 \text{ LBS.}$ EACH

36/50

PIER MODIFICATIONS
ANCHOR BOLTS.

10-8-98
ACMM

WALKWAY SUPPORT

ALLOWABLE SHEAR FORCE = 12,853 LBS/BOLT

COMPARES WITH RAWL BTHD CATOLOG:

CHECK MFG ALLOWABLE

3/4" 5" EMBEDMENT

2000 psi 15,770 LBS

INTERPOLATION ⇒ 3000 psi 16,440 LBS

4000 psi 17,110 LBS.

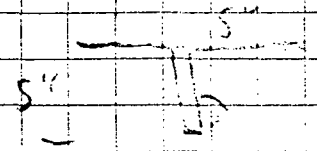
EDGE DISTANCE & SPACING = 10" = $\frac{10}{.75}$ = 13.3 D. O.K.

1923.3.2 DESIGN STRENGTH IN TENSION

$$\phi P_c = \phi \lambda 4 A_p \sqrt{f'_c}$$

$\phi = .65$

$\lambda = 1.0$



$A_p = \pi 5^2 = 78.54 \text{ in}^2$

$f'_c = 3000$

$$\phi P_c = .65 \times 1.0 \times 4 \times 78.54 \times \sqrt{3000}$$

$\phi P_c = 11,185$ LBS.

37/50

PIER MODIFICATION
ANCHOR BOLTS.

10-8-98
SCHK

WALKWAY SUPPORT - ALLOWABLE TENSION

ϕP_c = 11,185 LBS.

MFG's ALLOWABLE: COMPARES WITH RAWL STUD CATOLOG

3/4" W/ 5" EMBEDMENT

2000 psi	14,855	
INTERPOLATION → 3000	15,225	LBS
4000	15,695	

STRENGTH IN SHEAR:

6 BOLTS WITH 12,853 LB ALLOWABLE LOAD: P_{ALLOW} = 77,118. LBS.

P. 39

$P_{ACTUAL} = 1/2 \times 29,092$ LBS

$= 14,546$ LBS

$P_{ACTUAL} = 14,546 << P_{ALLOW} = 77,118$ LBS.

O.K.

38/50

Koppers010186

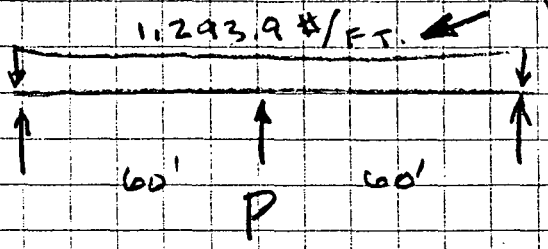
PIER MODIFICATIONS.
PILING SUPPORTS.

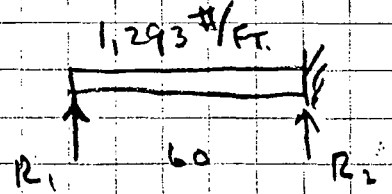
10-8-98
[signature]

WALKWAY MID SUPPORT. - VERTICAL LOAD

3 WOOD PILINGS.

WORST LOAD COMBINATION
D+L+S





AISC CASE 12

$R_1 = \frac{3}{8} wl = \frac{3}{8} \times 1293 \times 60 = 29{,}092.5$

$R_2 = \frac{5}{8} wl = \frac{5}{8} \times 1293 \times 60 = 48{,}487.5$

77,580

$W = 1293 \times 90 = 75{,}580$ LBS

$P = 2 \times 48{,}487.5 = 96{,}975$ LBS
$\div$ 3 PILING

32,325 LBS
$\div$ 2000

16.2 S.T. / PILING

TYPICAL WOOD PILINGS GOOD FOR 30 S.T.

39/50

PIER MODIFICATION
PILING SUPPORTS

10-8-98
JCMK

WALKWAY MID SUPPORT

SEISMIC

$E_H = V = .37 W$ (SEE p. 32)

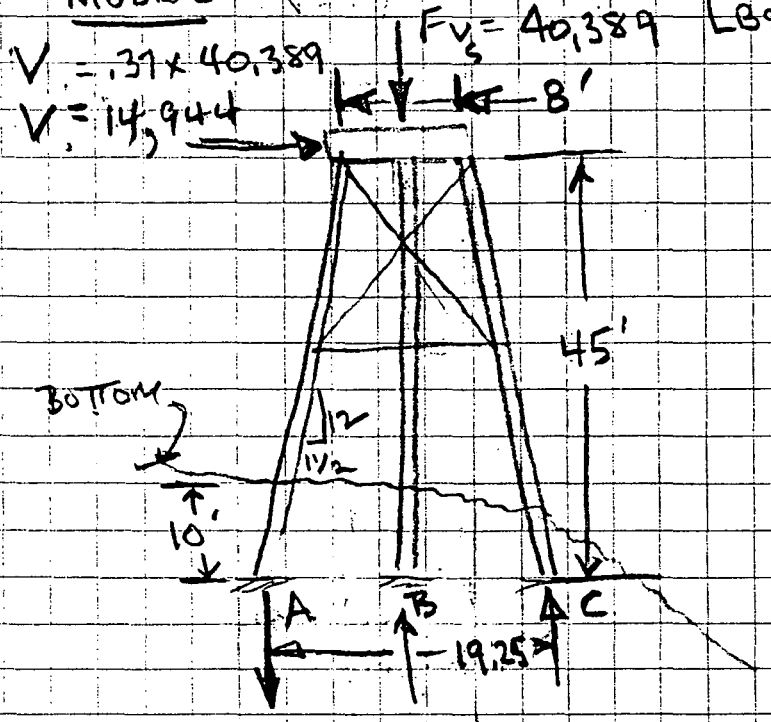
W = DEAD LOAD ONLY = 538.9 #/FT

$= \frac{538.9}{1293.9} \times 96.975 = 40,389$ LBS

MODEL

$V = .37 \times 40,389$

$V = 14,944$



$F_{V_P} = \frac{40,389}{3} = 13,463$ LBS

ASSUME: VERTICAL LOAD SHARED EQUALLY ON 3 PILINGS = $\frac{20,144}{3} = 6715$ LBS/PILING

HORIZONTAL SEISMIC LOAD RESISTED BY COUPLE = $19.25' \times (F_{A_S} = F_{C_S})$

40/50

PIER MODIFICATION
PILING SUPPORTS

10-8-95
JC

WALKWAY MID SUPPORT:

ΣM @ B: SEISMIC LOADS ONLY

$F_{A_s} + 8.375 F_{c_s} = 45 \times 14,944$

$F_{A_s} = F_{c_s} = \frac{45}{19.25} \times 14,944$

$F_{A_s} = F_{c_s} = 34,934$ LBS.

UPLIFT

$F_A = 13,463 - 34,934 = -21,480$ LBS

$F_B = 13,463 \pm 0 = 13,463$ LBS

$F_C = 13,463 + 34,934 = 48,397$ LBS

TYPICAL WOOD PILE - LESS THAN 50' LONG
GOOD FOR 30 S.T. = 60,000 LBS BEARING
÷ 1.6

ALLOWABLE 36,000 LBS UPLIFT

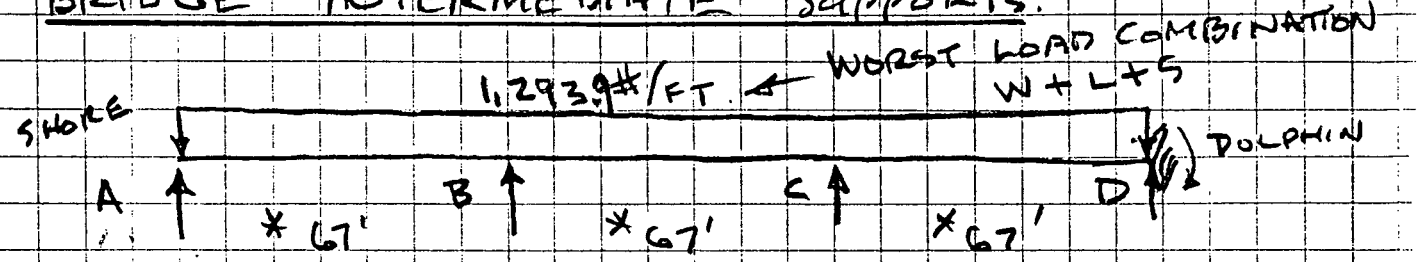
NEW PILE TO BE DRIVEN TO 30 S.T. BEARING CAPACITY.

41/50

PIER MODIFICATION
PILING SUPPORTS.

10-B-98
9CWR

BRIDGE INTERMEDIATE SUPPORTS.



* ASSUME ALL EQUAL

AISC CASE 36

$R_B = R_C = 1.10\,wl = 1.10 \times 1,293.9 \times 67$

$= 95,360$ LBS

$\div$ 2 PILING

$= 47,680$ LBS. EACH PILING

$= 23.8$ S.T. PER PILING

WILL DRIVE PILING TO AT LEAST 50 S.T. BEARING CAPACITY

$R_A = R_D = .4\,wl = .4 \times 1,293.9 \times 67$

$= 34,677$ LBS.

$= 17.3$ S.T.

DOLPHIN END IS SUPPORTED BY MANY PILING

SHORE END SUPPORTED BY CONCRETE PAD

Koppers010190

PIER MODIFICATION
PILING SUPPORTS

10-8-98
XMK

BRIDGE INTERMEDIATE SUPPORTS

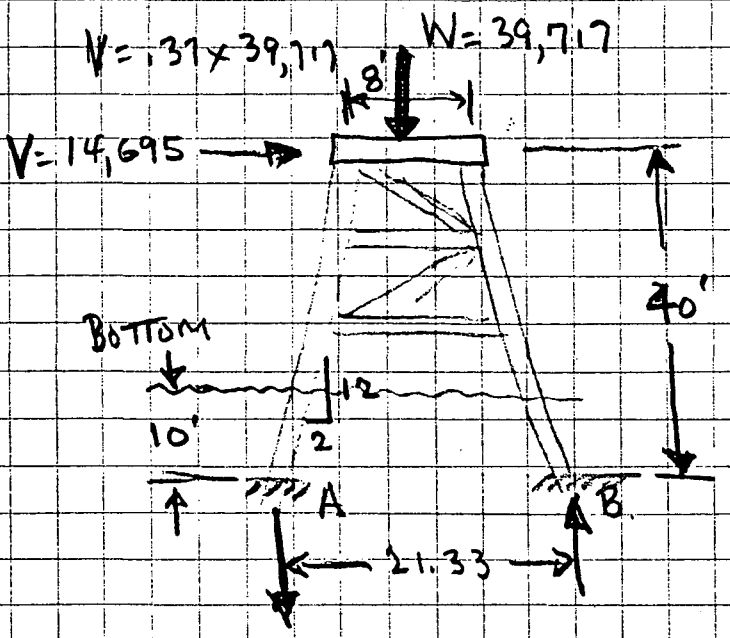
SEISMIC.

$E_H = V = .37\ W$ (SEE p 32)

W = DEAD LOAD ONLY = 538.9 #/FT.

$= \frac{538.9}{1293.9} \times 95{,}360 = 39{,}717$ LBS

MODEL



$F_{V_p} = \frac{39717}{2} = 19{,}858$

$\Sigma M @ A = 0$

$21.33\ F_{Bs} = 40 \times 14{,}695$

$F_{As} = F_{Bs} = 28{,}564$ LBS.

43/50

PIER MODIFICATION
PILING SUPPORTS

10-8-98
JCHM

BRIDGE INTERMEDIATE SUPPORTS

SEISMIC.

UPLIFT

F_A = 13,463 − 28,564 = −15,101 LBS

F_B = 13,463 + 28,564 = 42,027 LBS

USING HP14x73 : DRIVEN TO AT LEAST 50 S.T. BEARING

x .6

30 S.T. UPLIFT.

PILINGS O.K.

Koppers010192

PIER MODIFICATION
WALKWAY END SUPPORTS

10-8-78

AXIAL LOADS. = SEISMIC

$V = .37 W$

$D = 538.9$ LB/FT

WALKWAY $W = 538.9 \times 122 = 65,746$ LBS.

$V = .37 \times 65,746$

$V = 24,326$ LBS

DOLPHIN & SERVICE PLATFORM DESIGNED FOR 400,000 LBS. MOORING LINE FORCE. THE AXIAL SEISMIC LOAD IS WELL BELOW THE ALLOWABLE MOORING LINE FORCE

45/50

PIER MODIFICATIONS

10-12-98 ACMR

BRIDGE - DOLPHIN END SUPPORT:

AXIAL - SEISMIC LOAD

(DOLPHIN END RESISTS ALL AXIAL LOADS.)

D = 538.9 LBS/FT

LENGTH = 208'

W = 208 x 538.9 = 112,091 LBS.

V = .37 W = 41,437 LBS.

DOLPHIN DESIGNED FOR MOORING LINE FORCE = 400,000 LBS. = PRIMARY DOLPHIN STRUCTURE MORE THAN ADEQUATE TO RESIST.

BRIDGE IS SECURED TO DOLPHIN WITH ANCHOR BOLTS. BOLTS ARE SAME BASIC DESIGN AS WALKWAY SUPPORT ANCHOR BOLTS. (SEE p 36)

ANCHOR BOLTS LOADED IN SHEAR

12 - 3/4" RAWL STUDS

ALLOWABLE LOAD = 12,853 LBS/EACH (SEE PAGE 36)

P_{ALLOW} = 12 x 12,853 = 154,236 LBS.

$P_{REQ'D}$ = 41,437 << P_{ALLOW} = 154,236.

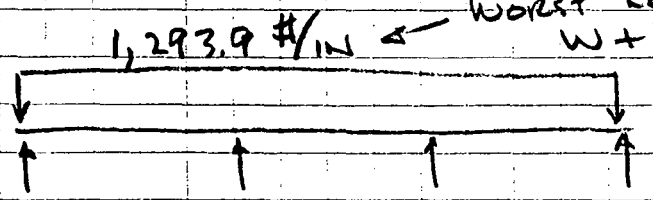
OK

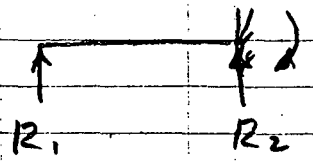
Koppers010194

PIER MODIFICATION
BRIDGE FOOTING

10-10-98

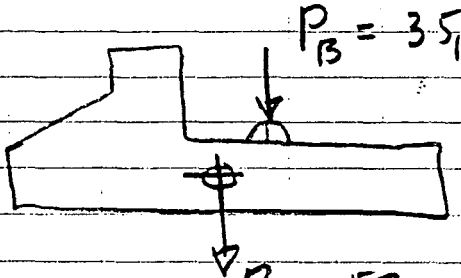
WORST LOAD COMBINATION





R_1 = 32,994 LBS
CP

R_1 = 34,677 LBS
(P



CONCRETE = P_C = 53,000

BRIDGE = P_B = 35,000

88,000 LBS.

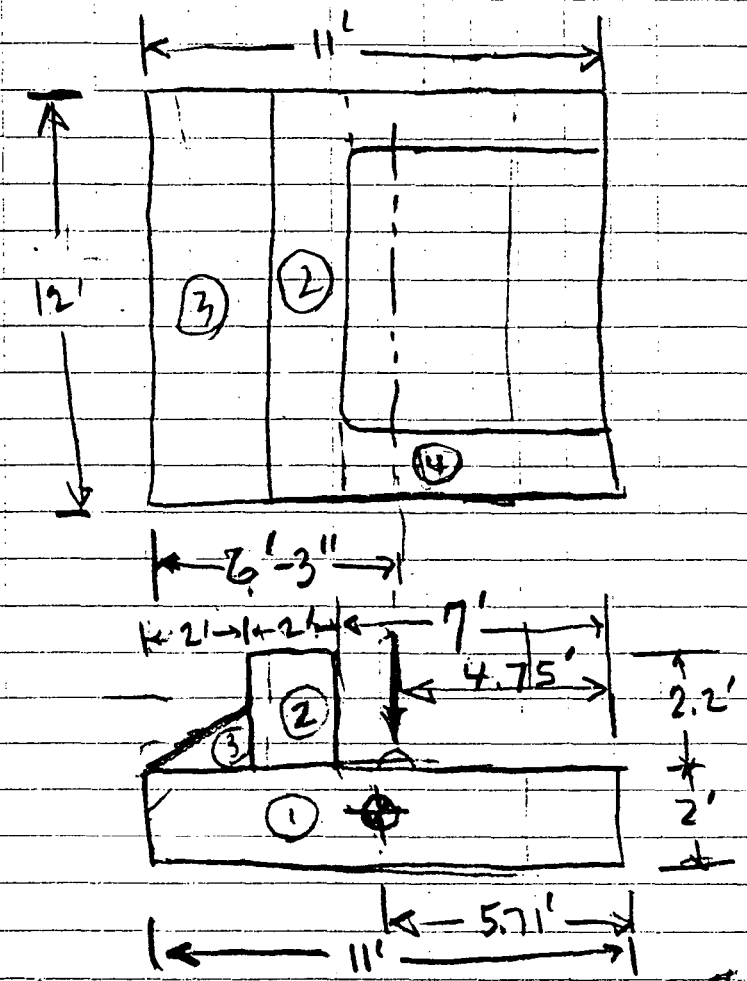
AREA = 11 X 12 = 132 FT²

FOUNDATION PRESSURE = $\frac{88,000}{132}$ = 667 PSF

47/50

PIER MODIFICATION
BRIDGE FOOTING

10-10-98



CONCRETE WEIGHT = 140 #/FT³

				LEVER	MOM
(1)	BASE:	11 × 12 × 2' =	264.0 FT³	5.5	1452 FT⁴
(2)		2 × 12 × 2.2 =	52.8	8.0	422.4
(3)		½ × 2 × 12 × 1 =	12.0	9.3	111.6
(4)		2 × 1.75 × 6.25 × 2.2 =	48.2	3.5	168.7
			377 FT³		2154.7

C.G. = $\frac{2154.7}{377}$ = 5.71'

O.K.

WT = 377 × 140 = 52,780 LBS.

48/50

PIER MODIFICATION
BRIDGE FOOTING

10-10-96 [illegible]

OSSC (UBC) TABLE 18-1-A

#4 SAND - SILTY SAND - CLAYEY SAND ETC

ALLOWABLE FOUNDATION PRESSURE = 1,500 PSF
$P_{ACTUAL} = 666 << P_{ALLOW} = 1,500$ OK

ALLOWABLE BEARING PRESSURE = 150 PSF/FT

COEFFICIENT = .25

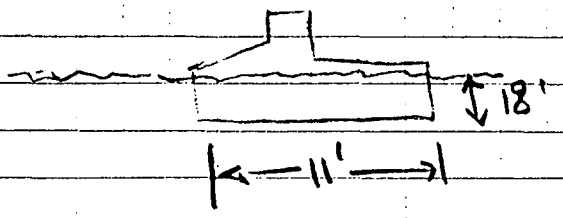
LATERAL LOAD = SEISMIC LOAD (SEE p

$E_H = .37\ W$; W = DEAD LOAD OF BRIDGE

W = 538.9 #/FT.

$W = \frac{538.9}{1293.9} \times 35,000 = 14,577$ LB;

$E_H = .37 \times 14,577 = 5,394$ LBS.



A = 1.5 x 11 = 16.5 FT²

DEPTH = .75'

ALLOWABLE PRESSURE = .75 x 150 = 100
ALLOWABE FORCE = 100 x 16.5 = 1,650#

DEAD LOAD = WT OF FOUNDATION + W BRIDGE
= 88,000 + 13,030 = 101,030 (49/50)

SLIDING RESISTANCE: .25 x 101,030 = 25,258 LB.

PIER MODIFICATION
BRIDGE FOOTING

10-10-98
[illegible]

SEISMIC LOADS CONT'D.

ALLOWABLE LATERAL FORCE = 1,650 LBS

ALLOWABLE SLIDING RESISTANCE = 25,258

ALLOWABLE RESISTANCE = 26,908 LBS.

ACTUAL SEISMIC LOAD = 5,394 LBS
(FROM END OF BRIDGE ONLY)

NO AXIAL LOAD = BRIDGE SECURED AT DOLPHIN END.

SHORE FOOTING END GUIDED TRANSVERSELY ONLY = FREE TO MOVE AXIALLY. (FOR EXPANSION)

50/50

FORM U-1A MANUFACTURERS' DATA REPORT FOR UNFIRED PRESSURE VESSELS

Alternate Form For Single Chamber Completely Shop Fabricated Vessels Only
As required by the Provisions of the ASME Code Rules and the National Board

300190 64/8780 (2)

1. Manufactured by UNION CARBIDE CORP., LINDE DIVISION, TONAWANDA, NEW YORK
(Name and address of Manufacturer)

2. Manufactured for UNION CARBIDE CORP., LINDE DIVISION, NEW YORK, NEW YORK
(Name and address of Purchaser)

3. Type Vert. (Horiz. or Vert.) Vessel No. (TM3000-3024) (Mfrs. Serial) ( ) (State & Std. No.) Nat'l Bd. No. 268 Yr. Built 1968
9% Ni Stl.

4. SHELL: Mat'l SA300 (Kind and Spec. No.) T.S. 95,000 (Fig. of F. B. & Spec. Min. T.S.) Nom. Thk. .485 in. Corr. Allow. 0 in. Diam. 7 ft. 1 in. Length 12 ft. 1 in.

5. SEAMS: Long WSB (Welded, Dbl., Single, Lap, Butt) H.T. (Yes or No)[1] X.R. comp. (Spot or Complete) Sectioned no (Yes or No) Efficiency 90 %

Girth WSB H.T. X.R. comp. Sectioned no No. of Courses 4

If riveted or brazed describe seams fully under remarks.

6. HEADS: (a) Material SA300 9% Ni Stl. T.S. 95,000 (b) Material T.S.

Location (Top, bottom, ends)	Thickness	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a) Top&Bottom	.5			2:1				concave
(b)								

If removable, bolts used (Material, Spec. No., T.S., Size, Number) Other fastening (Describe or Attach Sketch)

7. Constructed for max. allowable working press.[2] 250 psi. at max. temp. 100 °F Min. temp. (when less than -20°) -320 °F. Hydrostatic Pneumatic Combination Test Press. 408 psi.

8. SAFETY OR RELIEF VALVE OUTLETS: Number Size Location

9. NOZZLES:

Purpose, (Inlet Outlet, Drain)	Number	Diam. or Size	Type	Material	Thickness	Reinforcement Material	How Attached
2-1 1/2",	2-1/4",	2-1"	Pipe	9% Ni Stl.	Sch. 40	no	Welded

10. INSPECTION OPENINGS Manholes, No. Size Location
Handholes, No. Size Location
Threaded, No. Size Location

11. SUPPORTS: Skirt no (Yes or No) Lugs 2 (Number) Legs (Number) Other (Describe) Attached Welded to heads (Where & How)

12. REMARKS: Code Case 1308-5

Vessel to be used for storage of liquified gas.

(Brief description of purpose of the vessel, as Air Tank, After Cooler, Jacketed Cooker, etc. State contents of each part.)
[1] If Postweld Heat-Treated [2] List other internal or external pressures with coincident temperature when applicable.

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Unfired Pressure Vessels.

Date January 8, 19 68 Signed UCC, Linde Division (Manufacturer) By C.C. Bayman

Certificate of Authorization Expires December 31, 1968

CERTIFICATE OF SHOP INSPECTION

VESSEL MADE BY UCC, Linde Division at Tonawanda, New York

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State of National Board and employed by Travelers Indemnity Co. of Conn. have inspected the pressure vessel described in this manufacturer's data report on January 8, 1968, and state that to the best of my knowledge and belief, the manufacturer has constructed this pressure vessel in accordance with the applicable sections of the ASME Boiler and Pressure Vessel Code.
By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this manufacturer's data report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date January 8, 19 68

J.C. Magee [signature]
Inspectors Signature

Commissions N.B. 6137 Penna 1610 and Ohio
Nat'l Board or State and No.

CALORIA HT 43
EXXON COMPANY, U.S.A

DATE ISSUED: 02/22/95
SUPERSEDES DATE: 09/15/93

MATERIAL SAFETY DATA SHEET

EXXON COMPANY, U.S.A. P.O. BOX 2180 HOUSTON, TX 77252-2180

A. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
CALORIA HT 43

PRODUCT CODE
333296

PRODUCT CATEGORY
Petroleum Process Oil

PRODUCT APPEARANCE AND ODOR
Clear liquid, light yellow color
Faint petroleum hydrocarbon odor

MEDICAL EMERGENCY TELEPHONE NUMBER
(713) 656-3424

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION
Distillates (petroleum), hydrotreated heavy paraffinic	64742-54-7	Greater than 99%
or	or	
Distillates (petroleum), solvent-dewaxed heavy paraffinic	64742-65-0	
Proprietary additives	Mixture	Less than 1%

This product, as manufactured by Exxon, does not contain polychlorinated biphenyls (PCB's).

All components of this product are listed on the U.S. TSCA inventory.

See Section E for Health and Hazard Information.

See Section H for additional Environmental Information.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

Health	Flammability	Reactivity	BASIS
1	1	0	Recommended by Exxon

EXPOSURE LIMIT FOR TOTAL PRODUCT
5 mg/m3 for oil mist (as oil) for an 8-hour workday

BASIS
OSHA Regulation 29 CFR 1910.1000 and recommended by the American Conference of Governmental Industrial Hygienists

(ACGIH). ACGIH states that the air is to be sampled by a method that does not collect vapor; in addition, it lists a 10 mg/m3 STEL.

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
If splashed into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN
In case of skin contact, remove any contaminated clothing and wash skin with soap and water. Launder or dry-clean clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

INHALATION
Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician. If breathing is irregular or has stopped, start resuscitation; administer oxygen, if available. If overexposed to oil mist, remove from further exposure until excessive oil mist condition subsides.

INGESTION
If ingested, DO NOT induce vomiting; call a physician immediately.

D. FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM)
199~C (390~F)
ASTM D 92, Cleveland Open Cup

AUTOIGNITION TEMPERATURE
Greater than 315~C (600~F)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION

Health	Flammability	Reactivity	BASIS
1	1	0	Recommended by Exxon

HANDLING PRECAUTIONS
Use product with caution around heat, sparks, pilot lights, static electricity, and open flame.

FLAMMABLE OR EXPLOSIVE LIMITS (APPROXIMATE PERCENT BY VOLUME IN AIR)
Estimated values: Lower Flammable Limit 0.9% Upper Flammable Limit 7%

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES
Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires

involving this type of p. duct, depending on size of potential size of fire and circumstances related to the situation. Plan fire protection and response strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protection Guide on Hazardous Materials", Tenth Edition (1991):

Use water spray, dry chemical, foam or carbon dioxide to extinguish the fire. Use water to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for persons attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing of gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS
Fumes, smoke, carbon monoxide, sulfur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING
"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repair, welding, or other contemplated operations.

B. HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS
Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)
Prolonged or repeated skin contact may cause skin irritation.

NATURE OF HAZARD AND TOXICITY INFORMATION
Repeated and prolonged overexposure to oil mists may result in droplet deposition, oil granuloma formation, inflammation and increased incidence of infection.

In accordance with the current OSHA Hazard Communication Standard criteria, this product does not require a cancer hazard warning. This is because the product is formulated from base stocks which are severely hydrotreated, severely solvent extracted, and/or processed by mild hydrotreatment and extraction. Alternatively, it may consist of components not otherwise affected by IARC criteria, such as atmospheric distillates or synthetically derived materials, and as such is not characterized by current IARC classification criteria.

Prolonged or repeated skin contact with this product tends to remove skin oils, possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Product contacting the eyes may cause eye irritation.

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE
None recognized

F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE
IBP Approximately 293~C (560~F)
by ASTM D 2887

SPECIFIC GRAVITY (15.6~C/15.6~C)
0.88

MOLECULAR WEIGHT
Approximately 372

pH
Essentially neutral

POUR, CONGEALING OR MELTING POINT
-6~C (20~F)
Pour Point by ASTM D 97

VISCOSITY
160 SSU @ 100~F

VAPOR PRESSURE
Less than 0.01 mm Hg @ 20~C

VAPOR DENSITY (AIR = 1)
Greater than 5

PERCENT VOLATILE BY VOLUME
Negligible from open container in 4 hours @ 38~C (100~F)

EVAPORATION RATE @ 1 ATM. AND 25~C (77~F) (n-BUTYL ACETATE = 1)
Less than 0.01

SOLUBILITY IN WATER @ 1 ATM. AND 25~C (77~F)
Negligible; less than 0.1%

G. REACTIVITY

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc., as this presents a serious explosion hazard.

Keep containers closed when not in use. Do not store near heat, sparks, flame or strong oxidants.

In order to prevent fire or explosion hazards, use appropriate equipment.

Information on electrical equipment appropriate for use with this product may be found in the latest edition of the National Electrical Code (NFPA-70). This document is available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

PERSONAL HYGIENE
Minimize breathing vapor, mist or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before re-use. Remove contaminated shoes and thoroughly clean before re-use; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION

TRANSPORTATION INCIDENT INFORMATION
For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents.

U.S. DOT HAZARDOUS MATERIALS SHIPPING DESCRIPTION
Not regulated

OSHA REQUIRED LABEL INFORMATION
In compliance with hazard and right-to-know requirements, where applicable OSHA Hazard Warnings may be found on the label, bill of lading or invoice accompanying this shipment.

Note: Product label may contain non-OSHA related information also.

The information and recommendations contained herein are, to the best of Exxon's knowledge and belief, accurate and reliable as of the date issued. Exxon does not warrant or guarantee their accuracy or reliability, and Exxon shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer repackages this product, legal counsel should be consulted to insure proper health, safety and other necessary information is included on the container.

The Environmental Information included under Section H hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by Exxon Company, U.S.A. in order to provide additional health and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these

H. ENVIRONMENTAL INFORMATION

CLEAN WATER ACT / OIL POLLUTION ACT
This product may be classified as an oil under Section 311 of the Clean Water Act, and under the Oil Pollution Act. Discharges or spills into or leading to surface waters that cause a sheen must be reported to the National Response Center (1-800-424-8802).

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Recover free product. Add sand, earth, or other suitable absorbent to spill area. Minimize skin contact. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas.

Assure conformity with applicable governmental regulations.

THE FOLLOWING INFORMATION MAY BE USEFUL IN COMPLYING WITH VARIOUS STATE AND FEDERAL LAWS AND REGULATIONS UNDER VARIOUS ENVIRONMENTAL STATUTES:

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355 (SARA Sections 301-304)
No TPQ for product or any constituent greater than 1% or 0.1% (carcinogen).

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372 (SARA Section 313)
No toxic chemical is present greater than 1% or 0.1% (carcinogen).

HAZARDOUS CHEMICAL REPORTING, EPA REGULATION 40 CFR 370 (SARA Sections 311-312)

EPA HAZARD CLASSIFICATION CODE:	Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard	Not Applicable
						XXX

I. PROTECTION AND PRECAUTIONS

VENTILATION
Use local exhaust to capture vapor, mists or fumes, if necessary. Provide ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. No smoking, or use of flame or other ignition sources.

RESPIRATORY PROTECTION
Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES
Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION
Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT
Use chemical-resistant apron or other impervious clothing, if needed, to avoi contaminating regular clothing, which could result in prolonged or repeated skin contact.

WORK PRACTICES / ENGINEERING CONTROLS

rating systems, together with Exxon's interpretation of the available data.

FOR LUBRICANTS TECHNICAL ASSISTANCE CALL: 1-800-443-9966

FOR FUELS TECHNICAL ASSISTANCE CALL: 713-656-4955

FOR AN MSDS OR ASSISTANCE WITH AN MSDS, DIRECT INQUIRIES TO THE ADDRESS BELOW OR CALL:

MARKETING TECHNICAL SERVICES
EXXON COMPANY, U.S.A.
ROOM 2344
P. O. BOX 2180
HOUSTON, TX 77252-2180
(713) 656-5949

IF YOU HAVE AN IMMEDIATE NEED FOR AN MSDS, DIAL 1-800-298-4007 FOR A FAXED COPY.

KOPPERS INDUSTRIES

Koppers Industries, Inc.
7540 NW St. Helen's Road
Portland, OR 97210-3663

Telephone: 503-286-3681
Fax: 503-285-2831

Portland Liquid Pitch Project
Project Update
November 23, 1999

Status of Mechanical Work:

We had the scaffolding modified on Friday the 19th to allow the remaining line to pass through without interference from the support legs. The pitch transfer and recirculation lines have since been completed. At this time work is progressing on the tracing for these line, with expectations that they will be completed on Friday the 26th. Pressure testing should be completed on Monday the 29th. A punch list of odds and ends is being generated for completion after these final lines are tested.

Status of Electrical Work:

I talked to Dave Chandler today and reconfirmed instrumentation requirements for startup as follows:

- All transmitters in the oil heater area and the oil-metering shed need to be online no later than Monday the 29th.
- All instruments at the top of 200 tank need to be in service no later than Wednesday the 1st of December.
- All electrical-pneumatic control valves need to be functional during the week of the 29th.
- All electrical and instrumentation work at the dock needs to be completed during the week of the 29th.

It is hard to say at this point what exactly when the lighting will be completed.

Status of Insulation Work:

The tank sidewall is complete except for covering the tie down rods. The tank roof is about 80% complete as I write this, it should be done this week. Work has also begun on the hot oil lines in the hot oil secondary pump shed area.

General notes:

One of the tank manways has been unbolted except for 4 bolts. On Monday the 29th we will enter and inspect the inside of the tank to check on settling which might have occurred during the hydro testing.

Plant personnel have adjusted all but 4 or 5 of the tie down bolts with a 1/8" gap to allow for heat-up growth. The remaining bolts were too tight to break loose in the night; these will be worked on either Wednesday or Friday as time permits.

TJ Turner and myself will check out all new pumps electrically and mechanically on Monday the 29th.

Charlie Norris
Construction Manager

Date: 11/22/99 6:37 PM
Sender: Jim Dietz
To: Amos Kamerer; Kevin Fitzgerald; BILL MEISINGER; BOB WOMBLES; John Kunkle; Traci Self; Jack Stephenson; Mark Cilley; iskoppers@aol.com; TJ Turner; Wayne Plovic
Priority: Normal
Subject: Re:Liquid Pitch Project Time Line Update

Amos,

A couple of comments:

1) If the contractor works Friday, you'll have to be in the plant with them.

2) When starting the hot oil system, you'll naturally bleed the air and check for oil leaks/loss prior to adding pitch.

3) All insulation blankets for the pitch valves will need to be in place prior to getting the valves hot for personnel protection.

4) Please give PTSI a start-up schedule, especially when there is hot oil present at the dock lines.

5) If you are adding liquid pitch to the tank from the melter, how are you controlling foundation heat up? Are you adding nitrogen first? When you add the pitch, it will have to cover the coils as you cannot have the coils heating in air with pitch below them.

6) Doesn't the level transmitter have to be installed and zeroed prior to adding pitch? I am not sure if the transmitter can be properly zeroed with the coils exposed and seeing an uneven surface, but perhaps you would like to know what this looks like to the transmitter.

Amos, please have Charlie & Dave transmit their detailed commissioning plan.

Jim

Reply Separator

Subject: Liquid Pitch Project Time Line Update
Author: Amos Kamerer
Date: 11/19/99 4:21 PM

W/O 11/15/99

The insulation contractor did not get finished with insulating the new tank this week, as expected. However, at their expense, they had the scaffold erectors come in to modify the scaffolding, to permit the mechanical contractor access to the tank in the areas that they are scheduled to work on next week, while the insulation is being finished.

The mechanical and electrical contractors continued work in their areas of the project.

Dave and JT conducted the first training class for the hourly employees yesterday. All employee's but 2 were able to attend.

W/O 11/22/99

The insulation contractor will have the tank side wall finished on Monday, and the roof finished Tuesday. They will start dismantling the scaffold on Wednesday and will be done with this early the following week.

Ponder Burner and the electrical contractor will do all of the hot oil heater

electrical and instrumentation checks this week, including the firing of the heater, so that we will be ready for a system start up the following week.

The mechanical contractor will finish all of the remaining pitch, hot oil and nitrogen line tie ins this week, again, so that we will be ready for start up the following week. These people will work the Friday after Thanksgiving, if needed, as they do not get paid for this Holiday and this would give them a full weeks pay. They will only work if they have work to do.

W/O 11/29/99

The hot oil for the new hot oil system is scheduled to be delivered Monday morning, we will do a slow start up of this system, at this time. All going well, we plan to add about 500 tons of liquid pitch from the melter, to the new T-200 tank on Thursday. This will permit the drying out of any moisture in the sand and special insulation aggregate, that is under the tank and inside the ring wall.

The mechanical contractor will concentrate on the punch list items that need to be finished for the pitch transfer. They are also scheduled to install the discharge hose rack, and to finish the fire line modifications, down at the dock.

The insulation and electrical contractors will continue on work in their areas. Items such as making insulation blankets for valves and pumps; putting up the lights around the tank and down at the dock, etc..

W/O 12/6/99

A final system check is planned for this week. The radar level transmitters on the new tank will be installed this week. We plan to add another 500 tons of liquid pitch to T-200 and then test the circulation system on this tank.

All contractors will continue to work on the punch list items that are still remaining and
additional employee training will be conducted.

W/O 12/13/99

Things should be pretty much finished by now. Some punch list items will need to be finished; insulation items, electrical items, chain link fence repairs, clean up, etc., etc..
We will transfer some of the pitch in T-200 back to the melter, to make sure we can accommodate the first discharge, next week. We plan to work over this week end, to run the hot oil system, to make sure that the new pitch discharge line is ready for this first unloading.

W/O 12/20/99

Gearbulk is still showing an ETA of the 22nd, and with our normal weather at this time of year, gaining any time might not be possible.

Amos

KOPPERS INDUSTRIES

Koppers Industries, Inc.
7540 NW St. Helen's Road
Portland, OR 97210-3663

Telephone: 503-286-3681
Fax: 503-285-2831

Portland Liquid Pitch Project
Project Update
November 12, 1999

Status of Mechanical Work:

The shutdown progressed well this week. All hot work was executed according to the procedures and no unforeseen problems arose. The startup of the old hot oil system was underway, as I had to leave the plant. However there seemed to be no unmanageable problems developing. All pumps have been checked for shaft alignment.

Status of Electrical Work:

The electrical work is progressing well. All motor starters are ready for use, and in fact the oil fill and drain pump had been tested and prepared for use during the startup. Since the MCC has been energized all pumps which are not ready to be used have been locked out with plant locks.

Status of Insulation Work:

The insulation crew has done a good job of responding to our needs on short notice during the shutdown. As a result of needing to develop more elaborate tie in procedures than was anticipated, we had considerably more insulation work as well. This was handled in a very timely fashion. I have discussed the progress on the tank work with the insulation foreman and have informed him that the scaffolding must be removed from in front of the transfer line by the 19th.

General notes:

As shutdowns go, this weeks work went exceptionally well. On Monday, Bill and Dave will meet with the PLC programmers to develop a plan for testing all of the instrumentation.

Charlie Norris
Construction Manager

Date: 11/12/99 6:47 PM
Sender: Amos Kamerer
To: Kevin Fitzgerald; Jim Dietz; BILL MEISINGER; BOB WOMBLES; John Kunkle; Traci Self; Jack Stephenson; Mark Cilley; iskoppers@aol.com
Priority: Normal
Subject: Liquid Pitch Project Update

Cost Analysis
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a) budget	$ 4,310,000
b) spent to date	4,223,170
c) committed to date	4,687,000
d) deviation	377,000

Time Line
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w/o 11/08/99

This week the plant was down to permit the tie in of the old and new hot oil heating systems. This followed last weeks cleaning and flushing of the old hot oil system, as the oil was due for changing. Today, after the tie ins, we re-charged the old hot oil system with new oil and we are now back operating. As a result, we are having to work this weekend, so that all systems will be ready and the pitch will be up to the required temperature, for next weeks business, which starts with truck loadings at midnight on Sunday.

w/o 11/15/99

All contractor's will continue with work in their area's. The insulation contractor is scheduled to be complete with the tank by Friday 11/19, or to be close enough to finished to permit the removal of the scaffold; thus, permitting the other contractor's access to the tank for their work, that still needs to be completed.

The checking of the instrumentation is scheduled to start 11/18.

We have a meeting scheduled with the electrical contractor for the 15th, to re-access the electrical work that will be need to be completed in the next couple of weeks, for us to be able to meet the rest of our schedule, for this period. We do not see this as a problem, it's just a CYA measure.

w/o 11/22/99

All contractor's will continue work in their area's. The mechanical contractor will complete the piping work around the tank; work that has been delayed due to the interference of the scaffold.

w/o 11/29/99

All contractor's will continue on work in their area's. The charging of the new hot oil system with oil is scheduled for Monday of this week and the start up of the heater. We also plan to make the first transfer of some 250 tons or so, of liquid pitch to tank T-200 from the melter.

Mark Cilley will be here to do the training of the PTSI personnel in our SH&E philosophies and requirements. We also have a meeting scheduled here at the plant for 12/01 with the ODEQ. They have offered, and we have accepted, that they will do a walk through of the plant and then help us write a waste reduction plan, something that we will be required to do.

w/o 12/06 & 13/99

All contractor's will continue with work in their area's. These weeks will cover

the balance of the checking out of all of the system's and the training of our employee's, on these new system's.

w/o 12/20/99

The first vessel is due on 12/22/99. Straws are curently being drawn by the out-of-town contingent, to see who gets which extra bedroom at the Kamerer house for Christmas; some my have to double up in one bed! Ha! Ha!

It's my plan to provide a similar update to this one, on Friday of every week through out the balance of the project.

Amos

(Full Version)	G/L	Loc	Dst	S-Det	Dept	Emp	Doc	JV#
	4210	9270	All	All	All	All	All	All

G/L	Loc	Dst	S-Det	Dept	Emp	Doc	Vendor/Comments/User	May Amounts	Jun Amounts	Jul Amounts	Aug Amounts	Sep Amounts	Oct Amounts	Current Y-T-D
4210	9270			46			Pr Yr Begin Balance	0	0	0	0	0	0	857,456
4210	9270			46		32	A C & S INC	0	0	0	0	0	33,000	33,000
4210	9270			46		32	C WARK TRUCKING INC	0	0	0	0	0	0	9,187
4210	9270			46		44	CASH RECEIPTS	19,623-	0	0	0	0	0	19,623-
4210	9270			46		44	CASH RECEIPTS	0	0	0	0	1,475-	0	1,475-
4210	9270			46		44	CASH RECEIPTS	0	0	0	0	0	2,500-	2,500-
4210	9270			46		32	CHANDLER ELEC INC&TAYL	0	0	0	20,918	0	0	20,918
4210	9270			46		32	CHANDLER ELEC INC&TAYL	0	29,018	0	0	0	0	29,018
4210	9270			46		32	CHANDLER ELECTRIC INC	0	15,339	0	0	0	0	15,339
4210	9270			46		32	CHANDLER ELECTRIC INC	0	0	0	26,856	0	0	26,856
4210	9270			46		32	CHANDLER ELECTRIC INC	0	0	0	22,611	0	0	22,611
4210	9270			46		32	CHANDLER ELECTRIC INC	0	0	0	0	0	52,294	52,294
4210	9270			46		32	CHANDLER ELECTRIC INC	0	0	0	0	0	75,523	75,523
4210	9270			46		32	CHANDLER ELECTRIC INC	0	0	0	0	0	0	10,592
4210	9270			46		32	CONSTRUCTION TECHNOLOG	0	0	0	0	0	1,000	1,000
4210	9270			46		32	CONSTRUCTION TECHNOLOG	0	0	0	5,200	0	0	5,200
4210	9270			46		32	CURTISS WRIGHT - FERRI	0	0	0	0	0	6,053	6,053
4210	9270			46		32	DIVERSIFIED MARINE INC	0	1,636	0	0	0	0	1,636
4210	9270			46		32	DIVERSIFIED MARINE INC	0	0	0	0	0	0	129,863
4210	9270			46		32	DIVERSIFIED MARINE INC	25,973	0	0	0	0	0	25,973
4210	9270			46		32	DIVERSIFIED MARINE INC	0	0	0	0	0	0	64,890
4210	9270			46		32	DREXELBROOK ENGINEERIN	0	0	0	1,499	0	0	1,499
4210	9270			46		32	EQUIPMENT & CONTROLS I	0	0	0	0	0	2,390	2,390
4210	9270			46		32	EQUIPMENT & CONTROLS I	0	0	0	0	0	3,690	3,690
4210	9270			46		32	FAMILIAN AUTOMATED VAL	0	0	0	0	0	57,902	57,902
4210	9270			46		32	FAMILIAN AUTOMATED VAL	0	0	0	3,191	0	0	3,191
4210	9270			46		32	FICKESS PUMPS INC	0	0	0	0	4,410	0	4,410
4210	9270			46		32	FICKESS PUMPS INC	0	0	0	0	0	49,585	49,585
4210	9270			46		32	GEO ENGINEERS INC	0	0	0	0	0	0	2,082
4210	9270			46		32	GEO ENGINEERS INC	0	0	0	283	0	0	283
4210	9270			46		32	GEO ENGINEERS INC	0	0	0	0	0	2,036	2,036
4210	9270			46		32	GEO ENGINEERS INC	0	0	0	584	0	0	584
4210	9270			46		32	GEO ENGINEERS INC	0	0	0	4,127	0	0	4,127
4210	9270			46		32	GEO ENGINEERS INC	0	10,061	0	0	0	0	10,061
4210	9270			46		32	GEO ENGINEERS INC	0	920	0	0	0	0	920
4210	9270			46		32	GEO ENGINEERS INC	0	1,182	0	0	0	0	1,182
4210	9270			46		32	GEO ENGINEERS INC	0	12,523	0	0	0	0	12,523
4210	9270			46		32	GRAYBAR ELECTRIC CO IN	0	0	0	15,256	0	0	15,256
4210	9270			46		32	HARDER MECHANICAL CONT	0	0	0	0	0	183,027	183,027
4210	9270			46		32	HARDER MECHANICAL CONT	0	0	303,133	0	0	0	303,133
4210	9270			46		32	HARDER MECHANICAL CONT	0	0	0	93,824	0	0	93,824
4210	9270			46		32	HARDER MECHANICAL CONT	0	0	0	0	0	0	279,300
4210	9270			46		32	HARDER MECHANICAL CONT	0	0	0	0	0	0	93,100
4210	9270			46		32	INDUSTRIAL CONTROLS &	0	0	0	110	0	0	110
4210	9270			46		32	INDUSTRIAL CONTROLS &	0	0	0	198	0	0	198

Koppers Industries Inc.
CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
October 1999

Requested By TITUS

(Full Version)	G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
	4210	9270	All	All	All	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	Vendor/Comments/User	May Amounts	Jun Amounts	Jul Amounts	Aug Amounts	Sep Amounts	Oct Amounts	Current Y-T-D
4210	9270			46		32	INDUSTRIAL CONTROLS &	0	0	0	22,928	0	0	22,928
4210	9270			46		32	INDUSTRIAL VALVE OF OR	0	0	2,230	0	0	0	2,230
4210	9270			46		32	INTERNATIONAL INSPECTI	0	1,238	0	0	0	0	1,238
4210	9270			46		32	INTERNATIONAL POWER MA	0	7,433	0	0	0	0	7,433
4210	9270			46		32	J CAMERON MCKERNAN	0	0	8,765	0	0	0	8,765
4210	9270			46		32	J CAMERON MCKERNAN	0	6,572	0	0	0	0	6,572
4210	9270			46		32	J CAMERON MCKERNAN	0	0	0	0	0	2,693	2,693
4210	9270			46		32	J CAMERON MCKERNAN	0	0	0	0	0	0	24,936
4210	9270			46		32	J CAMERON MCKERNAN	0	0	0	0	0	0	1,860
4210	9270			46		32	J CAMERON MCKERNAN	0	0	0	0	0	0	12,492
4210	9270			46		32	M S JACOBS & ASSOCIATE	0	0	0	0	0	610	610
4210	9270			46		32	MADDEN INDUSTRIAL CRAF	0	0	0	16,388	0	0	16,388
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	18,986	0	0	18,986
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	2,429	2,429
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	2,017	2,017
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	465	465
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	7,933	7,933
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	283	283
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	1,029	1,029
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	247	247
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	711	711
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	482	482
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	327	327
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	7,918	7,918
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	14,797	14,797
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	17,016	17,016
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	9,826	9,826
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	9,137	9,137
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	23,175	23,175
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	38,100	38,100
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	999	999
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	945	945
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	4,185	4,185
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	4,400	4,400
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	23,775	23,775
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	34,696	34,696
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	31,378	31,378
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	27,192	27,192
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	29,361	29,361
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	28,507	28,507
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	24,798	24,798
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	15,517	15,517
4210	9270			46		32	MCDOWELL WELDING & PIP	0	53,650	0	0	0	0	53,650
4210	9270			46		32	MCDOWELL WELDING & PIP	0	56,943	0	0	0	0	56,943
4210	9270			46		32	MCDOWELL WELDING & PIP	0	83,892	0	0	0	0	83,892

(Full Version)	G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
	4210	9270	All	All	All	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	Vendor/Comments/User	May Amounts	Jun Amounts	Jul Amounts	Aug Amounts	Sep Amounts	Oct Amounts	Current Y-T-D
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	22,422	0	0	0	22,422
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	26,867	0	0	0	26,867
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	48,029	0	0	0	48,029
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	19,477	0	0	19,477
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	0	2,298
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	0	6,333
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	0	60,027
4210	9270			46		32	MCDOWELL WELDING & PIP	73,981	0	0	0	0	0	73,981
4210	9270			46		32	MCDOWELL WELDING & PIP	48,554	0	0	0	0	0	48,554
4210	9270			46		32	MCDOWELL WELDING & PIP	31,975	0	0	0	0	0	31,975
4210	9270			46		32	MCDOWELL WELDING & PIP	14,541	0	0	0	0	0	14,541
4210	9270			46		32	MORSE CONSTRUCTION GRO	50,315	0	0	0	0	0	50,315
4210	9270			46		32	MORSE CONSTRUCTION GRO	0	0	0	0	0	0	181,119
4210	9270			46		32	MORSE CONSTRUCTION GRO	0	0	0	0	0	80,666	80,666
4210	9270			46		32	MORSE CONSTRUCTION GRO	0	0	0	0	0	6,505	6,505
4210	9270			46		32	MORSE CONSTRUCTION GRO	0	0	0	71,541	0	0	71,541
4210	9270			46		32	NORTHWEST NATURAL GAS	0	0	0	0	0	0	8,311
4210	9270			46		32	P S I ENVIRONMENTAL GE	0	0	0	0	0	4,313	4,313
4210	9270			46		32	P S I ENVIRONMENTAL GE	448	0	0	0	0	0	448
4210	9270			46		32	P S I ENVIRONMENTAL GE	0	0	0	1,666	0	0	1,666
4210	9270			46		32	P S I ENVIRONMENTAL GE	0	0	0	3,875	0	0	3,875
4210	9270			46		32	P S I ENVIRONMENTAL GE	0	2,301	0	0	0	0	2,301
4210	9270			46		32	P S I ENVIRONMENTAL GE	0	0	0	0	0	283	283
4210	9270			46		32	PACIFIC TECHNICAL IND	0	0	0	0	0	281	281
4210	9270			46		32	PACIFIC TECHNICAL IND	0	0	0	0	1,647	0	1,647
4210	9270			46		32	PACIFIC TECHNICAL IND	0	0	0	0	1,202	0	1,202
4210	9270			46		32	PARAMOUNT SUPPLY CO	0	0	0	0	0	5,327	5,327
4210	9270			46		32	PARAMOUNT SUPPLY CO	0	0	0	1,524	0	0	1,524
4210	9270			46		32	PAUL MUELLER CO	0	0	0	0	0	7,612	7,612
4210	9270			46		32	PERFORMANCE PUMPS INC	0	19,887	0	0	0	0	19,887
4210	9270			46		32	PERFORMANCE PUMPS INC	0	543	0	0	0	0	543
4210	9270			46		32	PONDER BURNER CO	0	0	0	20,600	0	0	20,600
4210	9270			46		32	PONDER BURNER CO	0	0	5	0	0	0	5
4210	9270			46		32	PONDER BURNER CO	0	0	0	0	0	10,780	10,780
4210	9270			46		32	PONDER BURNER CO	0	0	0	0	15,215	0	15,215
4210	9270			46		32	PONDER BURNER CO	0	0	0	0	22,823	0	22,823
4210	9270			46		32	PONDER BURNER CO	0	0	0	0	10,780	0	10,780
4210	9270			46		32	PORTLAND CITY	0	14,578	0	0	0	0	14,578
4210	9270			46		31	PORTLAND CITY	0	225	0	0	0	0	225
4210	9270			46		31	PORTLAND CITY BUREAU O	0	0	0	0	0	0	1,357
4210	9270			46		32	PORTLAND CITY BUREAU O	0	0	0	0	0	0	15,879
4210	9270			46		31	PORTLAND CITY BUREAU O	1,182	0	0	0	0	0	1,182
4210	9270			46		32	PROCESS PLANTS CONSULT	2,880	0	0	0	0	0	2,880
4210	9270			46		32	PROCESS PLANTS CONSULT	0	0	0	0	0	0	1,280
4210	9270			46		32	PROCESS PLANTS CONSULT	0	0	0	0	0	0	3,840

$929,628

	G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
(Full Version)	4210	9270	All	All	All	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	Vendor/Comments/User	May Amounts	Jun Amounts	Jul Amounts	Aug Amounts	Sep Amounts	Oct Amounts	Current Y-T-D
4210	9270	940		46		55	PAYROLL JV By PR/SC/46	0	427	0	0	0	0	427
4210	9270	940		46		55	PAYROLL JV By PR/SC/46	433	0	0	0	0	0	433
Total Location (9270) PORTLAND								276,032	356,527	415,383	382,956	12,402	952,923	4,297,683
Total Report								276,032	356,527	415,383	382,956	12,402	952,923	4,297,683

- 7688 - 74513
945,235 / 4,223,170

G/L	Loc	Dat	S-Det	Dept	Emp	Doc	JV#
4210	9270	All	All	All	All	All	All

G/L	Loc	Dat	S-Det	Dept	Emp	Doc	JV#	Tx#	Comments/Vendor/User	Amounts
4210	9270			46		32	9	362	PAUL MUELLER CO	7,612.00
4210	9270			46		32	10	362	M S JACOBS & ASSOCIATES INC	610.34
4210	9270			46		32	11	362	A C & S INC	33,000.00
4210	9270			46		32	12	362	ROADWAY EXPRESS INC	115.73
4210	9270			46		32	13	362	FICKESS PUMPS INC	49,585.86
4210	9270			46		32	14	362	MORSE CONSTRUCTION GROUP INC	80,666.80
4210	9270			46		32	15	362	MORSE CONSTRUCTION GROUP INC	6,505.90
4210	9270			46		32	16	362	P S I ENVIRONMENTAL GEOTECHNIC	4,313.50
4210	9270			46		32	17	362	FAMILIAN AUTOMATED VALVE	57,902.30
4210	9270			46		32	26	362	PONDER BURNER CO	10,780.00
4210	9270			46		32	27	362	PACIFIC TECHNICAL IND INC	281.00
4210	9270			46		32	28	362	PARAMOUNT SUPPLY CO	5,527.00
4210	9270			46		32	29	362	CONSTRUCTION TECHNOLOGY LAB	1,000.00
4210	9270			46		32	30	362	CURTISS WRIGHT - FERRIS ENG	6,053.00
4210	9270			46		32	31	362	HARDER MECHANICAL CONTRS INC	183,027.00
4210	9270			46		32	32	362	EQUIPMENT & CONTROLS INC	2,590.00
4210	9270			46		32	33	362	EQUIPMENT & CONTROLS INC	3,690.00
4210	9270			46		32	167	363	CHANDLER ELECTRIC INC	75,523.71
4210	9270			46		32	168	363	CHANDLER ELECTRIC INC	52,294.22
4210	9270			46		32	52	362	MCDOWELL WELDING & PIPEFITTING	7,918.00
4210	9270			46		32	53	362	MCDOWELL WELDING & PIPEFITTING	9,137.00
4210	9270			46		32	54	362	MCDOWELL WELDING & PIPEFITTING	9,826.00
4210	9270			46		32	55	362	MCDOWELL WELDING & PIPEFITTING	17,016.00
4210	9270			46		32	56	362	MCDOWELL WELDING & PIPEFITTING	14,797.00
4210	9270			46		32	57	362	MCDOWELL WELDING & PIPEFITTING	15,517.00
4210	9270			46		32	58	362	MCDOWELL WELDING & PIPEFITTING	24,798.00
4210	9270			46		32	59	362	MCDOWELL WELDING & PIPEFITTING	28,507.00
4210	9270			46		32	60	362	MCDOWELL WELDING & PIPEFITTING	29,361.00
4210	9270			46		32	61	362	MCDOWELL WELDING & PIPEFITTING	27,192.00
4210	9270			46		32	62	362	MCDOWELL WELDING & PIPEFITTING	31,378.00
4210	9270			46		32	63	362	MCDOWELL WELDING & PIPEFITTING	34,696.00
4210	9270			46		32	64	362	MCDOWELL WELDING & PIPEFITTING	23,775.00
4210	9270			46		32	65	362	MCDOWELL WELDING & PIPEFITTING	38,100.00
4210	9270			46		32	66	362	MCDOWELL WELDING & PIPEFITTING	23,175.00
4210	9270			46		32	78	362	GEO ENGINEERS INC	2,036.00
4210	9270			46		32	85	362	P S I ENVIRONMENTAL GEOTECHNIC	283.00
4210	9270			46		32	94	362	MCDOWELL WELDING & PIPEFITTING	4,400.00
4210	9270			46		32	95	362	MCDOWELL WELDING & PIPEFITTING	4,185.00
4210	9270			46		32	96	362	MCDOWELL WELDING & PIPEFITTING	945.00
4210	9270			46		32	97	362	MCDOWELL WELDING & PIPEFITTING	999.00
4210	9270			46		32	98	362	MCDOWELL WELDING & PIPEFITTING	327.00
4210	9270			46		32	99	362	MCDOWELL WELDING & PIPEFITTING	482.00
4210	9270			46		32	100	362	MCDOWELL WELDING & PIPEFITTING	711.00
4210	9270			46		32	101	362	MCDOWELL WELDING & PIPEFITTING	247.00
4210	9270			46		32	102	362	MCDOWELL WELDING & PIPEFITTING	1,029.00
4210	9270			46		32	103	362	MCDOWELL WELDING & PIPEFITTING	283.00
4210	9270			46		32	104	362	MCDOWELL WELDING & PIPEFITTING	7,933.00

Koppers Industries Inc.
CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
October 1999

G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
4210	9270	All	All	All	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#	Tx#	Comments/Vendor/User	Amounts
4210	9270			46		32	105	362	MCDOWELL WELDING & PIPEFITTING	465.00
4210	9270			46		32	106	362	MCDOWELL WELDING & PIPEFITTING	2,017.00
4210	9270			46		32	107	362	MCDOWELL WELDING & PIPEFITTING	2,429.00
4210	9270			46		32	108	362	J CAMERON MCKERNAN	2,693.00
4210	9270			46		44	150		CASH RECEIPTS	2,500.00-
4210	9270			51		32	83	362	PERFORMANCE PUMPS INC	7,054.00
4210	9270			51		32	84	362	PERFORMANCE PUMPS INC	634.00

Total Detail (0000)	952,923.36
Total Location (9270)	952,923.36
Total G/L (4210)	952,923.36
Total Report	952,923.36

- 7,688

945,235.36

(Full Version)	G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
	4210	9270	All	All	All	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	Vendor/Comments/User	May Amounts	Jun Amounts	Jul Amounts	Aug Amounts	Sep Amounts	Oct Amounts	Current Y-T-D
4210	9270			46		32	PROCESS PLANTS CONSULT	0	0	0	0	0	0	2,880
4210	9270			46		32	PROTECTOSEAL CO	0	0	3,342	0	0	0	3,342
4210	9270			46		33	RCLS NORRIS CAP TU EXP	0	0	5,541-	0	0	0	5,541-
4210	9270			46		33	RCLS SPARE EQUIP TO DI	0	0	0	0	42,200-	0	42,200-
4210	9270			46		33	REVERSE NORRIS EXP TO	0	0	0	861-	0	0	861-
4210	9270			46		32	RMCAT ENVIRONMENTAL	0	0	0	0	0	0	47,785
4210	9270			46		32	RMCAT ENVIRONMENTAL	32,632	0	0	0	0	0	32,632
4210	9270			46		32	ROADWAY EXPRESS INC	0	0	0	0	0	115	115
4210	9270			46		32	ROSE CITY CONTRACTING	0	425	0	0	0	0	425
4210	9270			46		32	T N TECHNOLOGIES INC	0	0	0	5,277	0	0	5,277
4210	9270			46		32	TELEDYNE FLUID SYSTEMS	0	0	0	10,205	0	0	10,205
4210	9270			46		32	THERMATICS INC	0	0	0	7,314	0	0	7,314
4210	9270			46		32	WHESSOE VAREC INC	0	0	0	2,746	0	0	2,746
4210	9270			46	6643	32	CHARLES E NORRIS JR	3,989	0	0	0	0	0	3,989
4210	9270			46	6643	32	CHARLES E NORRIS JR	252	0	0	0	0	0	252
4210	9270			46	6643	32	CHARLES E NORRIS JR	26	0	0	0	0	0	26
4210	9270			46	6643	32	CHARLES E NORRIS JR	550	0	0	0	0	0	550
4210	9270			46	6643	32	CHARLES E NORRIS JR	649	0	0	0	0	0	649
4210	9270			46	6643	32	CHARLES E NORRIS JR	75	0	0	0	0	0	75
4210	9270			**47**			Pr Yr Begin Balance	0	0	0	0	0	0	**26,258**
4210	9270			**47**		32	BECO ENGINEERING CO	0	0	0	0	0	0	**-534**
4210	9270			**47**		32	FAMILIAN AUTOMATED VAL	0	0	0	0	0	0	**1,328**
4210	9270			**47**		32	HEAT EXCHANGE & TRANSF	0	0	0	0	0	0	**5,354**
4210	9270			**47**		32	HEAT EXCHANGE & TRANSF	0	0	0	0	0	0	**204**
4210	9270			**47**		32	MCDOWELL WELDING & PIP	0	0	0	0	0	0	**2,241**
4210	9270			**47**		32	MCDOWELL WELDING & PIP	0	0	0	0	0	0	**10,335**
4210	9270			**47**		32	PETROCHEM INSULATION I	0	0	0	0	0	0	**4,765**
4210	9270			**47**		32	PETROCHEM INSULATION I	0	0	0	0	0	0	**4,800**
4210	9270			**49**		32	WESTERN POWER & EQUIPM	0	0	0	11,006	0	0	**11,006**
4210	9270			**51**		32	PERFORMANCE PUMPS INC	0	0	0	0	0	634	**634**
4210	9270			**51**		32	PERFORMANCE PUMPS INC	0	0	0	0	0	7,054	**7,054**
4210	9270		1	46			Pr Yr Begin Balance	0	0	0	0	0	0	12,704
4210	9270		1	46		33	CAPITALIZED INTEREST J	0	0	0	0	0	0	16,068
4210	9270		1	46		33	CAPITALIZED INTEREST J	0	32,029	0	0	0	0	32,029
4210	9270	10		46		55	PAYROLL JV By PR/SC/46	0	4,750	0	0	0	0	4,750
4210	9270	10		46		55	PAYROLL JV By PR/SC/46	0	0	4,750	0	0	0	4,750
4210	9270	10		46		55	PAYROLL JV By PR/SC/46	6,115	0	0	0	0	0	6,115
4210	9270	10		46		33	REVERSE NORRIS EXP TO	0	0	0	21,156-	0	0	21,156-
Total Detail (0010) Unknown								6,115	4,750	4,750	21,156-	0	0	5,541-
4210	9270	61		46		55	PAYROLL JV By PR/SC/46	0	0	433	0	0	0	433
4210	9270	61		46		33	REVERSE NORRIS EXP TO	0	0	0	433-	0	0	433-
Total Detail (0061) Unknown								0	0	433	433-	0	0	0

74,513

(Full Version)	G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
	4210	9270	All	All	All	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	Vendor/Comments/User	May Amounts	Jun Amounts	Jul Amounts	Aug Amounts	Sep Amounts	Oct Amounts	Current Y-T-D
4210	9270	66		46		55	PAYROLL JV By PR/SC/46	0	0	67	0	0	0	67
4210	9270	66		46		33	REVERSE NORRIS EXP TO	0	0	0	67-	0	0	67-
Total Detail (0066) Unknown								0	0	67	67-	0	0	0
4210	9270	72		46		55	PAYROLL JV By PR/SC/46	0	0	27	0	0	0	27
4210	9270	72		46		33	REVERSE NORRIS EXP TO	0	0	0	27-	0	0	27-
Total Detail (0072) Unknown								0	0	27	27-	0	0	0
4210	9270	74		46		55	PAYROLL JV By PR/SC/46	0	0	400	0	0	0	400
4210	9270	74		46		33	REVERSE NORRIS EXP TO	0	0	0	400-	0	0	400-
Total Detail (0074) Unknown								0	0	400	400-	0	0	0
4210	9270	76		46		55	PAYROLL JV By PR/SC/46	0	0	95	0	0	0	95
4210	9270	76		46		33	REVERSE NORRIS EXP TO	0	0	0	95-	0	0	95-
Total Detail (0076) Unknown								0	0	95	95-	0	0	0
4210	9270	823		46		55	PAYROLL JV By PR/SC/46	501	0	0	0	0	0	501
4210	9270	823		46		55	PAYROLL JV By PR/SC/46	0	501	0	0	0	0	501
4210	9270	823		46		33	REVERSE NORRIS EXP TO	0	0	0	1,003-	0	0	1,003-
Total Detail (0823) Unknown								501	501	0	1,003-	0	0	0
4210	9270	824		46		55	PAYROLL JV By PR/SC/46	0	0	356	0	0	0	356
4210	9270	824		46		55	PAYROLL JV By PR/SC/46	0	356	0	0	0	0	356
4210	9270	824		46		55	PAYROLL JV By PR/SC/46	461	0	0	0	0	0	461
4210	9270	824		46		33	REVERSE NORRIS EXP TO	0	0	0	1,175-	0	0	1,175-
Total Detail (0824) Unknown								461	356	356	1,175-	0	0	0
4210	9270	825		46		55	PAYROLL JV By PR/SC/46	122	0	0	0	0	0	122
4210	9270	825		46		55	PAYROLL JV By PR/SC/46	0	95	0	0	0	0	95
4210	9270	825		46		33	REVERSE NORRIS EXP TO	0	0	0	217-	0	0	217-
Total Detail (0825) Unknown								122	95	0	217-	0	0	0

Date: 11/11/99 1:21 PM
Sender: <ISKOPPERS@aol.com>
To: Amos Kamerer
Priority: Normal
Subject: (no subject)

Portland Liquid Pitch Project
Project Update
November 5, 1999

Status of Mechanical Work:
The fitters wee able to complete the recirculation line with the scaffolding
still in place. This leaves only the transfer line and the hot oil tie-ins
remaining. On Monday the plant will be shut down for the annual boiler
inspection. We will take advantage of the situation to make the tie-ins and
tank swap out at the same time. The oil system has been flushed and drained,
and is ready. Hot work procedures have been prepared for all tie ins, and
were faxed on Thursday to Mike Juba and Mark Cilley for review.

Status of Electrical Work:
The electrical work is progressing well. The starters have all been installed
in the MCC. Most of the wires have been pulled. The pushbutton station
brackets have been galvanized. Final hookup work will begin during the week

Status of Insulation Work:
We met with Ron Peterson on Tuesday to discuss the progress on the project.
We got a commitment from him that they would complete the tank, as well as
the work on the hot oil lines within two weeks. As a result addition people
were assigned to the project and the progress improved noticeably. The work
on the line from the dock is nearly complete the only part remaining is in
the immediate area of the evacuation pump which still need pressure testing.

General notes:
We will have the air sample equipment calibrated first thing Monday morning.
All tie-in procedures have been reviewed for safety, and have been provided
to the contractor in advance of the work. The system has been prepared. Next
week will be a very busy week involving coordination of numerous critical
jobs, but I believe we are well prepared for it.

Charlie Norris
Construction Manager

RFC822.TXT

Date: 11/11/99 1:20 PM
Sender: <ISKOPPERS@aol.com>
To: Amos Kamerer
Priority: Normal
Subject: (no subject)

Portland Liquid Pitch Project
Project Update
October 31, 1999

Status of Mechanical Work:
As of Monday November first, all of the 3" and 4" oil headers will be
completed, tested, and ready for insulation. The dock pump area which was
delayed by barge unloading will be completed by Tuesday. The vent line, The
sump line, the nitrogen line, and the oil tracing in the tank area should be
the only incomplete mechanical work by weeks end.

Status of Electrical Work:
The electricians are in the process of pulling wire and making hookups in the
oil heater and tank areas. This work will continue throughout the next week

Status of Insulation Work:
The insulation work had been progressing well, but seemed to hit a wall last
week. The progress had been tapering off the previous week, but not at an
alarming rate. I indicated to the site lead-man that he needed to get
additional help earlier in the week. As the week progressed The crew was
further diminished by hunting season. On Thursday I called their office and
requested addition help for him myself. I received assurances that at least
three men would be added on Monday, and that all the necessary equipment
would be provided.

Charlie Norris
Construction Manager

RFC822.TXT

GL/46116/MENU100PRTJV
11/01/99 06:58:07 AM

Requested By KONKLE

Koppers Industries Inc.
CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
October 1999

PORTLAND

G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
4210	9270	All	All	46	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#	Tx#	Comments/Vendor/User	Amounts
4210	9270			46		32	9	362	PAUL MUELLER CO	7,612.00
4210	9270			46		32	10	362	M S JACOBS & ASSOCIATES INC	610.34
4210	9270			46		32	11	362	A C & S INC	33,000.00
4210	9270			46		32	12	362	ROADWAY EXPRESS INC	115.73
4210	9270			46		32	13	362	PICKESS PUMPS INC	49,585.86
4210	9270			46		32	14	362	MORSE CONSTRUCTION GROUP INC	80,666.80
4210	9270			46		32	15	362	MORSE CONSTRUCTION GROUP INC	6,505.90
4210	9270			46		32	16	362	P S I ENVIRONMENTAL GEOTECHNIC	4,313.50
4210	9270			46		32	17	362	FAMILIAN AUTOMATED VALVE	57,902.30
4210	9270			46		32	26	362	PONDER BURNER CO	10,780.00
4210	9270			46		32	27	362	PACIFIC TECHNICAL IND INC	281.00
4210	9270			46		32	28	362	PARAMOUNT SUPPLY CO	5,527.00
4210	9270			46		32	29	362	CONSTRUCTION TECHNOLOGY LAB	1,000.00
4210	9270			46		32	30	362	CURTISS WRIGHT - FERRIS ENG	6,053.00
4210	9270			46		32	31	362	HARDER MECHANICAL CONTRS INC	183,027.00
4210	9270			46		32	32	362	EQUIPMENT & CONTROLS INC	2,590.00
4210	9270			46		32	33	362	EQUIPMENT & CONTROLS INC	3,690.00
4210	9270			46		32	167	363	CHANDLER ELECTRIC INC	75,523.71
4210	9270			46		32	168	363	CHANDLER ELECTRIC INC	52,294.22
4210	9270			46		32	52	362	MCDOWELL WELDING & PIPEFITTING	7,918.00
4210	9270			46		32	53	362	MCDOWELL WELDING & PIPEFITTING	9,137.00
4210	9270			46		32	54	362	MCDOWELL WELDING & PIPEFITTING	9,826.00
4210	9270			46		32	55	362	MCDOWELL WELDING & PIPEFITTING	17,016.00
4210	9270			46		32	56	362	MCDOWELL WELDING & PIPEFITTING	14,797.00
4210	9270			46		32	57	362	MCDOWELL WELDING & PIPEFITTING	15,517.00
4210	9270			46		32	58	362	MCDOWELL WELDING & PIPEFITTING	24,798.00
4210	9270			46		32	59	362	MCDOWELL WELDING & PIPEFITTING	28,507.00
4210	9270			46		32	60	362	MCDOWELL WELDING & PIPEFITTING	29,361.00
4210	9270			46		32	61	362	MCDOWELL WELDING & PIPEFITTING	27,192.00
4210	9270			46		32	62	362	MCDOWELL WELDING & PIPEFITTING	31,378.00
4210	9270			46		32	63	362	MCDOWELL WELDING & PIPEFITTING	34,696.00
4210	9270			46		32	64	362	MCDOWELL WELDING & PIPEFITTING	23,775.00
4210	9270			46		32	65	362	MCDOWELL WELDING & PIPEFITTING	38,100.00
4210	9270			46		32	66	362	MCDOWELL WELDING & PIPEFITTING	23,175.00
4210	9270			46		32	78	362	GEO ENGINEERS INC	2,036.00
4210	9270			46		32	85	362	P S I ENVIRONMENTAL GEOTECHNIC	283.00
4210	9270			46		32	94	362	MCDOWELL WELDING & PIPEFITTING	4,400.00
4210	9270			46		32	95	362	MCDOWELL WELDING & PIPEFITTING	4,185.00
4210	9270			46		32	96	362	MCDOWELL WELDING & PIPEFITTING	945.00
4210	9270			46		32	97	362	MCDOWELL WELDING & PIPEFITTING	999.00
4210	9270			46		32	98	362	MCDOWELL WELDING & PIPEFITTING	327.00
4210	9270			46		32	99	362	MCDOWELL WELDING & PIPEFITTING	482.00
4210	9270			46		32	100	362	MCDOWELL WELDING & PIPEFITTING	711.00
4210	9270			46		32	101	362	MCDOWELL WELDING & PIPEFITTING	247.00
4210	9270			46		32	102	362	MCDOWELL WELDING & PIPEFITTING	1,029.00
4210	9270			46		32	103	362	MCDOWELL WELDING & PIPEFITTING	283.00
4210	9270			46		32	104	362	MCDOWELL WELDING & PIPEFITTING	7,933.00

Koppers Industries Inc.
CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
October 1999

G/L	Loc	Dct	S-Det	Dept	Emp	Doc	JV#
4210	9270	All	All	46	All	All	All

G/L	Loc	Dct	S-Det	Dept	Emp	Doc	JV#	Tx#	Comments/Vendor/User	Amounts
4210	9270			46		32	105	362	MCDOWELL WELDING & PIPEFITTING	465.00
4210	9270			46		32	106	362	MCDOWELL WELDING & PIPEFITTING	2,017.00
4210	9270			46		32	107	362	MCDOWELL WELDING & PIPEFITTING	2,429.00
4210	9270			46		32	108	362	J CAMERON MCKERNAN	2,693.00
4210	9270			46		44	150		CASH RECEIPTS	2,500.00-
									Total Detail (0000)	945,235.36
									Total Location (9270)	945,235.36
									Total G/L (4210)	945,235.36
									Total Report	945,235.36

Date: 10/25/99 2:42 AM
Sender: <ISKOPPERS@aol.com>
To: Amos Kamerer
Priority: Normal
Subject: project status text

Portland Liquid Pitch Project
Project Update
October 24, 1999

Status of Mechanical Work:
The pipe fitters have nearly completed the hot oil pump shed area. We have set up a schedule of line testing which will allow for insulation to be completed on each line prior to the final debug of the systems. The only bottleneck yet to be worked out is coordination of the final tie-ins of the recirculation loop. The problem here is that it requires partial disassembly of the scaffolding, but not complete disassembly.

Status of Electrical Work:
The electricians have begun installation of pushbutton stations and starters for the pumps. There is some question about the switch-gear for the oil heater blower. The controls for the new equipment are not set up the same as the old heater. We hope to have this resolved on Monday.

Status of Insulation Work:
The insulation is moving along well. The line from the dock is nearly complete, only the dock itself and the immediate tank area remain. This week the insulators will begin work on the tank roof, and the oil heater area oil lines. We have a coordinated plan with the piping contractors to keep the work on schedule. The insulators have agreed to focus their efforts on the roof in the area above where the recirculation loop needs to be tied in. This will help us to coordinate the work with the scaffolders.

Nitrogen System:
The nitrogen tank was installed on Friday. Installation work for the vaporizer will proceed during the week with a tie-in planned for the end of the week.

General notes:
Today (Sunday) I observed the startup of the existing hot oil system with the intention of gathering information to be used in establishing startup procedures for the new system. The startup was smoother than I anticipated. I will review the details with Dave Wibble and Bill Meisinger on

Date: 10/15/99 1:41 PM
Sender: <ISKOPPERS@aol.com>
To: Amos Kamerer
Priority: Normal
Subject: project status

Portland Liquid Pitch Project
Project Update
October 15, 1999

Status of Mechanical Work:
The pipe fitters concentrated their efforts in the hat oil pump shed area this week, and the progress is impressive. The area can possible be complete by this time next week. The insulators will have people free to work on it by then. The problem is that we may not be able to test the lines soon enough to stay ahead of the insulators. On Monday I will meet with Steve Hinds to set up a schedule for completion and testing on each line. This will drive the schedules for the Insulators and to some extent the electricians. By the middle of next week we should have clearly defined milestones that identify progress on practically a daily basis for each trade.

Status of Electrical Work:
We met with Dave chandler this week and discussed concerns about the absence of any slack in the schedule, and the need to focus on specific areas to ensure timely startup. As a result we have come up with a prioritized milestone list with specific completion dates defined, which they will be held to. This will be an aid not only in tracking the progress, but also in clearly communicating the priorities.

Status of Insulation Work:
Two of the three pipe bridges are now done. The insulation is installed on the lower third of the tank and it is now getting the metal covering. Work has begun on the dock piping. At this point coordinating the timing is the biggest hurdle. Although there is a lot of piping that requires insulation the lines must be fully tested before hand. Therefor there are a lot of lines which cannot yet be insulated because the final tie-ins have not been made.

Overall:
Crunch time continues. Coordinating the timing of the work to minimize interference of one trade on another is becoming a monumental task, but one, which we can handle. I'm pleased to say that even when

Date: 10/13/99 11:00 AM
Sender: <ISKOPPERS@aol.com>
To: Amos Kamerer
Priority: Normal
Subject: report dated 10/8

Portland Liquid Pitch Project
Project Update
October 8, 1999

Status of Mechanical Work:
The work in the immediate area of the tank in nearly completed. The oil heater area is complete except for the tie-ins to the existing system, which will be made when the tanks are changed out. The focus now is on the piping in the oil pump area. This work is slightly behind schedule because it was stopped in order to concentrate the efforts on the tank piping to clear the area for scaffolding. The piping to the dock has been hydro-tested as has the oil piping mounted on the tank. Erection of the pitch pump shed will have be implemented in two stages; The structural members which tie into the pipe bridge can be assembled at any time, and should proceed next week. Some of the columns, which do not carry any of the pipe bridge loads, will have to be assembled at a later time due to interference from the scaffolding. This is unavoidable, and not on the critical path, so it should not effect the testing and startup of the system.

Status of Electrical Work:
Chandler electric continues to focus their attention on getting the conduit in the tank and oil heater areas ready. The service upgrades have been completed. The PLC program is currently being debugged off site. The electricians have started to pull wires in the tank area, however many of the instruments are not yet installed. The next couple of weeks will require a great deal of cooperative effort with the pipe fitters to maximize efficiency.

Status of Insulation Work:
The tank scaffolding has been erected and insulating of the tank itself is currently underway. Work is progressing well on the tank and although it is too soon to tell for sure, it appears that it may be ahead of schedule. Work on the pipeline is moving right along. Most of the pipeline along the ground is insulated, the exception being in the dock area and the

immediate tank
area. Both of these were waiting for hydro-testing results before being
pursued. The bridge in segment five is now nearly complete.

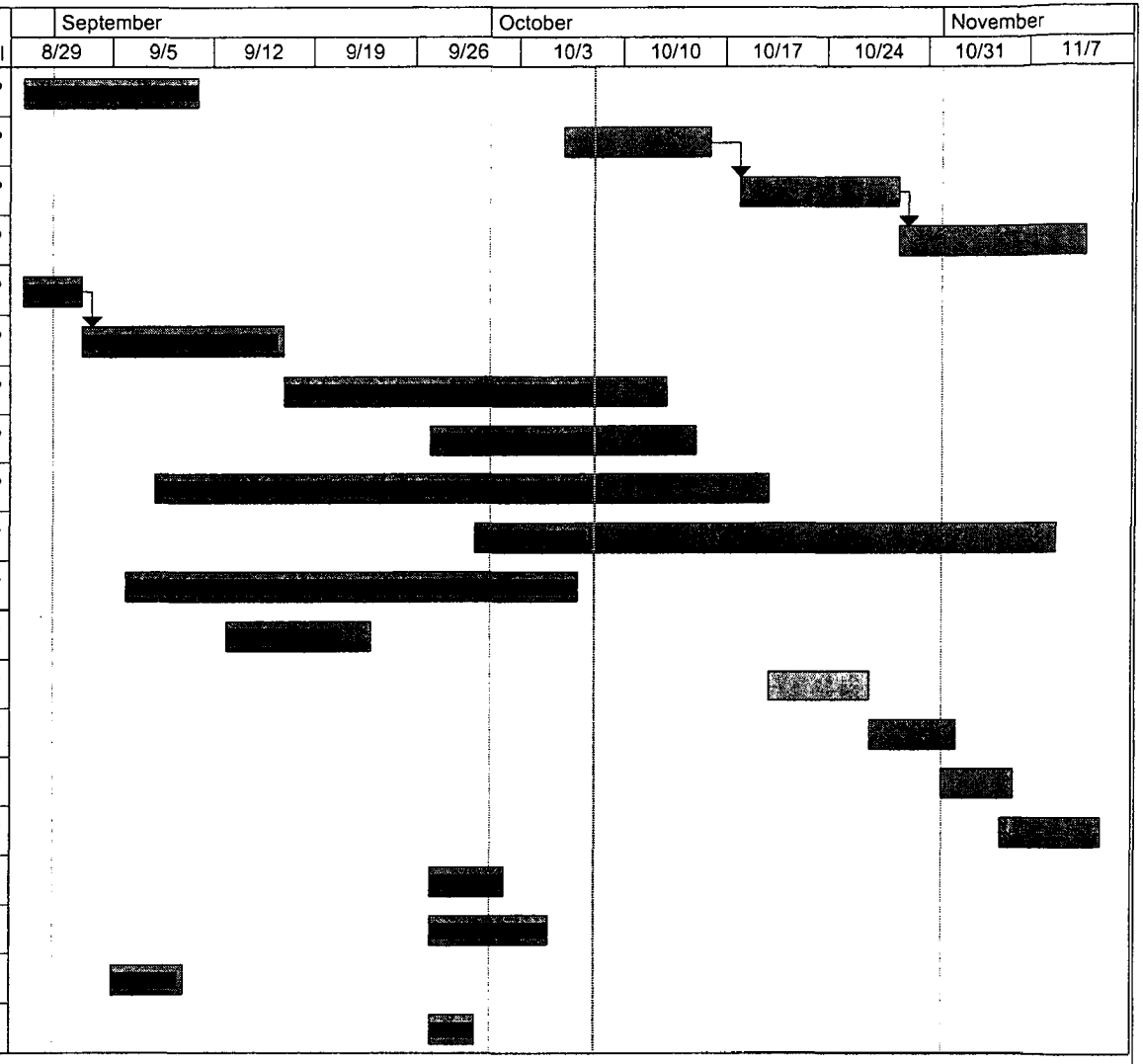
Overall:
Its crunch time! My focus now is two fold: keep the pressure on the
contractors to meet deadlines, and stay one step ahead of everybody to
predict and eliminate potential conflicts. So far, so good. I am faxing a
mechanical schedule showing the progress for each task. I don''t know if the
progress lines will be visible in the fax transmissions. They are hard to see
in photocopies so I have my doubts. Basically I have adjusted the task bars
to position the progress line on the current day line. This brings some of
the bars into the early part of November, indicating potential problems
meeting the schedule. We are putting the pressure on McDowell to add people
to these tasks in order to shorten their duration. I will continue to update
this chart semiweekly. A spreadsheet showing progress is attached.

Charlie Norris
Construction Manager

RFC822.TXT

projec~1.xls

ID	Task Name	% Compl
1	hot oil shed erection	100%
2	pitch pump shed erection	0%
3	pipe bridge #2 erection	0%
4	pipe bridge #2 piping	0%
5	pitch pumps install	100%
6	pitch pump piping install to/from pitch tank	95%
7	recirculating line	83%
8	t-200 vent line and & stm-trc & nitrogen	70%
9	hot oil tracing on pitch piping	75%
10	hot oil supply and return - piping/pump cells	20%
11	pitch cargo piping to top of tank	100%
12	dock pumps, valves and tracing	75%
13	hot oil and N2 lines by pitch building	0%
14	fab and install stiles and walkways	0%
15	changeout tanks 240 and 250	0%
16	*install sump pump and line*	0%
17	*install clips for insulation*	100%
18	*cut in valves and temp xmit at metering shed*	100%
19	*install thermowells, close manways and flanges*	90%
20	*cut in oil fill connection by P-260*	100%



Project: final-mech-portland
Date: Fri 10/8/99

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

Koppers010230

Date: 9/13/99 4:50 PM
Sender: <ISKOPPERS@aol.com>
Subject: project update

Portland Liquid Pitch Project
Project Update
September 10, 1999

Status of Civil Work:
Harder will be back in the plant on Wednesday the 15th to fill under the tank with additional sand. The grouting will take place on Monday the 20th.
Allowing 7 days for the grout to cure, we should begin the testing of the tank on the 27th.

Status of the Tank Construction:
The tank is complete, and Morse has left the site. I did an initial evaluation of the tank on Friday the 10th using the prints Morse had for construction. Later I noticed some discrepancies between these and the Chemtech drawings. I don't think there is a problem, but I will discuss my observations with Bill Meisinger on Tuesday the 14th when he arrives at the plant.

Status of Mechanical Work:
The pitch pumps and oil pumps have been mounted. The internal tank coils have all been tested. The heating panels for the tank nozzles have been mounted, and the piping is being run. Work is progressing well in the heater area. Now that the work is focussed on the smaller pipes it seems to progress much faster. Things are shaping up well. The final drawings for the sheds have been completed and are being approved now.

Status of Electrical Work:
The PLC panel has been installed. Currently the electrical work is centered on getting the conduit runs installed in the tank area. Chandler could no longer wait for the sheds to be built to start assembling conduit, so they are running it on temporary stands while the sheds and permanent stands are being built.

Status of Insulation Work:
The pipeline insulation is progressing well. The insulation of the tank itself will be delayed by the need to grout and test the tank prior to insulating. We expect to be able to start on the tank as early as the 29th, or at least by October 4th.

Date: 9/9/99 11:15 AM
Sender: Amos Kamerer
To: Jim Dietz; Kevin Fitzgerald; BILL MEISINGER; Jack Stephenson; John Kunkle; BOB WOMBLES; Traci Self; jtsor@aol.com
Priority: Normal
Subject: August Report - Liquid Pitch Unloading Project

Jim,

Cost Analysis
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a) budget	$ 4,310,000
b) spent to date	3,290,967
c) committed to date	4,593,895
d) deviation	283,895

Time Line

With the exception of some pressure relief valves, all equipment for the project has now been received.

The civil contractor will be back the next 2 week's to finish the black topping and add the grouting to the tank. That will complete their work. The hydro test of the tank is tentatively scheduled for the w/o 9/26.

The tank builder is finishing up their work today and tomorrow, and expects to be off site by the end of the day tomorrow.

The mechanical contractor continues to work any where they can, as other work around them is completed.The critical area now is the fabrication of the roof's and structures for the 3 pump sheds. We are pushing to get this done, ASAP.

The electrical contractor continues at a good pace. Again they are working around anything/everything to keep working, and have been a good job, under the circumstances.

The insulation contractor started last week, on the pipe line from the flow meter shed towards the tank. We are going to have to stay on top of these guys to keep this work on schedule.

Bill and I are traveling to Kitimat, BC this Sunday to witness first hand a Gearbulk liquid pitch vessel discharge at the Alcan facility.

Amos

GL/46116/MENU100PRTJV6
09/01/99 07:04:06 AM

Requested By KUNKLE

Koppers Industries Inc.
CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
August 1999

(Summarized Version)	G/L	Loc	Dct	S-Dct	Dept	Emp	Doc	JV#
	4210	9270	All	All	46	All	All	All

Vendor / Comments / User	Mar Amounts	Apr Amounts	May Amounts	Jun Amounts	Jul Amounts	Aug Amounts	Current Y-T-D
Prior Year Beginning Balance	0	0	0	0	0	0	857,456
C WARK TRUCKING INC	0	0	0	0	0	0	9,187
CASH RECEIPTS	0	0	19,623-	0	0	0	19,623-
CHANDLER ELEC INC&TAYLOR ELEC	0	0	0	29,018	0	20,918	49,936
CHANDLER ELECTRIC INC	0	10,592	0	15,339	0	49,467	75,398
CONSTRUCTION TECHNOLOGY LAB	0	0	0	0	0	5,200	5,200
DIVERSIFIED MARINE INC	0	129,863	25,973	1,636	0	0	222,362
DREAELBROOK ENGINEERING	0	0	0	0	0	1,499	1,499
FAMILIAN AUTOMATED VALVE	0	0	0	0	0	3,191	3,191
GEO ENGINEERS INC	2,082	0	0	24,686	0	4,994	31,762
GRAYBAR ELECTRIC CO INC	0	0	0	0	0	15,256	15,256
HARDER MECHANICAL CONTRS INC	279,300	93,100	0	0	303,133	93,824	769,357
INDUSTRIAL CONTROLS & EQUIP	0	0	0	0	0	23,236	23,236
INDUSTRIAL VALVE OF OREGON INC	0	0	0	0	2,230	0	2,230
INTERNATIONAL INSPECTION	0	0	0	1,238	0	0	1,238
INTERNATIONAL POWER MACHINES	0	0	0	7,433	0	0	7,433
J CAMERON MCKERNAN	0	12,492	0	6,572	8,765	0	54,625
MADDEN INDUSTRIAL CRAFTSMEN	0	0	0	0	0	16,588	16,588
MCDOWELL WELDING & PIPEFITTING	6,333	62,325	169,051	194,485	97,318	38,463	567,975
MORSE CONSTRUCTION GROUP INC	0	181,119	50,315	0	0	71,541	302,975
NORTHWEST NATURAL GAS CO	0	8,311	0	0	0	0	8,311
P S I ENVIRONMENTAL GEOTECHNIC	0	0	448	2,301	0	5,541	8,290
PARAMOUNT SUPPLY CO	0	0	0	0	0	1,524	1,524
PERFORMANCE PUMPS INC	0	0	0	20,430	0	0	20,430
PONDER BURNER CO	0	0	0	0	5	20,600	20,605
PORTLAND CITY	0	0	0	14,803	0	0	14,803
PORTLAND CITY BUREAU OF BLDGS	0	15,879	1,182	0	0	0	18,418
PROCESS PLANTS CONSULTANTS	0	8,000	2,880	0	0	0	10,880
PROTECTOSEAL CO	0	0	0	0	3,342	0	3,342
RCLS NORRIS CAP TO EXP JV By PATTERSON	0	0	0	0	5,541-	0	5,541-
RMCAT ENVIRONMENTAL	0	47,785	32,632	0	0	0	80,417
ROSE CITY CONTRACTING INC	0	0	0	425	0	0	425
T N TECHNOLOGIES INC	0	0	0	0	0	5,277	5,277
TELEDYNE FLUID SYSTEMS	0	0	0	0	0	10,205	10,205
THERMATICS INC	0	0	0	0	0	7,314	7,314
WHESSOE VAREC INC	0	0	0	0	0	2,746	2,746
CHARLES E NORRIS JR	0	0	5,541	0	0	0	5,541
Prior Year Beginning Balance	0	0	0	0	0	0	12,704
CAPITALIZED INTEREST JV By ROBERTS	16,068	0	0	32,029	0	0	48,097
PAYROLL JV By PR/SC/46114/KII	0	0	6,115	4,750	4,750	0	15,615
Total Detail (0010) Unknown	0	0	6,115	4,750	4,750	0	15,615
PAYROLL JV By PR/SC/46114/KII	0	0	0	0	433	0	433
Total Detail (0061) Unknown	0	0	0	0	433	0	433

Post-It® Fax Note 7671	Date	# of pages ▶ (2)
To AMOS.	From JOHN KUNKLE	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

GL/46116/MENU100PRTJV6
09/01/99 07:04:06 AM

Requested By KUNKLE

Koppers Industries Inc.
CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
August 1999

(Summarized Version)	G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
	4210	9270	All	All	46	All	All	All

Vendor / Comments / User	Mar Amounts	Apr Amounts	May Amounts	Jun Amounts	Jul Amounts	Aug Amounts	Current Y-T-D
PAYROLL JV By PR/SC/46114/KII	0	0	0	0	67	0	67
Total Detail (0066) Unknown	0	0	0	0	67	0	67
PAYROLL JV By PR/SC/46114/KII	0	0	0	0	27	0	27
Total Detail (0072) Unknown	0	0	0	0	27	0	27
PAYROLL JV By PR/SC/46114/KII	0	0	0	0	400	0	400
Total Detail (0074) Unknown	0	0	0	0	400	0	400
PAYROLL JV By PR/SC/46114/KII	0	0	0	0	95	0	95
Total Detail (0076) Unknown	0	0	0	0	95	0	95
PAYROLL JV By PR/SC/46114/KII	0	0	501	501	0	0	1,003
Total Detail (0823) Unknown	0	0	501	501	0	0	1,003
PAYROLL JV By PR/SC/46114/KII	0	0	461	356	356	0	1,175
Total Detail (0824) Unknown	0	0	461	356	356	0	1,175
PAYROLL JV By PR/SC/46114/KII	0	0	122	95	0	0	217
Total Detail (0825) Unknown	0	0	122	95	0	0	217
PAYROLL JV By PR/SC/46114/KII	0	0	433	427	0	0	861
Total Location (9270) PORTLAND	303,783	569,466	276,032	356,527	415,383	397,384	3,290,967
Total Report	303,783	569,466	276,032	356,527	415,383	397,384	3,290,967

Date: 9/3/99 2:11 PM
Sender: <ISKOPPERS@aol.com>
To: Amos Kamerer
Priority: Normal
Subject: project status

Portland Liquid Pitch Project
Project Update
September 3, 1999

Status of Civil Work:
With the exception of grouting the tank, and Black-topping the area, the civil work is complete. Harder Mechanical contractors are not currently on site.

Status of the Tank Construction:
The tank is nearly complete. The door sheet has been closed, and the roof installed. The remaining work consists of mounting the insulation vertical bars, and a couple of nozzles. On Wednesday, September 8, 1999, we will have a final walk through with Morse construction.

Status of Mechanical Work:
The Viking pitch pumps finally arrived, and were mounted on Thursday. The coils have been installed in the tank. The transfer line is virtually complete, just awaiting the arrival of the valves. The critical path now involves fabrication of the pump sheds. These are required because the tank area pipe bridges and supports tie into them. We have been in constant contact with McDowell to expedite their fabrication.

Status of Electrical Work:
The PLC panel is at Ponder Burner's shop. I requested that they deliver it to the plant on Monday. The power an instrumentation wire from the flow meter shed to the dock were pulled this week. The conduit runs along the wall of the pitch building are now in place. The pace on the electrical work should be dramatically increased in the next couple of weeks. The critical path involves the pump sheds once again.

Status of Insulation Work:
The pipeline insulation has begun. The materials for insulating the line are positioned in the field for ease of installation.

Charlie Norris
Construction Manager

PS ---- I don't normally editorialize in my reports, but some of the pipeline
is now insulated and covered so the final results can be visualized. I must
say that this will be a truly impressive installation.

RFC822.TXT

mvc-104e.ZIP

Date: 8/7/99 11:40 AM
Sender: <ISKOPPERS@aol.com>
To: Amos Kamerer
Priority: Normal
Subject: report

Portland Liquid Pitch Project
Project Update
August 6,1999

Status of Civil Work:
The pad surrounding the tank has been poured, along with some of the pipe supports inside the containment wall, and part of the wall itself.

The MCC extension is complete except for the drywall.

Status of the Tank Construction:
Four of the seven levels of the tank are in place and welded. The anchor assemblies have been installed. The opening for crane access into the tank has been made. We plan to construct a ramp into the opening on Monday. I will be working with the welding x-ray inspector on Sunday. We plan to set the fifth level on Monday.

Status of Mechanical Work:
The pipe-bridge from the oil heater area is now in place. The permanent pipe shoes have been installed along most of the 10" pitch line. The pump sheds are beginning to be a bottleneck. Final drawings still have not been submitted, although I understand that the approval process should not hold up construction. I got Gray Johnson to agree to build the structural members, which the Electricians need to mount panels on immediately, so that the electrical work is not delayed.

Status of Electrical Work:
The power wires for the dock area have been pulled to the flow meter area, where a distribution panel will be installed. The MCC panel are in the MCC/control building extension, awaiting drywall installation before final placement.

Status of Insulation Work:
Insulation of the pipeline is scheduled to begin by the end of the month, with tank insulation schedule to start by mid-September. ACandS is planning bring samples of the insulation materials specified to verify fit up early next week.

Date: 8/6/99 5:01 PM
Sender: Amos Kamerer
To: Jim Dietz; Kevin Fitzgerald; BILL MEISINGER; Jack Stephenson; John Kunkle; BOB WOMBLES; Traci Self; iskoppers@aol.com
Priority: Normal
Subject: July Report - Liquid Pitch Unloading Project

Jim,

Cost Analysis
---

a) budget	$4,310,000
b) spent to date	2,893,583
c) committed to date	4,561,635
d) deviation	251,635

Time Line

The civil contractor has finished the foundation for the tank; and will be finished with the rest of the pipe supports and related work by the end of August.

The tank contractor is about half finished with the tank and related work, and expects to be finished some time the second week of September, at the latest. At the rate of progress that they have made so far, I think they will meet this projection, or better it. This is going to be one BIG tank!

The mechanical contractor is essentially finished with the pipeline and hot oil piping from the dock to the tank area, and is planning to do the testing of these lines within the next 2 weeks, thus, permitting the insulators to get started on that end of the project. They have also been installing any thing they can in the general plant area, as soon as the civil contractor has something ready for them. Most of the pipe supports have been installed, as has the new hot oil heater, ect., etc..

The electrical contractor has all of the conduit placed from the dock to the tank area, and has pulled the supply and ground wires through them. They too, are always looking for area's where they can step in and get something new going; around the civil and tank contractors.

Bill was in town earlier this week. We meet with all of the contractors to review their work schedules. At this time, no "red flags" developed. Everyone is committed to being finished by the end of October. This will give us the needed time for start up, prior to the receipt of the first vessel.

Amos

GL/46116/MENU100PRTJV6 Koppers Industries Inc. Page 1
08/06/99 04:50:17 PM CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
Requested By PATTERSON July 1999

(Full Version)	G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
	4210	9270	All	All	46	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	Vendor/Comments/User	Feb Amounts	Mar Amounts	Apr Amounts	May Amounts	Jun Amounts	Jul Amounts	Current Y-T-D
4210	9270			46			Pr Yr Begin Balance	0	0	0	0	0	0	857,456
4210	9270			46		32	C WARK TRUCKING INC	9,187	0	0	0	0	0	9,187
4210	9270			46		44	CASH RECEIPTS	0	0	0	19,623-	0	0	19,623-
4210	9270			46		32	CHANDLER ELEC INC&TAYL	0	0	0	0	29,018	0	29,018
4210	9270			46		32	CHANDLER ELECTRIC INC	0	0	0	0	15,339	0	15,339
4210	9270			46		32	CHANDLER ELECTRIC INC	0	0	10,592	0	0	0	10,592
4210	9270			46		32	DIVERSIFIED MARINE INC	0	0	129,863	0	0	0	129,863
4210	9270			46		32	DIVERSIFIED MARINE INC	0	0	0	0	1,636	0	1,636
4210	9270			46		32	DIVERSIFIED MARINE INC	0	0	0	25,973	0	0	25,973
4210	9270			46		32	DIVERSIFIED MARINE INC	0	0	0	0	0	0	64,890
4210	9270			46		32	GEO ENGINEERS INC	0	0	0	0	10,061	0	10,061
4210	9270			46		32	GEO ENGINEERS INC	0	0	0	0	12,523	0	12,523
4210	9270			46		32	GEO ENGINEERS INC	0	0	0	0	1,182	0	1,182
4210	9270			46		32	GEO ENGINEERS INC	0	0	0	0	920	0	920
4210	9270			46		32	GEO ENGINEERS INC	0	2,082	0	0	0	0	2,082
4210	9270			46		32	HARDER MECHANICAL CONT	0	279,300	0	0	0	0	279,300
4210	9270			46		32	HARDER MECHANICAL CONT	0	0	93,100	0	0	0	93,100
4210	9270			46		32	HARDER MECHANICAL CONT	0	0	0	0	0	303,133	303,133
4210	9270			46		32	INDUSTRIAL VALVE OF OR	0	0	0	0	0	2,230	2,230
4210	9270			46		32	INTERNATIONAL INSPECTI	0	0	0	0	1,238	0	1,238
4210	9270			46		32	INTERNATIONAL POWER MA	0	0	0	0	7,433	0	7,433
4210	9270			46		32	J CAMERON MCKERNAN	0	0	0	0	6,572	0	6,572
4210	9270			46		32	J CAMERON MCKERNAN	0	0	0	0	0	8,765	8,765
4210	9270			46		32	J CAMERON MCKERNAN	0	0	0	0	0	0	24,936
4210	9270			46		32	J CAMERON MCKERNAN	0	0	0	0	0	0	1,860
4210	9270			46		32	J CAMERON MCKERNAN	0	0	12,492	0	0	0	12,492
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	60,027	0	0	0	60,027
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	2,298	0	0	0	2,298
4210	9270			46		32	MCDOWELL WELDING & PIP	0	6,333	0	0	0	0	6,333
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	73,981	0	0	73,981
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	22,422	22,422
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	26,867	26,867
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	0	48,029	48,029
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	53,650	0	53,650
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	56,943	0	56,943
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	0	83,892	0	83,892
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	48,554	0	0	48,554
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	31,975	0	0	31,975
4210	9270			46		32	MCDOWELL WELDING & PIP	0	0	0	14,541	0	0	14,541
4210	9270			46		32	MORSE CONSTRUCTION GRO	0	0	0	50,315	0	0	50,315
4210	9270			46		32	MORSE CONSTRUCTION GRO	0	0	181,119	0	0	0	181,119
4210	9270			46		32	NORTHWEST NATURAL GAS	0	0	8,311	0	0	0	8,311
4210	9270			46		32	P S I ENVIRONMENTAL GE	0	0	0	448	0	0	448
4210	9270			46		32	P S I ENVIRONMENTAL GE	0	0	0	0	2,301	0	2,301
4210	9270			46		32	PERFORMANCE PUMPS INC	0	0	0	0	19,887	0	19,887

GL/46116/MENU100PRTJV6
08/06/99 04:50:17 PM

Requested By PATTERSON

Koppers Industries Inc.
CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
July 1999

	G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
(Full Version)	4210	9270	All	All	46	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	Vendor/Comments/User	Feb Amounts	Mar Amounts	Apr Amounts	May Amounts	Jun Amounts	Jul Amounts	Current Y-T-D
4210	9270			46		32	PERFORMANCE PUMPS INC	0	0	0	0	543	0	543
4210	9270			46		32	PONDER BURNER CO	0	0	0	0	0	5	5
4210	9270			46		31	PORTLAND CITY	0	0	0	0	225	0	225
4210	9270			46		32	PORTLAND CITY	0	0	0	0	14,578	0	14,578
4210	9270			46		31	PORTLAND CITY BUREAU O	0	0	0	1,182	0	0	1,182
4210	9270			46		31	PORTLAND CITY BUREAU O	0	0	0	0	0	0	1,357
4210	9270			46		32	PORTLAND CITY BUREAU O	0	0	15,879	0	0	0	15,879
4210	9270			46		32	PROCESS PLANTS CONSULT	0	0	2,880	0	0	0	2,880
4210	9270			46		32	PROCESS PLANTS CONSULT	0	0	1,280	0	0	0	1,280
4210	9270			46		32	PROCESS PLANTS CONSULT	0	0	3,840	0	0	0	3,840
4210	9270			46		32	PROCESS PLANTS CONSULT	0	0	0	2,880	0	0	2,880
4210	9270			46		32	PROTECTOSEAL CO	0	0	0	0	0	3,342	3,342
4210	9270			46		33	RCLS NORRIS CAP TO EXP	0	0	0	0	0	5,541-	5,541-
4210	9270			46		32	RMCAT ENVIRONMENTAL	0	0	0	32,632	0	0	32,632
4210	9270			46		32	RMCAT ENVIRONMENTAL	0	0	47,785	0	0	0	47,785
4210	9270			46		32	ROSE CITY CONTRACTING	0	0	0	0	425	0	425
4210	9270			46	6643	32	CHARLES E NORRIS JR	0	0	0	550	0	0	550
4210	9270			46	6643	32	CHARLES E NORRIS JR	0	0	0	649	0	0	649
4210	9270			46	6643	32	CHARLES E NORRIS JR	0	0	0	75	0	0	75
4210	9270			46	6643	32	CHARLES E NORRIS JR	0	0	0	3,989	0	0	3,989
4210	9270			46	6643	32	CHARLES E NORRIS JR	0	0	0	252	0	0	252
4210	9270			46	6643	32	CHARLES E NORRIS JR	0	0	0	26	0	0	26
4210	9270		1	46			Pr Yr Begin Balance	0	0	0	0	0	0	12,704
4210	9270		1	46		33	CAPITALIZED INTEREST J	0	0	0	0	32,029	0	32,029
4210	9270		1	46		33	CAPITALIZED INTEREST J	0	16,068	0	0	0	0	16,068
4210	9270	10		46		55	PAYROLL JV By PR/SC/46	0	0	0	6,115	0	0	6,115
4210	9270	10		46		55	PAYROLL JV By PR/SC/46	0	0	0	0	4,750	0	4,750
4210	9270	10		46		55	PAYROLL JV By PR/SC/46	0	0	0	0	0	4,750	4,750
Total Detail (0010) Unknown								0	0	0	6,115	4,750	4,750	15,615
4210	9270	61		46		55	PAYROLL JV By PR/SC/46	0	0	0	0	0	433	433
Total Detail (0061) Unknown								0	0	0	0	0	433	433
4210	9270	66		46		55	PAYROLL JV By PR/SC/46	0	0	0	0	0	67	67
Total Detail (0066) Unknown								0	0	0	0	0	67	67
4210	9270	72		46		55	PAYROLL JV By PR/SC/46	0	0	0	0	0	27	27
Total Detail (0072) Unknown								0	0	0	0	0	27	27

GL/46116/MENU100PRTJV6
08/06/99 04:50:17 PM

Requested By PATTERSON

Koppers Industries Inc.
CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
July 1999

(Full Version)	G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#
	4210	9270	All	All	46	All	All	All

G/L	Loc	Det	S-Det	Dept	Emp	Doc	Vendor/Comments/User	Feb Amounts	Mar Amounts	Apr Amounts	May Amounts	Jun Amounts	Jul Amounts	Current Y-T-D
4210	9270	74		46	55		PAYROLL JV By PR/SC/46	0	0	0	0	0	400	400
Total Detail (0074) Unknown								0	0	0	0	0	400	400
4210	9270	76		46	55		PAYROLL JV By PR/SC/46	0	0	0	0	0	95	95
Total Detail (0076) Unknown								0	0	0	0	0	95	95
4210	9270	823		46	55		PAYROLL JV By PR/SC/46	0	0	0	0	501	0	501
4210	9270	823		46	55		PAYROLL JV By PR/SC/46	0	0	0	501	0	0	501
Total Detail (0823) Unknown								0	0	0	501	501	0	1,003
4210	9270	824		46	55		PAYROLL JV By PR/SC/46	0	0	0	461	0	0	461
4210	9270	824		46	55		PAYROLL JV By PR/SC/46	0	0	0	0	356	0	356
4210	9270	824		46	55		PAYROLL JV By PR/SC/46	0	0	0	0	0	356	356
Total Detail (0824) Unknown								0	0	0	461	356	356	1,175
4210	9270	825		46	55		PAYROLL JV By PR/SC/46	0	0	0	0	95	0	95
4210	9270	825		46	55		PAYROLL JV By PR/SC/46	0	0	0	122	0	0	122
Total Detail (0825) Unknown								0	0	0	122	95	0	217
4210	9270	940		46	55		PAYROLL JV By PR/SC/46	0	0	0	433	0	0	433
4210	9270	940		46	55		PAYROLL JV By PR/SC/46	0	0	0	0	427	0	427
Total Location (9270) PORTLAND								9,187	303,783	569,466	276,032	356,527	415,383	2,893,583
Total Report								9,187	303,783	569,466	276,032	356,527	415,383	2,893,583

GL/46116/MENU100PRTJV
08/06/99 04:43:42 PM

Requested By PATTERSON

Koppers Industries Inc.
CARBON MATERIALS AND CHEMICALS
Journal Voucher Inquiry Report
July 1999

G/L	Loc	Det	S-Det	Dept	Emp	Doc	JV#	Tx#	Comments/Vendor/User	Amounts
									G/L 4210 Loc 9270 Det All S-Det All Dept 46 Emp All Doc All JV# All	
4210	9270			46		32	364	362	INDUSTRIAL VALVE OF OREGON INC	2,230.00
4210	9270			46		32	365	362	PONDER BURNER CO	5.00
4210	9270			46		32	366	362	MCDOWELL WELDING & PIPEFITTING	48,029.00
4210	9270			46		32	367	362	MCDOWELL WELDING & PIPEFITTING	26,867.00
4210	9270			46		32	368	362	MCDOWELL WELDING & PIPEFITTING	22,422.00
4210	9270			46		32	384	362	PROTECTOSEAL CO	3,342.00
4210	9270			46		32	396	362	HARDER MECHANICAL CONTRS INC	303,133.00
4210	9270			46		32	402	362	J CAMERON MCKERNAN	8,765.00
4210	9270			46		33	33		RCLS NORRIS CAP TO EXP JV By PATTERSON	5,541.00-
									Total Detail (0000)	409,252.00
4210	9270	10		46		55	24		PAYROLL JV By PR/SC/46114/KII	4,750.00
									Total Detail (0010)	4,750.00
4210	9270	61		46		55	24		PAYROLL JV By PR/SC/46114/KII	433.99
									Total Detail (0061)	433.99
4210	9270	66		46		55	24		PAYROLL JV By PR/SC/46114/KII	67.55
									Total Detail (0066)	67.55
4210	9270	72		46		55	24		PAYROLL JV By PR/SC/46114/KII	27.55
									Total Detail (0072)	27.55
4210	9270	74		46		55	24		PAYROLL JV By PR/SC/46114/KII	400.43
									Total Detail (0074)	400.43
4210	9270	76		46		55	24		PAYROLL JV By PR/SC/46114/KII	95.00
									Total Detail (0076)	95.00
4210	9270	824		46		55	24		PAYROLL JV By PR/SC/46114/KII	356.86
									Total Detail (0824)	356.86
									Total Location (9270)	415,383.38
									Total G/L (4210)	415,383.38
									Total Report	415,383.38

Date: 7/16/99 2:33 PM
Sender: <ISKOPPERS@aol.com>
To: Amos Kamerer
Priority: Normal
Subject: project update

Portland Liquid Pitch Project
Project Update
July 16, 1999

Status of Civil Work:
Harder has just completed the pours for the pump pads NE of the tank, and the
final pipe supports in the tank area, the footings for the containment wall
SE of the tank, and the bottom of the trench in that area.

The fill material for inside the ring wall has started to arrive on site. The
remainder is to be delivered on Saturday, and Monday. The fill will be placed
on Monday.

Status of the Tank Construction:
Morse construction will be on site on Tuesday next week and plans to start
with constructing the floor on Wednesday.

Status of the Mechanical Work:
The work on the pipeline tracing is continuing as before. The modifications
to the manifold at the pitch-loading platform have been fabricated and will
be installed next week.

Construction on the new MCC/Control room addition is scheduled to begin in
the middle of next week which will coordinate well with the expected delivery
of the MCC panels.

Status of Electrical Work:
I created a crude schedule for Dave Chandler to modify as he saw fit. The
timeline showed the project going into December. I am aware that this is
unacceptable, but I wanted Dave Chandler to identify the ways to expedite the
work. One of the reasons for doing this was to point out the need for a plan.
I had no intention of making it public in this form until Bill Meisinger
requested to see the crude draft. Since this created confusion, I modified
the plan to conform to a completion date of October 27th. This was
accomplished with minimal addition of manpower from my original plan but with
reallocation of the work from crew to crew. This of course will need to be
modified according to what Chandler's resources, and the timely completion of

work by other contractors. This is however, Chandler's responsibility to work
out the details.

The conduit work has progressed to the bridge in segment 5 of the pipeline
and continues at a consistent pace. I am hoping to get the MCC assembled
soon, so that more than one electrical crew can work simultaneously.

Charlie Norris
Construction Manager

RFC822.TXT

mvc-018e.ZIP

Author: <ISKOPPERS@aol.com> at internet
Date: 7/2/99 2:34 PM
Priority: Normal
TO: Amos Kamerer at PITT
Subject: project status
---------- Message Contents ----------

Portland Liquid Pitch Project
Project Update
July 2, 1999

Status of Civil Work:
Harder is in the process of pouring the ring wall and several FD-3 and FD-4 pads in the tank area. Sam Moss inspected the re-bar on Wednesday, in addition to the normal inspection by PSI. PSI noted some discrepancies in the re-bar cages for the bolts and Sam had to be contacted for approval. After a short period for research Sam gave his approval for the deviations, and the pour is proceeding on schedule.

Status of Mechanical Work:
The Pitch line is nearly completed up to the tank area. The current focus is on installing the tracing lines, installing the permanent pipe supports, and starting the hot oil piping in the heater area. The permanent pipe supports have been installed on the dock, and they look great. Some photos of these are attached.

Status of Electrical Work:
Chandler has been working on the installation of the junction boxes for the pipe bridge in segment-09 along with the conduit over the bridge. Still no schedule, etc., has been forthcoming from Dave Chandler.

ODEQ Well:
The wells have been completed. No contamination was noted in the drillings, which went smoothly with the exception of one minor injury to a contractor.

Charlie Norris
Construction Manager

Author: AMOS KAMERER at PITT
Date: 6/18/99 4:21 PM
Priority: Normal
TO: Kevin Fitzgerald at PITT
TO: Jim Dietz at PITT
TO: BILL MEISINGER at TECHCTR
TO: Jack Stephenson at PITT
TO: iskoppers@aol.com at internet
Subject: TANK

---------- Message Contents ----------

The concrete pour for the tank pile cap took place today. Charlie had another near heart attach, when they started at 6AM with the first pour at the side closest to the new pitch building, and in about 5 minutes the bottom of the form panels gave out. As it turned out, this was only a minor problem, it was shored up and no similar problems occurred. There is about a 4" bow in the bottom of these panels.

However, the job Forman for Harder had under estimated how the pour would go and they were very under staffed. Calls were made and in about an hour, they had triple the number of people on hand, including one of their department managers, Tom Howell our in house day to day contact for Harder, and several other crew Forman that were available.

They finished the pour at about 2:30PM and then covered the entire area with the required plastic sheeting and Styrofoam. The 3 thermal couples were installed as specified, to check the progress of the curing. They were out of here about 4PM.

My only final comment is; this is going to be one big ------- tank!

Amos

Author: <ISKOPPERS@aol.com> at internet
Date: 6/15/99 4:27 PM
Priority: Normal
TO: Amos Kamerer at PITT
Subject: update
---------- Message Contents ----------

Portland Liquid Pitch Project
Project Update
June 11, 1999

Status of Civil Work:
Pile driving was completed on Monday, June 7. The piles were filled with concrete on Tuesday, June 8. Forming for the pile cap concrete was taking place while the final pile driving and filling were being completed, and was ready at about the same time. The re-bar for the pile cap is in the process of being installed, and should be completed by the middle of the week.

Excavation for the pipe support in the roadway between the tank and the oil heater was completed on Thursday.

Status of Mechanical Work:
The final bridge for the 10" pipeline has been installed, and the pad for the flow meters was poured this week. This completes the civil work for the pipeline portion of the project. McDowell has shifted the focus of their civil people to the installation of the pipe supports and pump mounting in the hot oil area.

McDowell has nearly completed the drilling for the intermediate electrical conduit supports. I expect this to be completed by midweek.

Fabrication continues for the 10" transfer line and the hot oil tracing, The attached spreadsheet summarizes the progress.

Status of Tank Construction
Met with Pat Morse on Thursday evening to discuss the site layout and reach agreement on staging of materials and interfacing with other contractors. Pat believes he can do the job with the majority of his materials staged inside the footprint of the tank, including the crane. His biggest concern as far as interference with other contractors is the space he needs to setup his generators and power equipment. We agreed to use of the Southwest corner of the construction area for this purpose initially, and to relocate to a position nearer to the pitch building when time comes to excavate and form the original location.

Status of Electrical Work:
Chandler electric continues to install conduit along the pipeline. The progress is summarized in the electrical attachment.

ODEQ Well:
Met with representatives of the ODEQ on Wednesday to determine the location for two new wells to be installed for sampling ground water. We tentatively agreed upon the NE corner near the pitch buildings as the best location. I will lay the area out by Tuesday for final locations subject to ODEQ approval

Charlie Norris
Construction Manager

Author: <ISKOPPERS@aol.com> at internet
Date: 6/7/99 2:17 PM
Priority: Normal
TO: Amos Kamerer at PITT
Subject: (no subject)
---------- Message Contents ----------

Portland Liquid Pitch Project Update
June 4, 1999

Status of Civil Work:

The pile driving is continuing will be completed on Monday, June 7, 1999. The concrete filling is scheduled for Tuesday, June 8, 1999. There appears to have been some confusion concerning the Pile fill. Dewitt was unaware that the specifications required the use of Tremie pipes and vibration. Otherwise the pour might been done on Monday. Personally, I don't think they would have been ready in time anyway.

The foundations for the MCC extension and the pipe supports in the heater area are complete. Work is progressing at the tank location by setting up the forms for the pile cap pours even as the pile driving is continuing.

The MCC area will be back-filled early in the week, Which will allow for the mechanical work in the area to begin. At the same time excavation for the pipe support in the middle of the roadway will be done.

Status of Mechanical Work:

McDowell is currently working on both the pitch line and the hot oil tracing lines simultaneously. The concrete for the final bridge will be poured on Monday, June 07, 1999. All of McDowell's work is progressing well, and they are eager to set the heater and start work in that area.

Status of Electrical Work:

The conduit runs have been begun with the dock end of the piping run. Most of segments 11 and 12 are done. The work looks great. They are doing an excellent job of maintaining parallel lines even through the long radius elbows.

Plan For the Coming Week:

+ Ensure that the tank area grading is restored to design spec.
+ Continue to track the mechanical work on the pipeline.

Charlie Norris
Construction Manager

Author: <ISKOPPERS@aol.com> at internet
Date: 5/24/99 3:18 AM
Priority: Normal
TO: Amos Kamerer at PITT
Subject: weekly status report
---------- Message Contents ----------

Portland Liquid Pitch Project
Project Update
May 21, 1999

Status of Civil Work:
The pile driving is continuing with work on splicing the piles on the east end of the tank area. Fortunately we have been able to restart the piles after delays of more than a day so I don't anticipate any problems with "freezing" of the piles. The specifications for the piles included in the drawings are for +" wall piles whereas our piles are +" wall. This invalidates the inspection procedures outlined in the drawings.

We brought in PSI to conduct UT as well as visual inspections as outlined in the UBC. Most of the testing has been and will continue to be conducted during breaks and lunch times of the pile driving crew. When it is necessary to test at other times care is being taken to conduct the tests while the welders are occupied with another pile. In this way we are able to avoid any delays to the pile-driving resulting from the testing procedures.

Since a single weld in defined as 12" length of weld, and our piles are 16" diameter, each pile is considered to be 4 welds. We had an initial failure rate of 5 piles, some with multiple defects (the failure rate was estimated by the inspector to be 30%) in the first testing batch of eight piles. This is an unheard of failure rate, so I sought to have the testing independently verified. I was unable to get an independent UT inspector on short notice, so the technical manager for PSI came in to verify the testing. He found no flaw in the equipment or the test results. We have arranged however to have a different UT technician assigned to conduct the inspections for the remainder of the project.

Status of Mechanical Work:
McDowell Mechanical has completed the installation of the bridge at the pitch building doorway. And is in the process of setting re-bar and forming for the remaining bridge pours.

Plan For the Coming Week:
+ Continue tracking the mechanical work and addressing issues that arise.
+ Observe/facilitate pile driving operations.

Charlie Norris
Construction Manager

Author: <ISKOPPERS@aol.com> at internet
Date: 5/21/99 1:19 AM
Priority: Normal
TO: Amos Kamerer at PITT
Subject: project update
---------- Message Contents ----------

Liquid Pitch Project
Project Status
5/20/1999

Jim, Bill, and Amos

We had some unexpected developments today regarding the pile driving. I will try to reiterate the events as closely as I can.
+ Yesterday it became apparent that we would have to splice an estimated 60 to 75 piles. I reviewed the specs with the contractors, and discovered that non-standard backing plates were specified. This would cause a delay in the job, so we contacted the structural engineering firm who wrote the specs (KPFF) and discussed a deviation to the requirement. They agreed and said that they would contact Cameron McKernan with a revised spec.
+ This morning as follow up on yesterday's discussion with KPFF engineering the topic came up between Geo Engineers and KPFF about visual inspection requirements. (as the drawings indicated) KPFF needed to look into it and get back to us. Meanwhile we were assured that proceeding with one pile to find the depth at what we expected to be the lowest point would not create a problem. (This pile only went to 64 feet).
+ Dewitt continued to splice piles while we awaited a response from KPFF. (no more were driven however) It had become apparent that the welding specs were also incorrect.
+ Around noon Sam from KPFF got back to us with a fax telling us to disregard the pile splicing spec (which by now we knew to be incorrect) and to proceed with full penetration welds (which we had already figured out) and that we would need 100% inspections including UT.

This was new to us. At this point we stopped work on all piles which required splicing, and I contacted Bill with the problem. During a conference call with Bill and I, Cameron committed to finding the cities inspection requirements within the hour. About one hour later Cameron informed me that he had located the city requirements that applied to our situation. I now have a copy of the code which I'll paraphrase to say (100% inspection including UT is required for a representative sample defined as at least 40 welds. If the sample has a rejection rate less than 5%, testing can be reduced to 25% of welds.) A weld for the purposes of the document is defined as 12" long. Therefor, each piling would need to test at four points, but would be considered to be four welds. I understand this to mean that we need to test four points on each of the first ten piles, and one point on each subsequent pile.

I have made arrangements for PSI to be on site for this testing at 8:00 am tomorrow.

Harder Mechanical has issued an Extra Work Authorization to me for an additional $332 per splice and $30 per extra foot. I have also been informed that with this additional testing, Harder intends to bill Koppers for the delay time caused by the testing. They informed me at the time that this testing is up to the owners and therefor we are creating a loss of time for them. I believe that Tom may have even said some of this during my phone call with bill when he was on speakerphone, but I'm not sure.

I think that Harder is trying to pull one over on Koppers Industries, Inc. and that we should consider very carefully before agreeing to their change orders for the following reasons:

+ The price that they quoted for splicing is different than that submitted to Jack Stevenson on January 21st.
+ When I hesitated to sign one of their Extra work authorizations till I had a chance to discuss the situation with Bill and Jack Stevenson they threatened to stop all work on the foundation. The manner in which they presented this to me was one of strong-arming to get me to sign a document, which I believed to be in conflict with the PO. I wrote in that the work was authorized, but that all billing must be in accordance with the PO, then I signed it.
+ Even though the Splicing specs were incorrect they were included in the scope and therefore should have been considered before a bid was submitted. Yet to my understanding no mention was ever made in any document, to indicate that an additional fee would be charged for splicing of piles other than the reference to a charge of $27 per foot. For them to include that reference indicates that they were aware that splicing would be included in the scope, and since the job was awarded on a hard money bid they should have made note in the bid if splicing would require additional charges.
+ The change order for delays is just so much BS since they mentioned before the pile driving started that they expected to drive about 12 per day. The unspliced piles are being driven at nearly double that pace. Even with the testing we should be able to be close to averageing12 per day over the course of the pile driving operations.

I have been dealing with contractors for nearly twenty years, and have seen many times when a contractor low-balled a contract planning to make up the difference with change orders. Working with Harder day after day I am now 100% convinced that they are trying to do this. I think we need to be very careful how we respond to their requests for extra money. The work, which they are submitting as changes, was identified in the original scope. I think it would set a bad precedent to just accept everything they ask for, without negotiations. I personally will not sign any extra work requests from them without first consulting with either Bill Meisinger or Jim Dietz.

Author: <ISKOPPERS@aol.com> at internet
Date: 5/19/99 7:57 PM
Priority: Normal
TO: Jim Dietz at PITT
TO: BILL MEISINGER at TECHCTR
TO: Amos Kamerer at PITT
CC: canita@teleport.com at internet
Subject: PILE DRIVING PROGRESS
---------- Message Contents ----------

The attached spreadsheet shows the pile driving progress so far. All depths are measured from ground level. L-15 and M-15 have been driven to their full lengh, and must be spliced. This work will continue tomarrow (5/20/99). This chart shows the speed of progress and the contours of the load bearing base. Keep in mind when making projections from this data that progress will slow down dramatically when splices need to be made. My best guess from information from the contrctors is 8-10 spliced piles per day.

Charlie Norris
Construction Manager

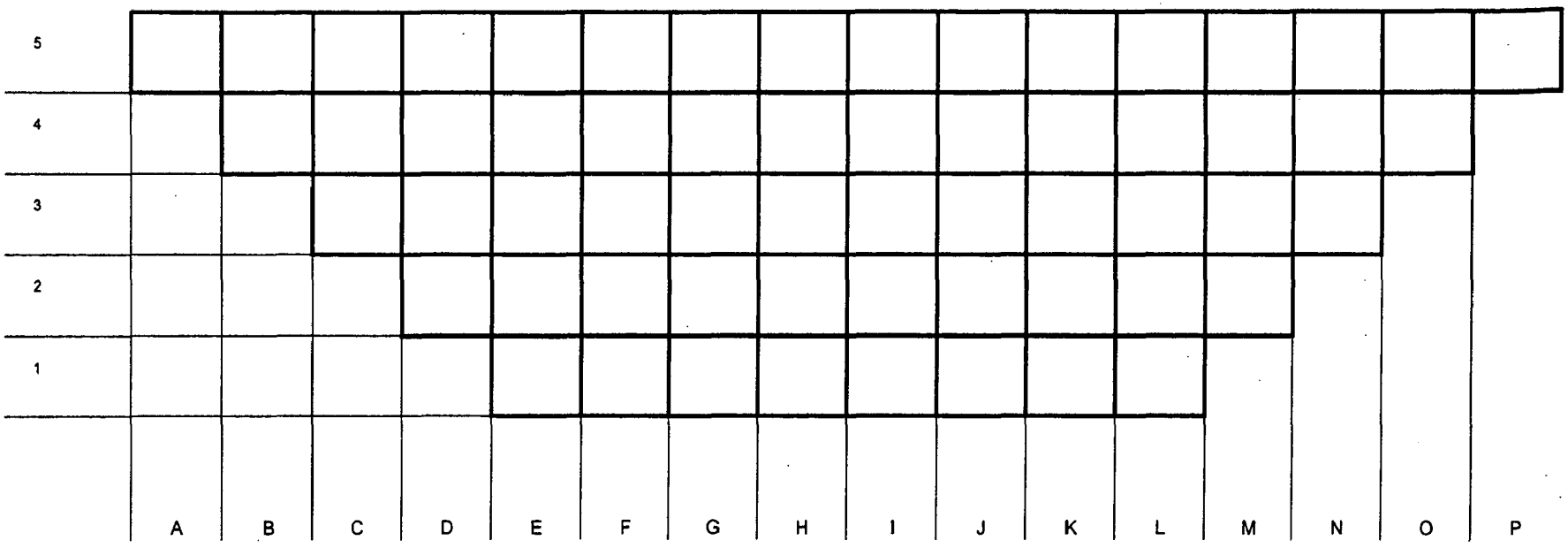
17th - 12
18th - 29 - 41
19th - 19 - 60

PILE DRIVING DEPTH CHART

N

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
16					50' 10" 18-May	51' 10" 18-May	53' 6" 18-May	55' 1" 18-May	56' 3" 18-May	58' 0" 18-May	57' 3" 19-May	57' 5" 19-May				
15				50' 10" 18-May	51' 8" 18-May	53' 4" 18-May	53' 4" 18-May	55' 10" 18-May	56' 1" 18-May	56' 7" 19-May	58' 5" 19-May	X	X			
14			48' 4" 17-May	51' 1" 18-May	51' 3" 18-May	53' 2" 18-May	54' 1" 19-May	55' 6" 19-May	56' 8" 19-May	57' 2" 19-May	58' 6" 19-May					
13		48' 11" 17-May	49' 2" 17-May	50' 2" 17-May	52' 0" 18-May	53' 8" 19-May	55' 6" 19-May	57' 0" 19-May	57' 7" 19-May							
12	45' 11" 17-May	47' 3" 17-May	48' 6" 17-May	50' 2" 17-May	52' 4" 18-May											
11	45' 0" 17-May	47' 0" 17-May	48' 2" 17-May	50' 2" 17-May	52' 4" 19-May											
10	46' 7" 18-May	47' 5" 18-May	47' 7" 18-May	49' 2" 19-May	50' 8" 19-May											
9	46' 0" 18-May	48' 0" 18-May	49' 3" 18-May	49' 8" 19-May												
8	45' 2" 18-May	47' 0" 18-May	48' 6" 18-May	49' 9" 19-May												
7	46' 3" 18-May	47' 2" 18-May	52' 6" 18-May	49' 7" 19-May												
6																

Koppers010253



Koppers010254

Author: <ISKOPPERS@aol.com> at internet
Date: 5/18/99 11:05 AM
Priority: Normal
TO: Amos Kamerer at PITT
Subject: status report
---------- Message Contents ----------

Portland Liquid Pitch Project
Project Update
May 14, 1999

Status of Civil Work:
The oil heater foundation is being completed today. The MCC extension and hot oil bridgework will be started on Monday while the pile driving is underway.

The tank site is excavated and ready for pilings. Dewitt will be mobilizing Monday to drive the pilings and should start sometime during the day. It should take 2-3 weeks to complete the pile driving.

Status of Mechanical Work:
McDowell Mechanical currently has two welding teams of two men each working on the liquid pitch line starting from the dock working their way toward the tank. They also have a crew of three working on setting the pipe support foundations and guides. This work is progressing at a steady pace. A spreadsheet is attached which I am using to track this progress. I am setting up similar sheets for the other trades, and will eventually incorporate them all in a Tracking Gantt chart.

I have halted McDowell's practice of tacking temporary pipe stands to the support bases and guides. They are currently clamping the temporary stands on. This will minimize the adverse effects on the hot dipped galvanizing.

Since the plant will be closed for Memorial Day on Monday May 31st McDowell will work ten-hour days on Tuesday through Friday that week.

Other Issues and Questions:
+ Gray Johnson has asked about inclusion of an additional drain for the pitch line in or near the expansion loop in segment 11 since this will be a low point. I have discussed this with Cameron McKernan, and he agrees that it should be included.

Plan For the Coming Week:
+ Evaluate the remaining civil work to identify tasks that can be done in parallel to minimize the project duration.
+ Continue tracking the mechanical work and addressing issues that arise.
+ Begin development of a detailed Gantt chart that includes actuals as well as planned tasks as a tool for effective project tracking.
+ Observe/facilitate pile driving operations.

Charlie Norris
Construction Manager

mechanical field work status

piping runs

segment	drive piles	set pads	set base plates	concrete fill base	set supports	fabricate pipe	install pipe	install tracing	hydro test	insulate
1	N/A	N/A	0%	0%	0%	0%	0%	0%	0%	0%
2	N/A	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%
4	100%	100%	100%	0%	0%	0%	0%	0%	0%	0%
5	100%	100%	100%	0%	0%	0%	0%	0%	0%	0%
6	100%	100%	100%	0%	0%	0%	0%	0%	0%	0%
7	100%	100%	100%	75%	0%	0%	0%	0%	0%	0%
8	100%	100%	100%	100%	temporary	30%	0%	0%	0%	0%
9	100%	100%	100%	100%	temporary	0%	0%	0%	0%	0%
10	100%	100%	100%	100%	temporary	60%	0%	0%	0%	0%
11	100%	100%	100%	100%	temporary	100%	0%	0%	0%	0%
12	N/A	100%	100%	100%	temporary	100%	0%	0%	0%	0%

includes mounting with final clamps and guides

bridges

	excavate	form and pour footings	assemble bridge
seg 3	100%	15%	0%
seg 5	100%	15%	0%
seg 9	100%	0%	0%

Koppers010256

J. CAMERON McKERNAN COMPANY

Engineering & Naval Architecture

825 NE 20th Avenue, Suite 110 • Portland, Oregon 97232 • (503) 232-7211 • FAX (503) 232-7658

HAND DELIVERED

File No. P97-10
September 9, 1999

Northwest Coppers Works Inc.
1303 N River Street
Portland, Oregon 97227

Attention: Ken Twiss

Subject: Koppers Industries, Inc. - Pitch Ship Terminal

Enclosure:

PLAN NO.	REV.	TITLE
6526-A004	1	HOT OIL SYSTEM EXPANSION TANK T-240

Gentlemen:

We send two copies of the enclosed plan for your information. Please prepare a quotation including delivery time to fabricate one tank in accordance with the plan. We would like to have the tank as soon as possible. Your quotation should be submitted to:

Koppers Industries, Inc.
Koppers Building
436 7th Avenue
Pittsburgh, PA 15219

Attention: Jack L. Stephenson, Manager of Purchasing

Phone: (412) 227-2265
FAX: (412) 227-2935

Very truly yours,

J. CAMERON MCKERNAN COMPANY

By: Mary Anne J McKernan
for:
J. Cameron McKernan, President

cc: Koppers Industries, Inc. - Bill Meisinger

McDowell Welding & Pipe Fitting, Inc.

4000 NW St. Helens Rd., Portland, OR 97210
503-241-2410 • Fax 503-241-2767

December 10, 1999

William Meisinger
Koppers Industries, Inc
1001 William Pitt Way
Pittsburg, PA 15238-1362

Subject: Change Order 92070 – 61

Bill,

On December 9th we reviewed the temperature element placement in the hot oil shed and we were asked by Koppers to relocate the temperature elements to the hot oil system returns instead of the pump discharge. We have reviewed the project drawings and interviewed our project foreman to determine how the temperature elements were located in the pump discharges with the following results.

1. Steve Hinds asked Charlie Norris to approve the temperature element location when drawing inconsistencies were noticed. Charlie approved the current location of the temperature elements in question.
2. The temperature elements in question are not depicted on the isometric drawings of the hot oil pumps 6526-P009
3. TE-2176 appears in plan view and elevation view drawing 6526-P006 and it is shown in the system return.
4. TE-2176 appears on P&ID drawing 6526-D006 in the pump discharge as we installed it.
5. TE-2166 and TE-2156 both do not appear on the plan and elevation views in the pump discharge or the system return.
6. TE-2166 and TE-2156 both appear on P&ID drawing 6526-D006 in the system return as you requested.
7. None of the temperature elements in question appear on the hot oil tracing isometric drawing 6526-P013.

As you can see we made a reasonable attempt to determine the temperature element locations based on the inconsistent drawings so we do not agree that the cost of this change belongs completely to McDowell.

Total of
All 5
$ 5029

We are willing to install threaded couplings on the hot oil system return pipes in the new locations and install new thermo wells with a partial hot tap procedure. The new tapped thermo wells will be supplied by Koppers and all other fittings will be supplied by McDowell. All electrical system changes or insulation changes will be made by others and these costs will be paid by Koppers. McDowell will begin relocating the temperature elements on Monday, December 13th provided that Koppers acknowledges some responsibility in the incorrect placement of these temperature probes and is willing to negotiate a reasonable compromise on the estimated cost of the changes.

We have identified this work as change order 92070-61. We estimate the cost to relocate these three temperature probes to be $2,634.00. We acknowledge that we could have done a better job of verifying the temperature element locations so we are willing perform the work at our cost of $1,755.00. We have attached a copy of the change order and we request that the not to exceed budget be increased to compensate for this added work.

Regards

McDowell Welding and Pipe Fitting

Gray Johnson
Engineering Manager

CC: Kurt Liebe Jack Stephenson Charlie Norris

McDowell Welding
& Pipe Fitting, Inc.

NOTIFICATION OF CONTRACT CHANGE OR DELAY

CLIENT: KOPPERS INDUSTRIES INC

ATTN: BILL MEISINGER

SUBJECT: CO 92070-61

DATE OF NOTIFICATION: 12 / 10 / 99

TIME: 5:00 am (pm) SHFT: 1 2 3

APPROVAL REQ'D BY: / / /

MCDOWELL NUMBER: 92070 (Job no.) - 61 (Change no.)

CLIENT NUMBER:

We respectfully direct your attention to the following ☒ items:

A. ☒ McDowell has received this date a ☐ WRITTEN ☒ VERBAL order issued by: BILL MEISINGER of KOPPERS INDUSTRIES INC directing us to:

☒ Perform work as described in Item C below.

☐ Stop work in progress as described in Item C below.

B. ☐ McDowell is unable to start work scheduled to commence on _____, for the reason described in Item C below

C. REASON FOR THE CHANGE: INSTALL TEMPERATURE ELEMENTS IN HOT OIL RETURN LINES AT PZ85, PZ80 AND P-275 INSTEAD OF PUMP DISCHARGE. A PARTIAL HOT TAP PROCEEDURE WILL BE REQUIRED TO INSTALL THESE TEMPERATURE ELEMENTS ☐ See Attached.

WE CONSIDER THE FOLLOWING ☒ ITEMS TO BE APPLICABLE:

D. ☒ The order is for work not within the scope of our present contract and will involve: ☒ ADDITIONAL COST, ☐ TIME EXTENSION.

E. ☒ The inherent delay of C above, will involve: ☒ ADDITIONAL COST, ☐ TIME EXTENSION, ☐ PREMIUM TIME, for contract completion.

IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

F. ☒ McDowell ☐ IS ☒ IS NOT proceeding with the work as directed before issuance of a formal change order, per Client Rep's Authority.

G. ☐ McDowell is submitting a proposal covering added cost directly* attributable to the work order:

☒ Lump Sum $ [redacted]. ☐ Per McDowell T & M Rates. ☐ See Attached.

$1755.00 INCREASE IN THE NOT TO EXCEED BUDGET

*Total cost due to change/delay and effect on completion date(s) cannot be completely determined at this time; McDowell will advise total impact upon further analysis of change/delay and overall project effect.

Respectfully Submitted,
McDowell Welding and Pipe Fitting, Inc.

GRAM JOHNSON 12/10/99
McDowell Representative Date

Approval to Proceed:

Client Rep. Date

McDowell Welding & Pipe Fitting, Inc.

4000 NW St. Helens Rd., Portland, OR 97210
503-241-2410 • Fax 503-241-2767

December 10, 1999

William Meisinger
Koppers Industries, Inc
1001 William Pitt Way
Pittsburg, PA 15238-1362

Subject: Change Order 06003 – 01

Bill,

On December 9th Cameron McKernan requested that we install two additional lifting eyes on the hose spreader bar. We would cut these parts out in our shop and would install them in the field to avoid shipment of the spreader bar. All welds would be cold galvanized. We were also asked to supply one additional anchor shackle. These lifting eyes were not included on the original prints so they were not part of our original scope of work. We have identified this work as change order 06003-01. We estimate the cost to install these lifting eyes to be $854.00. We have attached a copy of the change order and we request that the purchase order be increased to compensate for this added work.

Regards

McDowell Welding and Pipe Fitting

Gray Johnson
Engineering Manager

CC: Kurt Liebe Jack Stephenson Charlie Norris

McDowell Welding
& Pipe Fitting, Inc.

NOTIFICATION OF CONTRACT CHANGE OR DELAY

CLIENT: KOPPERS INDUSTRIES INC

ATTN: BILL MEISINGER

SUBJECT: C.O. 06003-01

DATE OF NOTIFICATION: 12 / 10 / 99

TIME: 5:00 am/pm SHFT: 1 2 3

APPROVAL REQ'D BY: / /

MCDOWELL NUMBER: 06003 (Job no.) - 01 (Change no.)

CLIENT NUMBER:

We respectfully direct your attention to the following ☒ items:

A. ☒ McDowell has received this date a ☐ WRITTEN ☒ VERBAL order issued by: CAMERON MCKERNAN of KOPPERS directing us to:

☒ Perform work as described in Item C below.

☐ Stop work in progress as described in Item C below.

B. ☐ McDowell is unable to start work scheduled to commence on _____, for the reason described in Item C below

C. REASON FOR THE CHANGE: INSTALL TWO MORE LIFTING EYES ON THE HOSE SPREADER BAR AND SUPPLY ONE ANCHOR CLEVIS

☐ See Attached.

WE CONSIDER THE FOLLOWING ☒ ITEMS TO BE APPLICABLE:

D. ☒ The order is for work not within the scope of our present contract and will involve: ☒ ADDITIONAL COST, ☐ TIME EXTENSION.

E. ☒ The inherent delay of C above, will involve ☒ ADDITIONAL COST, ☐ TIME EXTENSION, ☐ PREMIUM TIME, for contract completion.

IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

F. ☒ McDowell ☒ IS ☐ IS NOT proceeding with the work as directed before issuance of a formal change order, per Client Rep's Authority.

G. ☐ McDowell is submitting a proposal covering added cost directly* attributable to the work order:

☒ Lump Sum $ 854.00. ☐ Per McDowell T & M Rates. ☐ See Attached.

*Total cost due to change/delay and effect on completion date(s) cannot be completely determined at this time: McDowell will advise total impact upon further analysis of change/delay and overall project effect.

Respectfully Submitted,
McDowell Welding and Pipe Fitting, Inc.

GRAY JOHNSON 12-10-99
McDowell Representative Date

Approval to Proceed:

Client Rep. Date

McDowell Welding & Pipe Fitting, Inc.

4000 NW St. Helens Rd., Portland, OR 97210
503-241-2410 • Fax 503-241-2767

December 10, 1999

William Meisinger
Koppers Industries, Inc
1001 William Pitt Way
Pittsburg, PA 15238-1362

Subject: Change Order 01004 – 01

Bill,

On December 9th Cameron McKeman requested that we remove the 4" check valve from the dock fire line and install a galvanized union. McDowell would supply all materials. No welding would be required. The original drawings included a check valve so removal of the check valve was not part of our original scope of work. We have identified this work as change order 01004-01. We estimate the cost rework the dock fire line to be $610.00. Fortunately, the hyrdrotest was not complete so there is no additional charge for duplicate hydrotests. We have attached a copy of the change order and we request that the purchase order be increased to compensate for this added work.

Regards

McDowell Welding and Pipe Fitting

Gray Johnson
Engineering Manager

CC: Kurt Liebe Jack Stephenson Charlie Norris

McDowell Welding
& Pipe Fitting, Inc.

NOTIFICATION OF CONTRACT CHANGE OR DELAY

CLIENT: KOPPERS INDUSTRIES INC

ATTN: BILL MEISINGER

SUBJECT: C.O. 01004-01

DATE OF NOTIFICATION: 12 / 10 / 99

TIME: 5:00 am (pm) SHFT: (1) 2 3

APPROVAL REQ'D BY: ____ / ____ / ____

MCDOWELL NUMBER: 01004 (Job no.) - 01 (Change no.)

CLIENT NUMBER: ____

We respectfully direct your attention to the following ☒ items:

A. ☒ McDowell has received this date a ☐ WRITTEN ☒ VERBAL order issued by: BILL MEISINGER of KOPPERS directing us to:

☒ Perform work as described in Item C below.

☐ Stop work in progress as described in Item C below.

B. ☐ McDowell is unable to start work scheduled to commence on ____, for the reason described in Item C below

C. REASON FOR THE CHANGE: REMOVE EXISTING CHECK VALVE FROM DRY FIRE LINE AND INSTALL A UNION AND NIPPLE

☐ See Attached.

WE CONSIDER THE FOLLOWING ☒ ITEMS TO BE APPLICABLE:

D. ☒ The order is for work not within the scope of our present contract and will involve ☒ ADDITIONAL COST, ☐ TIME EXTENSION.

E. ☒ The inherent delay of C above, will involve ☒ ADDITIONAL COST, ☐ TIME EXTENSION, ☐ PREMIUM TIME, for contract completion.

IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

F. ☒ McDowell ☒ IS ☐ IS NOT proceeding with the work as directed before issuance of a formal change order, per Client Rep's Authority.

G. ☐ McDowell is submitting a proposal covering added cost directly* attributable to the work order:

☒ Lump Sum $ 610.00 ☐ Per McDowell T & M Rates, ☐ See Attached.

*Total cost due to change/delay and effect on completion date(s) cannot be completely determined at this time; McDowell will advise total impact upon further analysis of change/delay and overall project effect.

Respectfully Submitted,
McDowell Welding and Pipe Fitting, Inc.

GRAY JOHNSON 12/10/99
McDowell Representative Date

Approval to Proceed:

Client Rep. Date

McDowell Welding & Pipe Fitting, Inc.

4000 NW St. Helens Rd., Portland, OR 97210
503-241-2410 • Fax 503-241-2767

December 10, 1999

William Meisinger
Koppers Industries, Inc
1001 William Pitt Way
Pittsburg, PA 15238-1362

Subject: Change Order 96451 – 01

Bill,

On December 9th Cameron McKernan requested that we modify the corner of the hose rack to clear insulation on the dock evacuator pump. We were also instructed to install a corner gusset to strengthen the pan where the corner is removed. All welds would be made in the field and cold galvanized. The aluminum guide pole will be cut to match the hose trough. Clearance for these pipes was not noted on any drawings so this modification is not part of our original scope of work. We have identified this work as change order 96451-01. We estimate the cost to modify the trough corner to be $480.00. We have attached a copy of the change order and we request that the purchase order be increased to compensate for this added work.

Regards

McDowell Welding and Pipe Fitting

Gray Johnson
Engineering Manager

CC: Kurt Liebe Jack Stephenson Charlie Norris

McDowell Welding
& Pipe Fitting, Inc.

NOTIFICATION OF CONTRACT CHANGE OR DELAY

CLIENT: KOPPERS INDUSTRIES INC

ATTN: BILL MEISINGER

SUBJECT: C.O. 96451-01

DATE OF NOTIFICATION: 12 / 10 / 99

TIME: 5:00 am (pm) SHFT: 1 2 3

APPROVAL REQ'D BY: / / /

MCDOWELL NUMBER: 96451 (Job no.) - 01 (Change no.)

CLIENT NUMBER:

We respectfully direct your attention to the following ☒ items:

A. ☒ McDowell has received this date a ☐ WRITTEN ☒ VERBAL order issued by: CAMERON MCKERNAN of KOPPERS INDUSTRIES INC directing us to:

☒ Perform work as described in Item C below.

☐ Stop work in progress as described in Item C below.

B. ☐ McDowell is unable to start work scheduled to commence on _____, for the reason described in Item C below

C. REASON FOR THE CHANGE: TRIM CORNER OF HOSE TROUGH TO CLEAR HOT OIL TRACING PIPES AND INSULATION INSTALL 3" PIPE GUSSET

☐ See Attached.

WE CONSIDER THE FOLLOWING ☒ ITEMS TO BE APPLICABLE:

D. ☒ The order is for work not within the scope of our present contract and will involve: ☒ ADDITIONAL COST, ☐ TIME EXTENSION.

E. ☒ The inherent delay of C above, will involve: ☒ ADDITIONAL COST, ☐ TIME EXTENSION, ☐ PREMIUM TIME, for contract completion.

IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

F. ☐ McDowell ☐ IS ☐ IS NOT proceeding with the work as directed before issuance of a formal change order, per Client Rep's Authority.

G. ☐ McDowell is submitting a proposal covering added cost directly* attributable to the work order:

☒ Lump Sum $ 480.00. ☐ Per McDowell T & M Rates. ☐ See Attached.

*Total cost due to change/delay and effect on completion date(s) cannot be completely determined at this time; McDowell will advise total impact upon further analysis of change/delay and overall project effect.

Respectfully Submitted,
McDowell Welding and Pipe Fitting, Inc.

GRAY JOHNSON 12/10/99
McDowell Representative Date

Approval to Proceed:

Client Rep. Date

McDowell Welding & Pipe Fitting, Inc.

4000 NW St. Helens Rd., Portland, OR 97210
503-241-2410 • Fax 503-241-2767

December 10, 1999

William Meisinger
Koppers Industries, Inc
1001 William Pitt Way
Pittsburg, PA 15238-1362

Subject: Change Order 92070 – 60

Bill,

On December 8th we were asked by Charlie Norris and TJ to supply a price to extend the operators on two 6" pitch valves and to add intermediate bearings and a chain operator. Later on December 10th you told me that you felt this change was not billable because the valve operators were blocked by steam pipes that we installed. We disagree with your evaluation of this situation. We were specifically told to orient the pitch valves as they are currently located and we were not given any piping location details for the steam lines that currently "block" access to the valve operators. Steam piping locations were further complicated by the insulation scaffolding around the tank and the coordination issues surrounding the insulation. We had very few options for the steam piping and the original engineering drawings did not even attempt to show the valve operators or the steam piping. This change order price is based on McDowell supplying all materials. We have identified this work as change order 92070-60. We estimate the cost to extend these two valve operators to be $1,330.00. We have attached a copy of the change order and we request that the not to exceed budget be increased to compensate for this added work. We will not order materials for this change or make modifications until Koppers agrees to negotiate this change order and pay at least part of this expense.

Regards

McDowell Welding and Pipe Fitting

Gray Johnson
Engineering Manager

CC: Kurt Liebe Jack Stephenson Charlie Norris

McDowell Welding
& Pipe Fitting, Inc.

NOTIFICATION OF CONTRACT CHANGE OR DELAY

CLIENT: KOPPERS INDUSTRIES INC

ATTN: BILL MEISINGER

SUBJECT: C.O. 92070-60

DATE OF NOTIFICATION: 12 / 10 / 99

TIME: 5:00 am/pm SHFT: 1 2 3

APPROVAL REQ'D BY: / /

MCDOWELL NUMBER: 92070 (Job no.) - 60 (Change no.)

CLIENT NUMBER:

We respectfully direct your attention to the following ☒ items:

A. ☒ McDowell has received this date a ☐ WRITTEN ☒ VERBAL order issued by: CHARLIE NORRIS of KOPPERS INDUSTRIES INC directing us to:

☒ Perform work as described in Item C below.

☐ Stop work in progress as described in Item C below.

B. ☐ McDowell is unable to start work scheduled to commence on _____, for the reason described in Item C below

C. REASON FOR THE CHANGE: EXTEND OPERATOR ON 6" PITCH VALVE TO 12", AND EXTEND OPERATOR ON 6" PITCH VALVE 48" INSTALL INTERMEDIATE SUPPORT AND BEARING. INSTALL CHAIN OPERATOR

☐ See Attached.

WE CONSIDER THE FOLLOWING ☒ ITEMS TO BE APPLICABLE:

D. ☒ The order is for work not within the scope of our present contract and will involve ☒ ADDITIONAL COST, ☐ TIME EXTENSION.

E. ☒ The inherent delay of C above, will involve ☒ ADDITIONAL COST, ☐ TIME EXTENSION, ☐ PREMIUM TIME, for contract completion.

IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

F. ☒ McDowell ☒ IS ☐ IS NOT proceeding with the work as directed before issuance of a formal change order, per Client Rep's Authority.

G. ☐ McDowell is submitting a proposal covering added cost directly* attributable to the work order:

☒ Lump Sum $ [redacted] ☐ Per McDowell T & M Rates. ☐ See Attached.

$1530.00 [redacted] INCREASE IN THE NOT TO EXCEED BUDGET

*Total cost due to change/delay and effect on completion date(s) cannot be completely determined at this time; McDowell will advise total impact upon further analysis of change/delay and overall project effect.

Respectfully Submitted,
McDowell Welding and Pipe Fitting, Inc.

GRAY JOHNSON 12/10/99
McDowell Representative Date

Approval to Proceed:

Client Rep. Date

McDowell Welding & Pipe Fitting, Inc.

4000 NW St. Helens Rd., Portland, OR 97210
503-241-2410 • Fax 503-241-2767

November 30, 1999

William Meisinger
Koppers Industries, Inc
1001 William Pitt Way
Pittsburg, PA 15238-1362

Subject: Change Order 92070 – 59 Revised

Bill,

On November 22, 1999 we were instructed to install an offset section of fence around the metering shed with a gate. This additional fence repair was not included in our original scope of work. We have identified this work as change order 92070-59. We estimate the cost for the new fence with gate be $1,341.00. We have attached a copy of the change order and we request that the "not to exceed" budget be increased to compensate for this added work. We originally quoted this work for $1,833.00 based on a quotation from Interstate Fence the original installers. We have since received quotes from Town and Country fence for $1,534.00 and American fence for $1,341.00

Regards

McDowell Welding and Pipe Fitting

Gray Johnson

Engineering Manager

CC: Kurt Liebe Jack Stephenson Charlie Norris

McDowell Welding & Pipe Fitting, Inc.

4000 NW St. Helens Rd., Portland, OR 97210
503-241-2410 • Fax 503-241-2767

December 10, 1999

William Meisinger
Koppers Industries, Inc
1001 William Pitt Way
Pittsburg, PA 15238-1362

Subject: T&M Work Order 02017

Bill,

On December 9th you requested that we install a 4" bypass line around pitch pump P-220 and it's strainer. This line would include 4 each ½" steam tracers connected to two jacketed valves and three steam traps. Koppers would supply two 4" jacketed gate valves and two steam traps. McDowell would supply all other pipe fittings and pipe supports. This bypass line must be completed by December 13th so overtime is required. We estimate that the T&M cost for this project will not exceed $4,830.00 and we expect to complete the job for $3,890.00. Please note that we will route the pipe as we discussed but any modification to valve handles for operator access is not included in this quote and would require additional charges. This will be processed as a T&M work order by our accounting department with a "not to exceed" cap of $4,830.00.

Regards

McDowell Welding and Pipe Fitting

Gray Johnson
Engineering Manager

CC: Kurt Liebe Jack Stephenson Charlie Norris

FAX

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	10/14/99
Number of pages including cover sheet	2
To:	
	William Meisinger
	Koppers
Phone	286-3681
Fax Phone	285-2831
CC:	Charlie Norris Amos Kamerer

+ T. P. Turner

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill;

During the 10/13/99 meeting you requested an estimate of the remaining man hours for piping that is blocked by the scaffold and modifications to the scaffold that would allow us to work. We discussed your request and offer the following.

There are approximately 1,000 hours remaining on the hot oil and pitch piping around the tank. The following pipelines are blocked by the scaffolding.

60' of pitch recirculation pipe needs to be fitted and welded together.

The entire pitch recirculation line needs the tracing installed

One 4" drop from the pitch recirculation line to a nozzle needs to be bolted back into place.

(the pipe is already fabricated)

The 4" bypass from the cargo line to the recirculation line needs to be bolted back into place.

(the pipe is already fabricated)

All four nozzle drops and the bypass need the tracing installed

Vertical vent line connection to the pipe bridge run.

Vertical steam line connection to the pipe bridge run.

Vertical nitrogen line connection to horizontal run along the cargo line.

Hot oil suction and return connections to the heating coils in the pitch tank.

The pitch transfer line along the tank from the pitch shed to the rail loading needs to be fitted and welded together.

The pitch transfer line along the tank needs the hot oil tracing installed.

FAX

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

REMARKS.

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

We anticipate that we will have four men available to begin working on the piping around the tank by the 20th of October, but they will need help coordinating with the insulators to use the same scaffold. These men will consume 400 hours until November 8th at which time we could add two more men to the tank piping. The hours consumed up to November 8th will only be 70% effective because of the scaffolding so we can only deduct 280 from the 1,000 hour total. On November 8th we will have 720 hours remaining to finalize the piping around the tank and 6 men to apply to it at 70% effectiveness (assuming that the scaffold is still in place). These men will work on the piping until November 15th at which time there will be 552 hours remaining to finalize the piping around the tank. On November 15th we will have 552 hours remaining on this work and 8 men to apply to it at 70% effectiveness (assuming that the scaffold is still in place). These men will work on the piping until November 24th at which time there will be 160 hours remaining to finalize the piping around the tank. The scaffold must be completely removed for the final 160 hours which would be completed in two days.

The scaffold structure prevents us from connecting most of the outstanding pipes listed. We basically need the lower three or four levels of scaffold removed around the tank to work at 100% efficiency but we know this is impossible. Removal of planks would only help in two places. First we may need to remove planks where the vent and steam lines turn horizontal and connect to the pipe bridge runs. We would also like to remove planks where the hot oil suction and return connect to the hot oil coils in the tank. We need your help to coordinate the plank removal.

The only way we see to reduce this schedule would be to concentrate insulation installation on the railway side of the tank. If the insulators could complete the insulation from the rail loading tower around to the vertical cargo line run and completely remove the scaffold in this area we could complete our work much faster.

We realize that our estimate for completion of the hot oil system piping goes beyond the final tie in week. We will still be welding on the tank piping when you want to begin the start-up of the hot oil system. We can not change this schedule with the scaffold in place but we do believe that the hot oil tracing of the cargo line and the tank heaters will be complete, as well as, all piping around the hot oil heaters. We suggest that you debug the controls on the hot oil heaters, the cargo line, and the tank heaters first. Each of these systems seems to be a pump loop that can be isolated and tested separately. By the time these pump loops are debugged we will be finished with the tank piping and ready to test it.

Please consider this modified hot oil system test schedule. If this schedule is agreeable there are two other issues to consider. First we need to identify the valves that will isolate the hot oil loops being tested from the tank tracing. These valves should be given top priority for installation. Secondly, arrangements must be made with the oil supplier to fill the hot oil systems in stages instead of all at once. Alternatively, we could use the old surge tank as temporary storage for the extra oil or we could store the oil in barrels until it is time to top off the system.

Regards

Gray Johnson

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	10/14/99
Number of pages including cover sheet	1
To:	
	William Meisinger
	Koppers
Phone	286-3681
Fax Phone	285-2831
CC:	Charlie Norris
	Amos Kamerer

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill;

RFI #46

During the week of November the 8th McDowell needs to complete several system tie-ins in a very limited amount of time. To facilitate making the tie-ins, we are requesting that Kopper's maintenance remove the insulation from the tie-in areas of the pipes prior to the week of November 8th. Removing the insulation, marks the location of the desired tie-in and allows McDowell to inspect the pipe early for unseen interference. The following is a list of all the tie-ins we expect to make.

TP 21 Vent line

TP 111 Steam line to pitch tank

TP 41 Drain Line (may not be insulated only requires location identification)

TP 36 Old Hot oil system

TP 37 Old hot oil system

TP 32 Old hot oil system

TP 323 Old hot oil heater flow meter

TP 31 New hot oil heater relief

TP 35 New hot oil heater header

TP ??? Steam line for hot oil heater snuffing

All Connections to the hot oil surge vessel T-240 (all new lines no insulation removal required)

Regards,

Gray Johnson

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	10/14/99
Number of pages including cover sheet	1
To:	
	William Meisinger
	Koppers
Phone	286-3681
Fax Phone	285-2831
CC:	Charlie Norris Amos Kamerer

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill;

RFI #48

At TP-355 check valve V-236 is included above P-2. Please verify that this check valve is still required since the other modifications are not being made to the old hot oil pumps.

Regards,

Gray Johnson

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	10/14/99
Number of pages including cover sheet	1
To:	
	William Meisinger
	Koppers
Phone	286-3681
Fax Phone	285-2831
CC:	Charlie Norris
	Amos Kamerer

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill;

RFI #49

Since the drawings of the heavy oil modifications to tank 65 are not correct we are assuming that this work will not be performed during the shut down week (11/8 thru 11/12). Please verify that this work will be done at a different time and if a shut down is required to make these modifications.

Regards,

Gray Johnson

Discussion Items For 10/13/99 Meeting With Bill Meisinger, Charlie Norris, Amos Kamerer, And Cameron McKernan

1. Can the hose rack be formed sheet instead of reinforced with pipe and angle?
2. Can the hose rack pan joints be welded and cold galvanized on the dock so that the drip pan is fabricated in smaller sections that can be hand carried onto the dock? This would reduce the installation significantly.
3. Status of the dock drip pan approval?
4. The rail loading drip pan must be fabricated in sections because of the pipe supports. How should this be installed or is this critical.
5. Clarify the scope of work for the heavy oil line installation at tank 65. What coordination with plant processing schedules is required?
6. What is the P.O. number for the ASME tank?
7. Hot oil building grating was specified in the structural drawings. Was this the responsibility of Harder?
8. Do you want valves at each nitrogen purge on the hot oil pump discharge? Please verify the location of the tees you requested.
9. Is the 1" instead of 1 ½" tracing on the 8" pitch line acceptable?
10. Please explain the bird screen that is required on valves at the top of the tank.
11. We anticipate that we will not be finished by November 1st because of project delays beyond our control. We did not include overtime in our quote. We suggest working Fridays but this will require an authorization for overtime. We suggest 5 each 10 hour days.
12. Please provide a location for the 4" tie in points at the hot oil heater.
13. Please provide a typical steam trap mount diagram.
14. Drawings state that two steam outs can have only one trap. Is this correct?
15. Drawings state that steam traps are optional on steam outs as freeze protection. Are these required and how many.
16. Please explain the route of nitrogen instrument air piping between tank 240 and tank 250.

DEFERRED PROJECTS W.O. 92070

The projects listed below are not critical path and may not be completed by November 1st.

1. Metering shed steel erection
2. All shed roofing installations.
3. Pitch shed steel erection where it interferes with the scaffold.
4. Sump pump installation
5. Galvanized waste water line installation.
6. Drip pan installation and drain line installation.
7. Chain wheel installation on valves
8. Demobilization
9. Site clean-up field leveling.
10. Fence repairs
11. Stair / Stile / Crossover installation.
12. Heavy oil line modification at tank 65. EST. W/O 11/8/99 - contact customer
13. Miscellaneous pipe supports.
14. Hot oil system heat up and tightening.
15. Pitch shed crane rail installation.
16. Punch list items.
17. Dock hose rack.

The projects listed below may be critical path and we can not guarantee completion by November 1st.

1. Vent line steam tracing. 2nd week Nov
2. Installation of all steam traps and wye strainers for steam outs.
3. All IA nitrogen tubing connections to valve actuators. by 11/8
4. Pitch recirculation line from pitch shed to rail loading area. (scaffold)
5. Pitch recirculation line hot oil tracing. (scaffold)
6. Pitch recirculation drop tracing from loop to nozzle. (4x) (scaffold) okay to give est. man hours
7. Pitch bypass line tracing from 8" cargo to 4" recirculation loop. (scaffold)
8. ASME tank installation and plumbing.
9. Miscellaneous x-ray and mag particle tests and repairs.
10. Miscellaneous nitrogen pressure tests and repairs.

Quoted Price	$918,480.00	Original Bid
Contract Deducts		
#1	-$13,544.00	Hot oil piping
#2	-$15,500.00	Pipe and fittings A 53 welded
#3	-$2,000.00	Steam coil move in coordination
#4	-$1,803.00	Meter shed cost reduction
#5	-$5,000.00	Underground steam line
#6	-$9,041.00	Hot oil pump shed cost reduction
#7	-$2,000.00	Pitch pump shed cost reduction
#8	-$6,400.00	Precast pipe supports
#9	-$2,000.00	Reduced NDE expenses
#10	-$8,500.00	Valve substitutions
Contract Adders		
#1	$9,183.00	Intermediate conduit supports

Sub Total	$861,875.00

Total Adders	$97,265.00
Less "not approved"	-$13,740.00
Less deducts	-$6,574.00

	$938,826.00	REVISED CONTRACT TOTAL

Change Order #	Amount	Description	Status
92070-01	$4,400.00	Adder for increased embedment of pre-cast block	Approved
92070-02	$2,429.00	Adder for additional pipe support	Approved
92070-03	$2,017.00	Adder for dirt removal and rock excavation	Approved
92070-04	$6,276.00	Adder for bolted not welded pipeline anchors	Not Approved But Work Performed
92070-05	$465.00	Adder for additional low point drain	Approved
92070-06	$7,933.00	Adder for valve specifications	Approved
92070-07	$2,410.00	Increase fume line from 8" to 10"	Not Approved Work Not Performed
92070-08	$283.00	Increase steam line from 1" to 2"	Approved
92070-09	$11,093.00	Replace piping on Drawing 6526-P011	Requires Negotiation
92070-10	$152.00	Replace missing rebar	Not Approved
92070-11	$1,029.00	V-001 and V-002 change to jacketed valves	Approved
92070-12	$247.00	Rotate low point drains at pipe bridge three	Approved
92070-13	$711.00	Modify PS-210 base plate for incorrect anchor bolts	Approved
92070-14	$475.00	Install spools in steam line	Approved
92070-15	$1,727.00	Supply flex hoses	Requested to correct scope error
92070-16	$482.00	Install 300# ship connection	Approved
92070-17	$327.00	Modify pipe support base	Approved
92070-18	$3,231.00	Fabricate Natural Gas Control Manifold and Meter	Requested to correct scope error
92070-19	$1,178.00	Install Intermediate hydrotest flanges	Requires Negotiation
92070-20	$999.00	Reverse door in MCC building	Approved
92070-21	$1,158.00	Paint tank T-240	Approved
92070-22	$1,878.00	Paint tank T-250	Not Approved See new tank quote
92070-23	$535.00	Install offset in 2" nitrogen line around vent line	Requested to correct drawing error
92070-24	$8,500.00	Custom fabricate 13 jackets	Requested due to jacket availability
92070-25	$1,341.00	Fabricate and install pipe and heater stands	Requested to correct drawing error
92070-26	$1,277.00	Modify FD-7 and FD-8 bases for anchor bolt pattern	Requested to correct other contractor error
92070-27	$749.00	Install offsets in hot oil pipe around tank post	Requested to correct drawing error
92070-28	$0.00	Reroute piping at rail unloading	No charge No Labor difference
92070-29	$2,014.00	Offset headers at hot oil shed	Requested to correct drawing error
92070-30	$2,259.00	Fab and install pipe supports through truck crane	Requested to correct scope error
92070-31	$945.00	Install pipe supports under elbows at hot oil heater	Approved
92070-32	$4,185.00	Widen pitch pump building	Approved
92070-33	$4,863.00	Install block valve and vent T250	Requested to correct scope error
92070-34	$396.00	Relocate piping on tank roof for nozzle changes	Requested to correct other contractor error
92070-35	$495.00	Rework hot oil heater relief 3x4 to 4x6	Requested to correct drawing error
92070-36	$971.00	Fab and install lanyard on tank	Requested to improve safety
92070-37	$1,127.00	Install oil truck unloading line	Requested by plant maintenance
92070-38	$1,542.00	Rework metering shed piping for valves and probes	Requested to correct drawing error
92070-39	$3,479.00	Install bypasses around tank heater plates	Requested to correct design error
92070-40	$1,384.00	Install oil to heaters on spare 4" nozzle	Requested to correct drawing error
92070-41	$1,996.00	Install washers on anchor chairs for insulation	Not Approved Work Not Performed
92070-42	$1,028.00	Install manway gaskets on T-200	Not Approved Work Not Performed
92070-43	$2,145.00	Install offset in 4" recirculation line	Requested to correct drawing error
92070-44	$1,182.00	Rework hot oil pump reliefs 2x3 to 3x4	Requested to correct drawing error
92070-45	$2,170.00	Install pitch relief valves vertically	Requested to correct drawing error
92070-46	$1,782.00	Install second bypass at dock pitch pump	Requested to correct scope change

	$97,265.00	Sub Total	
	$28,085.00	Total Approved	
	$43,169.00	Total Requested	
	$12,271.00	Total To Be Negotiated	
	$13,740.00	Total Not Approved	
Deduct #	Amount	Description	Status
92070-01D	($1,470.00)	Eliminate V-023	Approved
92070-02D	($704.00)	Eliminate V-039	Approved
92070-03D	($4,400.00)	Rebuild of four plug valves	Approved
	($6,574.00)	Total Deducts	

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	09/15/99
Number of pages including cover sheet	1
To:	
	William Meisinger
	Koppers
Phone	286-3681
Fax Phone	285-2831
CC:	Charlie Norris
	Amos Kamerer

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill, Charlie and Amos;

RFI #41

The 8" vent line seems to be supported by 4" tall "T"s instead of 6" tall "T"s. All the pitch piping greater than 4" is on 6" or larger "T"s and we wanted to make sure this was not an error. (see page 6526-P004) Is the insulation on the vent pipe thinner allowing us to us a 4" tall "T"?

Secondly detail 10A on drawing 6526-P004 seems to infer that the both the nitrogen and the 8" vent line are restrained by angles but allowed to slide. The cross section above detail 10A does not show angle restraints on the 8" vent line. How is the 8" vent line attached to the vertical pipe supports on the tank?

Please review these questions and get back to us with your comments.

Regards,

Gray Johnson

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	09/10/99
Number of pages including cover sheet	1
To:	
	William Meisinger
	Koppers
Phone	286-3681
Fax Phone	285-2831
CC:	Charlie Norse
	Amos Kamerer

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill, Charlie and Amos;

RFI #40

We received your drawings of the ASME tank today so we assume that it is final that the new tank currently at Koppers can not be used. Since this new tank is the same size as the old one could we mount it on the ground and use it as the atmospheric tank? Couldn't we go ahead and plumb this tank into position? Does this expedite the insulators work? Wouldn't this make it easier to empty the upper tank and install the new vessel on the tower?

Please let us know what your plans are regarding the non code tank. We believe that using this tank could expedite our work.

Also inform us if you would like us to still paint this vessel before it is installed.

Please review these questions and get back to us with your comments.

Regards,

Gray Johnson

Discussion Items For 8/03/99 Meeting With Bill Meisinger, Cameron McKernan, Amos Kamerer, And Charlie Norris

Meeting Notes In Italics

1. **Clarify status of pitch pump and jacketed strainers. Do you want McDowell to wrap pipe around the jacket canister for tracing.** ***Jacketed strainers are not available. Koppers requested that McDowell install partial jackets on the pitch strainers. Charlie Norris will check to see if a tracing kit is available for these strainers, otherwise McDowell will fabricate strip jackets from sections of pipe and channel. The jackets will be strapped to the strainer canister and sealed with heat transfer mastic. The pitch relief valves are also not available with jackets so McDowell will have to provide jackets for these in a similar manner. The addition of these jackets is outside the scope of work and is an adder.***
2. **Discuss change order 18 for the natural gas control manifold and our justification that this plumbing was not in our scope of work.** ***All agreed that this work is a change order. A second larger meter must be installed in the existing natural gas line and the existing meter removed. This work should be coordinated with the relocation of the electric line so that the plant only shuts down for one weekend. The tenative shut down date is 8/13/99. Amos and Charlie to coordinate electrical contractor and gas company.***
3. **Discuss installation of right hand door in MCC building.** ***Bill Meisinger approved the door change and requested a change order. The tenative price is "less than $1,000.00".***
4. **Discuss change order 19. The installation of flanges at the corner of the pitch building to facilitate early hydro testing of the hot oil and pitch lines.** ***Gray Johnson explained the added labor and materials required to install test flanges. Bill Meisinger stated that this should have been included in the original quote. Approval of this change order is postponed until the end of the project. Gray Johnson to clarify if this work was included in the scope or quote.***
5. **Discuss grating for the sump and the hot oil shed. Clarify the grate specification.** ***Harder supplied grating for the sump and trench. The grating for the hot oil shed should be 1 x 4 galvanized bar grating. A pipe crossover stile was also discussed for the tank area. The drawings require this stile to be 10' wide. Bill Meisinger will verify the width of this stile and suggests that the stile be 3' wide. Bill will also check forklift access and verify that this stile should not be a forklift ramp.***
6. **Verify that wye strainers not canister style will be used at the hot oil heater. Will the style of strainer change anywhere else?** ***Only two canister strainers were changed to wye type on the 4" hot oil pumps. McDowell is authorized to field manufacture a pipe support without the strainer base mount.***
7. **Discuss the power line relocation and schedule at the MCC building.** ***Amos and Charlie Norris will coordinate Chandler and PGE to lower the power line 18" to clear the McDowell piping. The tenative date will be 8/13/99. See item #2.***
8. **Discuss coordination of the tank heater installation in the tank.** ***The tank installers will not be ready to remove the crane from the tank for another three weeks. At that time they will cut a door sheet and set the heat coils inside. Charlie will coordinate this work with Steve Hinds in three weeks.***
9. **Discuss pipeline hydrotest coordination.** ***This topic was only discussed in reference to item 4.***
10. **Discuss MCC building completion and removal of the dividing wall.** ***The dividing wall can be removed at any time.***
11. **Discuss alternate methods to unload a ship of pitch without a fully operational system.** ***Bill and Cameron will discuss this separately. The completion date for this project is still November 1 according to Bill Meisinger and Mcdowell should finish earlier than that deadline to allow time for insulators. Gray Johnson should E-mail an updated schedule to Bill Meisinger to verify that these dates are still possible.***
12. **Discuss buildings and structural steel.** ***Gray Johnson stated that the shop drawings were behind schedule and should be available in two to three weeks.***
13. ***Harder should be finished and off site in two weeks.***
14. ***Bill Meisinger requested separate invoices for C.O. 13, 14, and 17 to back charge other vendors.***
15. ***Bill Meisinger did not accept C.O. 07. The fume lines will remain 8" per the original specification.***

Discussion Items For 8/03/99 Meeting With Bill Meisinger, Cameron McKernan, Amos Kamerer, And Charlie Norris
Meeting Notes In Italics
Page Two

16. *Bill Meisinger requested further investigation and price justification for C.O. 09, the inclusion of the oil heater piping in the scope of work. He requested that this cost be negotiated at the end of the job.*
17. *Bill Meisinger verbally approved C.O. #'s 12, 13, 14, 16, 18, and 17.*
18. *Bill Meisinger questioned C.O. 15 and believes that the flex hoses were in McDowell's scope of supply. Gray Johnson to clarify if this work was included in the scope or quote. Bill requested that this cost be negotiated at the end of the job.*
19. *Bill Meisinger stated that Koppers supplied two hot oil strainers worth $7,314.00 that were not in their scope of supply. Gray Johnson pointed out that the hot oil strainers were included in the specification section where all other Owner supplied components were listed. Bill agreed with Gray's statement but also added that these strainers were not specifically identified in the owners' scope of supply. Gray Johnson to clarify if these strainers were included in the scope or quote. Bill requested that this cost be negotiated at the end of the job.*
20. *Bill and Charlie briefly discussed the need for Confined Space permits in the tank during construction. McDowell will need to get Confined Space permits from Charlie when working in the tank and will have to supply a hole watch.*
21. *Gray Johnson noted that the 1" expansion loops on the dock were installed in a vertical orientation when they were shown on the drawings as horizontal. Bill and Cameron verified that this orientation was not critical and did not require rework.*
22. *Bill Meisinger requested a deduct for the four valves at the rail loading rack that were to be rebuilt by McDowell. Koppers supplied three new jacketed gate valves in this location instead of the rebuilt valves.*
23. *The pitch strainer delivery was estimated at July 20th. Bill contacted Koppers purchasing to get a revised delivery date. McDowell should not fabricate any tracing or jackets prior to delivery and verification of the canister dimensions on the strainers*
24. *Amos Kamerer requested a price from McDowell to clean and paint the new oil pressure vessel exterior "Koppers Blue". He would also like to blast and paint the existing oil tank before it is relocated and placed back in service.*
25. *Cameron reported that he is working with The Portland Fire Department to eliminate the need for a new fire hydrant. He may require a check valve and a hose connection on the new dock dolphin for a fire ship. Cameron or Koppers will contact McDowell for a quote when the procedure is approved.*
26. *Bill Meisinger stated that the nozzle jackets for the pitch tank will not be delivered until mid September after the tank fabricators have demobilized. He asked that McDowell weld the jacket support brackets onto the tank for the nozzle jackets. McDowell will review the brackets when the nozzle jackets are delivered to determine if a change order is necessary.*
27. *Bill Meisinger stated that the nozzle jackets have a much larger pressure drop than originally specified. A bypass around these jackets will be required to balance hot oil pump flow. Bill and Cameron will review the nozzle jackets and try to combine bypasses to reduce additional piping and valves. Cameron will modify the piping drawings to show these additional bypasses. McDowell is authorized to generate a change order to install these bypasses and globe valves that were not in the original drawings.*
28. *Bill Meisinger asked for clarification on the charges for additional conduit supports from Chandler Electric. Gray informed Bill that these supports were for the control panels, not conduit and were outside the scope of the original contract. This explanation was acceptable to all.*
29. *Bill Meisinger asked if the grouting of the pipe support plates was complete on the pitch pipe and was informed by Gray that the grout would be dry packed below the slide plates and mitered to match the concrete blocks.*

McDowell

Discussion Items For 6/02/99 Meeting With Bill Meisinger And Jack Stephenson
Meeting Notes In Italics

1. **Review the change order list.** *C.O. 4 and 10 not accepted. C.O. 7 delay decision until July. C.O. 9 Koppers requested revised pricing. All others were accepted.*
2. **Are drain valves/isolation valves included by Koppers on strainers and pressure indicators?** *Requested data sheets of the strainers and pressure indicators.*
3. **Verify that a hot oil bypass is required around the strainer and pump jackets on the dock. If valves V-001 and V-002 are jacketed then does this bypass also include these valve jackets?** *Install the bypass around the pump and strainer as shown. If the jacket inlet/outlet coupling is less than ¾" NPT a bypass around each valve jacket is required. Attach jackets to the tracer lines shown across V-001 and V-002*
4. **Please supply standard detail of V-083 high point drain in the hot oil tracing lines.** *Install a 1" sockolet perpendicular to the 2" hot oil line on the bridges. Then install a length of 1" Sch80 pipe long enough to move V-083 outside the insulation. Socket weld the valve to the nipple and then install a 1"NPT pipe plug in the outlet of the valve*
5. **Where does the 12" fume line across the RR start and end?** *Koppers will answer this question if they accept this C.O.*
6. **Where does the 2" steam line across the RR start and end?** *Not discussed at this meeting.*
7. **How should third party inspections be processed?** *All welding inspections on the pipeline are still by MWP. All concrete inspections should be billed to Koppers and scheduled by MWP. Gray Johnson to inform PSI of this change.*
8. **We intend to make the metering shed similar to the hot oil and we need to know which side of the roof to make the high side. We assume the upstream side.** *Not discussed at this meeting, But Cameron requested drawings of the buildings for the permit package. MWP to submit concept to Koppers for approval then provide stamped erection drawings and shop details to Cameron for the permit. This should be a priority.*
9. **Please send cut sheets on the pressure relief valves, flow meters, Koppers supplied valves, instruments, dock pitch pump, strainers, and all flex hoses. We are not supplying these items and need to know the length to allow in our piping.** *Pitch pump cut sheets were provided in this meeting. Bill will forward the other details. Koppers will provide all flex hoses. MWP can fabricate piping based on the lengths shown in the drawings.*
10. **Can we use the typical U shape expansion loop for 1" pipe to bypass flange sets.** *This was not discussed with the group only with Cameron.*
11. **Can you provide a standard detail for the piping connection to valve jacket or other threaded connection. ChemTech implied that they had some problems with this connection in the past.** *A standard drawing was provided to MWP showing a union and nipple directly screwed into the jacket coupling of the valves or pumps. No elbows should be installed between the union and the jacket.*
12. **Has Harder been informed of the pump base changes? Have the mounting hole patterns changed for the pump bases? Can Harder modify the concrete foundations to match the new pump frames?** *Koppers will inform Harder of the pump base changes. Koppers will also research the use of Hilti expansion anchors to mount pitch pumps. Bill Meisinger believes these should be "cast in place" anchor bolts.*
13. *Pump jackets should be isolated with valves at the inlet and outlet and a bypass. Jackets on valves and strainers do not have isolation valves and bypasses are only required if the jacket couplings are less than ¾" NPT.*
14. *C.O. 4 was not approved but the anchors must still be bolted to the anchor plates.*
15. *The MCC sections arrive July 20 and the building extension should have an open wall so that the sections can be easily installed in the building.*
16. *Steve Hinds should meet with the project foreman for the tank manufacturer to determine how the two crews can work safely together and if the schedule can be reduced. Koppers will arrange this meeting.*
17. *Steve Hinds suggested nitrogen or pneumatic pressure testing of the cargo hot oil tracer lines to speed the insulation installation. This was approved by Koppers but a hydrotest is still required. Koppers will research oil delivery to fill the line and MWP will install a temporary pump to pressurize the hot oil loop for early testing.*

McDowell Welding & Pipefitting

4000 NW St. Helens Rd., Portland, OR 97210
503-241-2410 • Fax 503-241-2767

Memorandum

To: William Meisinger

CC: Amos Kamerer
Jack Stephenson
Charlie Norse
Cameron McKernan

From: Gray Johnson

Date: 05/10/99

Subject: Change Order 92070-04

Bill,

Cameron visited our shop last week to approve the remaining pipe bridges for galvanizing. During that visit he noticed that we had not welded the pipe support "tees" with pipe clamps to the anchor plates in the center of each pipe bridge. He allowed us to bolt these and we agreed to proceed on this basis. We had intended to field weld the anchor to the anchor plate and cold galvanize the weld in the field. This seemed obvious to us because of alignment issues during pipe assembly. (The drawings neither specify or disallow a field weld in this location) The main reason for bolting this anchor assembly was to preserve the quality of the hot dip galvanize finish on the two separate parts that McDowell had already fabricated.

Later that week, as we were discussing the rework with the shop we realized that there were 10 other anchors with the same problem along the cargo line route. The only difference was that the anchor plates were directly embedded in concrete on the pre-cast blocks. We consulted Cameron and arrived at the similar solution of bolting the pipe support anchors to the anchor plates and welding ¾" nuts to the underside of the anchor plates. We have stopped the civil crew from pouring concrete at these anchors and we have made arrangements to modify the anchor plates by drilling and installing the nuts as requested. We estimate the additional cost to make this change is $6,272.00 and we request that the "not to exceed budget" be increased by $6,276.00. The labor to weld and cold galvanize these anchors was deducted from this change order request.

We have also contacted Charlie Norse at the job site to coordinate these changes with Harder for the one anchor plate that they install near the pitch building. (@ the "Big Tee") Charlie is also coordinating the installation of conduit support clamps on the five pipe support plates next the pitch building that are in Harder's scope of work.

Please call with any questions.

Regards

Gray Johnson

McDowell Welding
& Pipefitting, Inc.

NOTIFICATION OF CONTRACT CHANGE OR DELAY

CLIENT: Koppers Ind

ATTN: William [illegible]

SUBJECT: Eliminate Pipe Support Deduct

DATE OF NOTIFICATION: 03 / 16 / 99

TIME: 12:00 am pm SHFT: 1 2 3

APPROVAL REQ'D BY: / /

MCDOWELL NUMBER: 02070 (Job no.) - 01 (Change no.)

CLIENT NUMBER:

We respectfully direct your attention to the following ☒ items:

A. ☒ McDowell has received this date a ☐ WRITTEN ☒ VERBAL order issued by: Carson McKernan

of McKernan Engineers directing us to:

☒ Perform work as described in Item C below.

☐ Stop work in progress as described in Item C below.

B. ☐ McDowell is unable to start work scheduled to commence on _____, for the reason described in Item C below

C. REASON FOR THE CHANGE: Pipe supports must be a minimum of 12" below grade. Pipe support design requires field routing and the labor impact is unknown.

☐ See Attached.

WE CONSIDER THE FOLLOWING ☒ ITEMS TO BE APPLICABLE:

D. ☒ The order is for work not within the scope of our present contract and will involve: ☒ ADDITIONAL COST, ☐ TIME EXTENSION.

E. ☐ The inherent delay of C above, will involve: ☐ ADDITIONAL COST, ☐ TIME EXTENSION, ☐ PREMIUM TIME, for contract completion.

IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

F. ☐ McDowell ☐ IS ☒ IS NOT proceeding with the work as directed before issuance of a formal change order, per Client Rep's Authority.

G. ☒ McDowell is submitting a proposal covering added cost directly* attributable to the work order:

☐ Lump Sum $_____. ☒ Per McDowell T & M Rates. ☐ See Attached. Increase Unit 7 Screen Contract by $4,400.00

*Total cost due to change/delay and effect on completion date(s) cannot be completely determined at this time; McDowell will advise total impact upon further analysis of change/delay and overall project effect.

Respectfully Submitted,
McDowell Welding and Pipefitting

[illegible] Johnson 3-16-99
McDowell Representative Date

Approval to Proceed:
[illegible]

[illegible] [illegible]
Client Rep. Date

McDowell Welding
& Pipefitting, Inc.

NOTIFICATION OF CONTRACT CHANGE OR DELAY

CLIENT: Koppers Ind

ATTN: William Messinger

SUBJECT: Add one [illegible] [illegible] [illegible]

DATE OF NOTIFICATION: [illegible] / 16 / [illegible]

TIME: ____ : [illegible] am pm SHFT: 1 2 3

APPROVAL REQ'D BY: ____ / ____ / ____

MCDOWELL NUMBER: [illegible] (Job no.) – 2 (Change no.)

CLIENT NUMBER: ____

We respectfully direct your attention to the following ☒ items:

A. ☒ McDowell has received this date a ☐ WRITTEN ☒ VERBAL order issued by: [illegible] McKernan

of McKernan Engineers directing us to:

☒ Perform work as described in Item C below.

☐ Stop work in progress as described in Item C below.

B. ☐ McDowell is unable to start work scheduled to commence on _____, for the reason described in Item C below

C. REASON FOR THE CHANGE: Add one pipe support in pipe segment #7

☐ See Attached.

WE CONSIDER THE FOLLOWING ☒ ITEMS TO BE APPLICABLE:

D. ☒ The order is for work not within the scope of our present contract and will involve: ☒ ADDITIONAL COST, ☐ TIME EXTENSION.

E. ☐ The inherent delay of C above, will involve: ☐ ADDITIONAL COST, ☐ TIME EXTENSION, ☐ PREMIUM TIME, for contract completion.

IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

F. ☒ McDowell ☐ IS ☒ IS NOT proceeding with the work as directed before issuance of a formal change order, per Client Rep's Authority.

G. ☒ McDowell is submitting a proposal covering added cost directly* attributable to the work order:

☐ Lump Sum $_____. ☒ Per McDowell T & M Rates. ☐ See Attached. Increase Not To Exceed [illegible] by $2,[illegible]

*Total cost due to change/delay and effect on completion date(s) cannot be completely determined at this time; McDowell will advise total impact upon further analysis of change/delay and overall project effect.

Respectfully Submitted,
McDowell Welding and Pipefitting

[illegible] Johnson
McDowell Representative Date

Approval to Proceed:
Koppers Ind

[signature] 4/[illegible]
Client Rep. Date

FAX

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/08/99
Number of pages including cover sheet	1

To:	
	William Meisinger
	Koppers
Phone	**412-826-3962**
Fax Phone	**412-826-3999**
CC:	**Amos Kamerer**

From:	
	Gray Johnson
	McDowell Welding
Phone	**503-241-2410**
Fax Phone	**503-241-2767**

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill;

We have begun to install piles and pipe support blocks. We are also accumulating pipe and fittings to begin installation of the 10" cargo line. We will need the 8", 150#, automated, jacketed, plug valves for the cargo line very soon to avoid rework during the pipeline installation. These valve numbers are HV2008, HV2083, ZV2082, and HV 2081. Valve HV 2083 is the top priority because it is positioned in the middle of our line while the others are at either end and we can bypass them.

What is the status of these 8" automated plug valves? Have you or Amos ordered them? How soon can we expect them? We will need them by the end of April if we continue at our current pace.

Please call with any questions or comments.

Regards,

Gray Johnson

FAX

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/08/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	Amos Kamerer

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron and Amos;

We have accumulated several truck loads of structural pipe supports, base plates, and pipe bridges that require a third party visual inspection prior to galvanizing per the ChemTech drawings (UBC 1703).

I realize that we discussed this as being a responsibility of McDowell with Bill Meisinger but I later showed Amos phone notes and quote notes that excluded any third party UBC structural inspections from our scope of work. We agreed to notify the proper party when we needed inspection and we agreed to assist with the inspection as necessary.

We have reached the point that we need an inspection to provide materials to the field in a timely manner. Please arrange for an inspection early next week at our shop and inform me and Terry Allen, our QC manager of the schedule.

Regards

Gray Johnson

cc: B. Meisinger

FAX

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/08/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	Amos Kamerer

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron and Amos;

We have accumulated several truck loads of structural pipe supports, base plates, and pipe bridges that require a third party visual inspection prior to galvanizing per the ChemTech drawings (UBC 1703).

I realize that we discussed this as being a responsibility of McDowell with Bill Meisinger but I later showed Amos phone notes and quote notes that excluded any third party UBC structural inspections from our scope of work. We agreed to notify the proper party when we needed inspection and we agreed to assist with the inspection as necessary.

We have reached the point that we need an inspection to provide materials to the field in a timely manner. Please arrange for an inspection early next week at our shop and inform me and Terry Allen, our QC manager of the schedule.

Regards

Gray Johnson

McKernan will do shop structural observations.
C. McKernan
4/12/99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/09/99
Number of pages including cover sheet	2

To:	
	Cameron McKern
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	

To write responses on

From:	
	Gray Johnson
	McDowell Welding
	503-241-2410
	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #18

Attached is the grout specification from the KPFF drawings. We have forwarded this to several concrete ready mix companies in an attempt to purchase this by the truck load to fill the piles and corrugated pipe on each pipe support. We can not purchase this by the truck load because of the limestone requirement and the alumina content. We would like to request that the pile and corrugated pipe be filled with 3000 psi concrete (ready mix) and that the final 1" to 2" gap between the pre- cast block and slide plate be filled with non shrink grout that is hand mixed from bags. Would this change be acceptable? Please provide a brand name or source for this grout. We have not been able to identify this material.

Regards

Gray Johnson

Use "Standard" Conventional Concrete mix. Do not ~~use~~ use special mix specified on KPFF dwg

C. McK 4-12-99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/08/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #17

We agreed to install the entire cargo line expansion loop closest to the river on a slightly tilted plane so that all the pre-cast pipe support blocks would have proper soil bearing. This creates a low spot in the cargo line. Is a drain required in this area now? If so where should it be located? Even before we found it necessary to tilt this section of the cargo line we thought that it should have a drain because there is a flanged valve in this section. We did not quote this additional drain but we will gladly install it as a change order. Please cal to let us know if an additional drain is necessary.

Regards

Gray Johnson

Drain required at "low" point.
Place drain at "low" point
C. Smith
4-12-99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/08/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	**503-232-7211**
Fax Phone	**503-232-7658**
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	**503-241-2410**
Fax Phone	**503-241-2767**

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #16

The expansion loops in the 1" heat tracing on the dock are a "U" shape so there is no contact with the cargo line for their entire width (16"). The drawings seem to show that all four expansion loops are aligned in the plan view. This would leave a 16" section of line without tracing. We were wondering if the 1" expansion loops should be staggered along the length of the pipe so that 3 of 4 hot oil tracers are always in contact with the cargo pipe.

Please call with your comments

Regards

Gray Johnson

Stagger loops to keep heat 3 traces in contact with pipe

C. Sneek 4-12-99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/08/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #15

We would like to verify that the torque stops are only required on anchors and unguided pipe supports. We can not find where they are specifically excluded from the unguided pipe supports.

We also requested that you allow 3/8 X 1 ½" flat bar on the 8" top clamps to match Grinnell standards. We would still use ½" x 2" formed flat bar on the bottom so that all of the pipe support heights matched.

Finally, on the anchors you show ½" by 4" flat bar for the clamps. If we make the lower clamp half as shown, can we use two standard ½" by 2" Grinnell clamps "side by side" on the top instead of a ½" by 4" formed flat bar?

Please call with your comments

Regards

Gray Johnson

Torque Stops required on anchors & unguided pipe supports ~~please~~ on guided supports within two supports each side of anchor. 8" guided on back O.K. to use 1/2 x 3/8 clamp on top.
On 4" wide clamp at anchors use 4" wide top clamp. C. Smith 4-12-99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/07/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #14

We see that a clamp is required every 5' on the 10" cargo line to support two 2" hot oil trace lines. This includes the clamps on the pipe supports. The 8" cargo line also appears to have intermediate clamps at least at the expansion loops. We see notes about 1/32" strapping on 30" centers, but we can not find a requirement for intermediate clamps between pipe supports on the 8" cargo line. Are intermediate clamps required or is the banding the only intermediate support on the 8" line? – Banding only

Please call with your comments

Regards

Gray Johnson

= Clamps at "T" BAR supports for all 2" on 10" pipe & 1" tracing on 8" pipe in tank area.

* Banding on all ~~pipe~~ 8" pipe = 30" o.c.

* Intermediate clamps on 2" tracing on 10" pipe

C. McKernan 4-12-99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/07/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	**503-232-7211**
Fax Phone	**503-232-7658**
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	**503-241-2410**
Fax Phone	**503-241-2767**

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #13

We began driving piles today and we encountered some underground rocks. We understand from conversations that the piles can move +/- 1' along the pipe line to avoid underground obstacles but what are our options if a pile will not go in the minimum 12'.

1. Can we relax the minimum embedment on unguided pipe supports to 6'? 8'? yes.
2. Can we relax the minimum embedment on guided pipe supports? No
3. What about anchor type pipe supports? No.
4. Should we reduce the pipe support spacing in half and install two supports in hopes of avoiding the underground obstruction? No.

Please call with your comments

Regards

P. Meek 4-12-99

Gray Johnson

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/07/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	**503-232-7211**
Fax Phone	**503-232-7658**
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	**503-241-2410**
Fax Phone	**503-241-2767**

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #12

The pipe bridge foundations on the south end of the pitch building are located in a fairly deep ditch at the edge of the building that runs parallel to the wall. The purpose of this ditch seems to be to prevent rain run off from flowing into the pitch building (it may also be a tire wash, we don't know). If we make the foundations per print, water will accumulate in the ditch between the foundations during a storm and could eventually flow into the pitch building. We propose that the foundations on this pipe bridge should be poured and finished to match the contour of the ditch. This will allow water to flow off the parking lot in the same manner as it did in the past. Please call with your comments.

Regards

Gray Johnson

Contour concrete to keep drain.
Slope concrete down away from
steel posts so they don't stand
in water.

C. Smith 4-12-99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/06/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	**503-232-7211**
Fax Phone	**503-232-7658**
cc.	

From:	
	Gray Johnson
	McDowell Welding
Phone	**503-241-2410**
Fax Phone	**503-241-2767**

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #11

The pre-cast pipe support blocks along the east wall of the pitch building are located next to a drainage ditch. If we follow land grade as instructed, the east side of the blocks will not meet the minimum embedment criteria of 12" even when the west side of the block is full depth in the ground. We intend to move the soils we excavate to the east side of the block to reduce this problem but we will change the route of the drainage ditch. We did not plan to relocate the drainage ditch and we are limited in how much the ditch location can change by the existing pipe and fence.

Can we relax the embedment criteria on the east side of the pipe support blocks along the east wall of the pitch building?

Regards

Gray Johnson

No! except in middle of segment. Near end at gate foundation blocks must resist side force from pipe expansion. Jow backfill if necessary to obtain embedment.

C. McK · 4.12.99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/06/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #10

We have determined that the pre-cast pipe supports require only a 3 cylinder compression test on the concrete and no rebar inspection prior to pouring. Can we extend these assumptions to the pipe bridge foundations?

1. Do you or the City of Portland require an inspection of the rebar prior to pouring? We want to drive rebar in the ground to suspend the mat in the concrete, but if the city is inspecting prior to pouring we will be required to support the mat with concrete blocks.
2. Do you require concrete cylinder compression tests on the concrete poured for the pipe bridge support foundations.
3. Questions #1 and #2 also apply to the hot oil metering shed containment pad what inspections and tests are required here?

Regards

Gray Johnson

Bridges only:

1 & 2: McKernan to check rebar placement " " witness pour.

3: Same as 1 & 2

C. McK 4-12-99

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	04/06/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #9

Thank you for the warning about the fire hydrant line along the east wall of the pitch building. This line is 2' below grade and goes through the footing for the pipe bridge over the road. There are three options for dealing with this interference. We can make the vertical legs of the pipe bridge avoid the pipe line. Which option do you prefer?

1. Pour concrete directly around the line where it is currently located.
2. Install a sleeve around the line through the new concrete we pour.
3. Reroute the fire line to avoid the foundation.

Items 2 and 3 would require change orders.

Also please determine if the fire department or building inspectors need to inspect the line while it is exposed or when we install options 1, 2, or 3.

Regards

Gray Johnson

Option 1: relocate post so it doesn't land on pipe.
C. Mck 4-12-99

3/23/99

McDowell

- Cam, Bill, Gray, Scott & Amos
- All foundation work is Harders, including the inbeds.
- ? third party inspection costs

✓ * Advise McDowell Harders schedule

- tracking hours of steaming, possible Addon's

TJ, offer help.

** - Advise MWP - NWN/Hahn contact info.

verify no-one needed for pile/stake driving - yes

only soils work. - yes/Rob.

J. CAMERON McKERNAN COMPANY

Engineering + Naval Architecture

825 NE 20th Avenue, Suite 110 * Portland, Oregon 97232 * (503) 232-7211 * FAX (503) 232-7658

FACSIMILE TRANSMITTAL FORM

FILE NO: P97-10

DATE: 3-30-99

TRANSMIT TO: McDowell Welding & Pipefitting, Inc. (Attention: Gray Johnson)

FAX NUMBER: 503-241-2767

NUMBER OF PAGES TRANSMITTED INCLUDING THIS COVER SHEET: 1

PROJECT NAME: Koppers Pitch Ship Terminal

COPY

Subject: Re bar for pipe supports

Reference: Your FAX dated 3/24/99 transmitting Request for Information and copy of A.S.T.M A706

Gentlemen:

Thank you for the copy of A706. You may use A706 GR 60 reinforcing bars for any of the pipe support and pipe cross over bridges foundations instead of A615 or A616 previously approved or specified.

Very truly yours,

J. CAMERON MCKERNAN COMPANY

By: Cam McK

J. Cameron McKernan, President

cc: Koppers Industries, Inc.
Bill Meisinger
Amos Kamerer

RECEIVED

MAR 3 1 1999

KOPPERS INDS, INC.
PORTLAND OR

TRANSMISSION REPORT

:J. CAMERON MCKERNAN (MAR 30 '99 13:25)

DATE	START TIME	REMOTE TERMINAL IDENTIFICATION	MODE	TIME	RESULTS	TOTAL PAGES	DEPT. CODE
MAR 30	13:25	503 241 2767	G3ST	00'52"	OK	01	9710

J. CAMERON McKERNAN COMPANY

Engineering + Naval Architecture

825 NE 20th Avenue, Suite 110 * Portland, Oregon 97232 * (503) 232-7211 * FAX (503) 232-7658

FACSIMILE TRANSMITTAL FORM

FILE NO: P97-10

DATE: 3-30-99

TRANSMIT TO: McDowell Welding & Pipefitting, Inc. (Attention: Gray Johnson)

FAX NUMBER: 503-241-2767

NUMBER OF PAGES TRANSMITTED INCLUDING THIS COVER SHEET: 1

PROJECT NAME: Koppers Pitch Ship Terminal

Subject: Pitch and Hot Oil Tracing Pipe Installation and Support and Clamp Detail

Reference: Your FAX dated 3/23/99

COPY

Gentlemen:

McKernan discussed the contents of the referenced FAX with your Gray Johnson on March 29, 1999 at your office.

During this discussion Gray Johnson agreed that you would provide temporary pipe supports during the installation of the piping. No change in the pipe support and clamp is required.

Very truly yours,

J. CAMERON MCKERNAN COMPANY

By: Cam McK

J. Cameron McKernan, President

RECEIVED

MAR 3 1 1999

KOPPERS INDS, INC.
PORTLAND OR

cc: Koppers Industries, Inc.
Bill Meisinger
Amos Kamerer

TRANSMISSION REPORT

:J. CAMERON MCKERNAN (MAR 30 '99 13:21)

DATE	START TIME	REMOTE TERMINAL IDENTIFICATION	MODE	TIME	RESULTS	TOTAL PAGES	DEPT. CODE
MAR 30	13:21	503 241 2767	G3ST	00'52"	OK	01	9710

J. CAMERON McKERNAN COMPANY

Engineering + Naval Architecture

825 NE 20th Avenue, Suite 110 * Portland, Oregon 97232 * (503) 232-7211 * FAX (503) 232-7658

FACSIMILE TRANSMITTAL FORM

FILE NO: P97-10

DATE: 3-30-99

TRANSMIT TO: McDowell Welding & Pipefitting, Inc. (Attention: Gray Johnson)

FAX NUMBER: 503-241-2767

NUMBER OF PAGES TRANSMITTED INCLUDING THIS COVER SHEET: 2

PROJECT NAME: Koppers Pitch Ship Terminal

Subject: Underground water pipe

COPY

Gentlemen:

The attached XEROX excerpt from Plan No. 97010-22A shows a buried 6" pipe to an existing fire hydrant near the gate at the railroad track at the east corner of the existing pitch building. It appears this pipe is located about 4' outside the fence.

It appears the pipe cross-over bridge foundation shown on Plan Nos. 97010-47 and 97010-69 will be directly over this buried water main.

We bring this to your attention so you can take appropriate measures to prevent damaging the 6" pipe.

Very truly yours,

J. CAMERON MCKERNAN COMPANY

By: Sam McK

J. Cameron McKernan, President

RECEIVED

MAR 31 1999

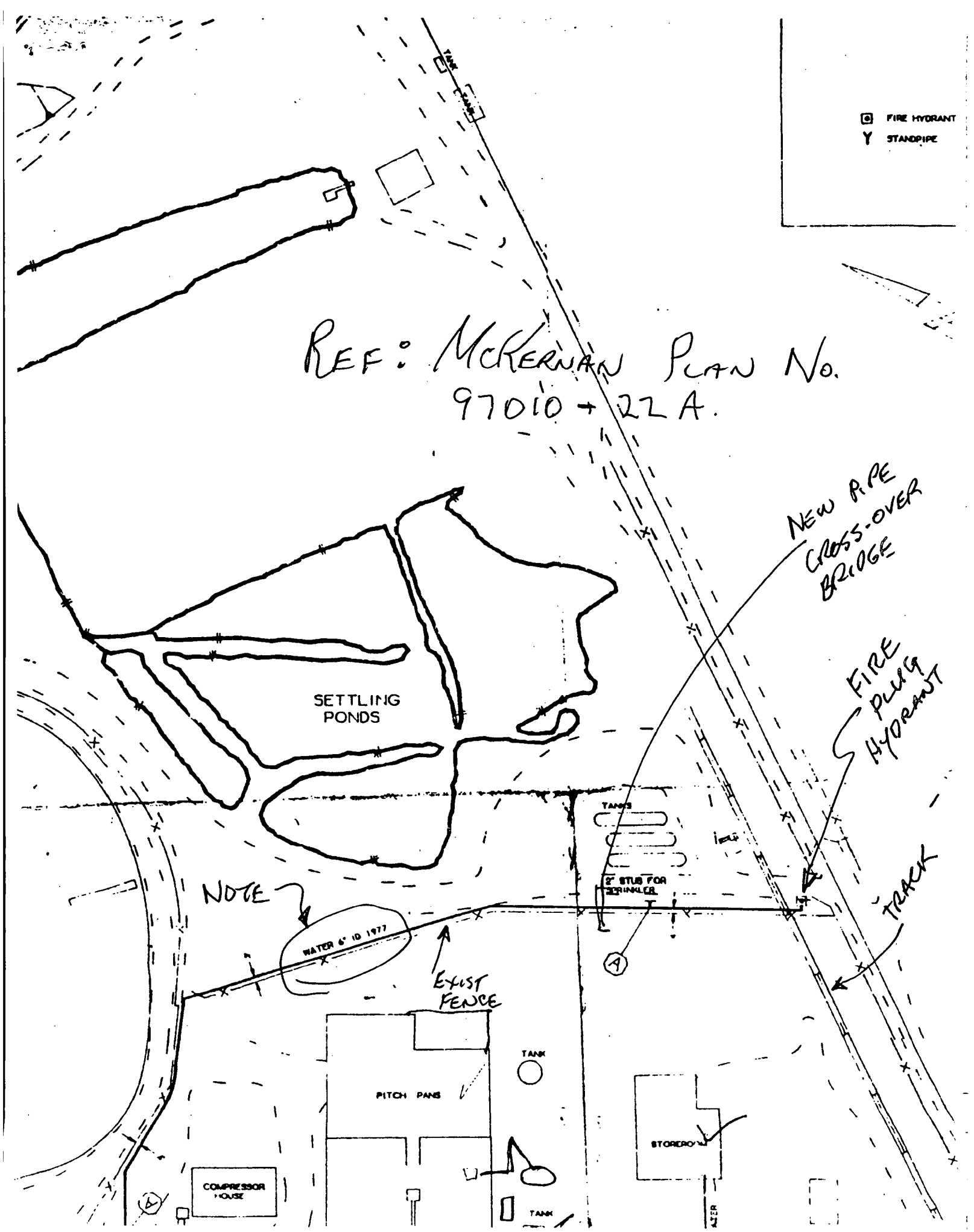
KOPPERS IND
PORTLAND

cc: Koppers Industries, Inc.
Bill Meisinger
Amos Kamerer

TRANSMISSION REPORT

:J. CAMERON MCKERNAN (MAR 30 '99 15:32)

DATE	START TIME	REMOTE TERMINAL IDENTIFICATION	MODE	TIME	RESULTS	TOTAL PAGES	DEPT. CODE
MAR 30	15:30	503 241 2767	G3ST	01'23"	OK	02	9710



Koppers010308

Meeting Notes

Koppers Pitch Pipe

Work Order 92070

Date: 3/17/99
Time: 11:30 AM
Attendees: Amos Kamerer, Cameron McKernan, Gray Johnson, & Scott Crawford
Distribution: William Messinger, Jack Stephenson, Kurt Liebe, and attendees
Subject: Field Review Of Pitch Pipe Route
Written By: Scott Crawford

1. Pipe supports coming off pier will be in one plane 1/8" tolerance. Elbow at pier will slightly rotated (2°).
2. Install drain next to 1st valve off pier.
3. Cameron Mckernen to view layout of pipe stakes before starting construction.
4. Bolt holes & plate edges can be plasma cut with 1/16" tol.
5. MWP is not responsible for 3rd party inspection, of all structural steel according to UBC. MWP will notify Koppers of completed structural fabrications and coordinate with Koppers for 3rd party inspection prior to galvanizing.
6. Wire feed welding with E70XX is acceptable.
7. ¼" tol. In 10ft. for general fabrication of pipe supports & misc. fabrications.
8. Plugging of galvanizing holes is not necessary. Put drain hole inside of the pipe with base.
9. Fence posts must be braced around metering shed.
10. Under ground steam pipe and culvert, have been eliminated.
11. Embeds & base plates for pipe supports at pitch building & future tank by harder.
12. Hazardous material disposal is Koppers responsibility.
13. MWP will record hours spent for demolition. If hours run over original allocation, Koppers will pay the difference.
14. Electrical panel in sheds, are not to be pedestal mounted or add an additional post. MWP is to supply drawing for approval.
15. Two monitor wells along cargo line and around pitch building to be cut off 5" above ground, and caps installed (not welded or threaded).
16. MWP can start on dock pipeline by 3-31-99.
17. North West Natural is to be on site during excavation.
18. Koppers will have full time supervision by 4-15-99. Bill Messinger will visit once a month.

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	03/23/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	503-232-7211
Fax Phone	503-232-7658
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #3

Drawing 97010-61 requires that the lower pipe clamp on each pipe support be welded to the "T" beam and galvanized as a complete unit. We have discussed this method and we have a request. Because the tracing pipe must fit tight to the cargo line, we want to install the cargo line first and the tracing last. The only problem with this procedure is that the tracing pipe with bends and welds must be squeezed through the clamp below the pipe after it is assembled. The proximity of the tracing to the cargo line will also make it difficult to weld and inspect. We anticipate that the tracing will have to be fabricated on the ground, inspected, and then lifted into the clamp. If the clamp is welded this will be impossible because the cargo line will block access to the lower clamp. We would like to request that the lower clamp be welded to the "T" in the field. We would further like to request that the lower clamp not be galvanized. We do not anticipate this being a problem since the clamp and attachment weld are covered by insulation. Another alternative would be to redesign the clamps so that the joint is in the vertical instead of horizontal plane. We could cold galvanize the clamp and attachment weld in the field with rattle cans as a third alternate.

1. Did you intend for all of the tracing to be installed prior to the Cargo Line?
2. Which alternative to shop welding and galvanizing of the clamp do you find acceptable?

Please contact Scott Crawford with your preferred solution.

Regards

Gray Johnson

Memorandum

To: Terry Allen
Quality Control Manager
McDowell Welding and Pipefitting

Fred Harris
Production Manager
McDowell Welding and Pipefitting

CC: Carl Maurhoff
Engineer
ChemTech Consultants Inc.

Cameron McKernan
Engineer Of Record
J Cameron McKernan Company

Bill Meisinger
Project Manager
Koppers Industries

From: Gray Johnson
Engineering Manager
McDowell Welding and Pipefitting

Date: 03/23/99

Subject: Fabrication Procedure Revisions Allowed By Chemtech and J Cameron McKernan

Terry,

McDowell has requested and received approval for four exceptions to the fabrication notes on ChemTech drawing 6526-S004.

1. Under 3.0 Connections: The welding specification is per AWS D1.1 Code with "Electrode" (stick). We have been approved to weld with wire feed instead of electrode to the same code with E70XX filler wire (dual shielded).
2. Under 5.0 Inspections: All pipe supports depicted on 6526-S004 and 6526-S005 as well as the pipe support embedments on 97010-64 can be shop fabricated without continuous inspection. Partial third party visual inspection will be required. We are to fabricate the parts and contact Koppers to request an inspector when a significant quantity of parts are ready to go to the galvanizer. Do not galvanize any fabricated parts prior to third party inspection. This procedure will allow us to begin fabrication. McDowell Welding and Pipefitting should still perform visual inspections of all welds.
3. In general: All bolt holes and plate shapes depicted on the drawings listed above can be cut using a CNC plasma/flame cutter machine that will maintain a 1/16" tolerance on holes. All holes are dimensioned oversized so the plate cutter should be programmed 1/16" below the nominal hole size shown on the drawings. This procedure will insure that the holes are not oversized. All plate edges are to be clean cut without burrs and slag. All cut plate edges are to be free from flame/plasma cut marks deeper than 1/32".
4. In general: A shop tolerance of ¼" per 10 ft. is acceptable for pipe support fabrication.

Please call with any questions.

Regards

Gray Johnson

KOPPERS INDUSTRIES

FAX TRANSMITTAL

Koppers Industries, Inc.
7540 N.W. St. Helens Road
Portland, OR 97210-3663

Telephone: 503-286-3681
Fax: 503-285-2831

TO: Gray Johnson, McDowell DATE: 3/24/99

FROM: Amos TOTAL # OF PAGES: 2

The attached F.Y.I., it could mean the possibility of a piping change

We will keep you advised.

IF THIS TRANSMITTAL IS IN ERROR. PLEASE CALL 503-286-3681 FAX # 503-285-2831

Author: Ted Andersen <tsandersen@chemtech88.com> at internet
Date: 3/24/99 12:37 PM
Priority: Normal
TO: Amos Kamerer at PITT
TO: "'Koppers Bill Meisinger'" <Bill_Meisinger@Koppers.com> at internet
TO: KEN JONES at TECHCTR
CC: "Mack Larry" <Windows/catena/mack@chemtech88.com> at internet
Subject: 6526T069: Koppers - Portland Pitch Terminal - Hot Oil Relief
---------- Message Contents ----------

6526T069
24 March 1999

The following recommendation is provided for your information.

Ted Andersen

From: Mack, Larry
Sent: Wednesday, March 24, 1999 10:39 AM
To: Andersen, Ted
Subject: Koppers - Portland Pitch Terminal - Hot Oil Relief Valves

Working with Ken Jones of Koppers, George Barrett of iCE, and Ferris we discoveredthat the Pressure Relief Valve, PRV #2163 on P-280 and PRV #2173 on P-285, presented problems when Ferris sized these valves with their new valve sizing program. his investigation also revealed that when we increased the capacity of P-285 we glected to increase the relieving capacity of PRV #2173.

In looking at all of the alternatives with the intent of recommending the lowest ost and best operating characteristics, we recommend the following;

1) Change the discharge piping from PRV #2163 and #2173 from the high pressure s ply loop, 120 psig at failure of the FV-2105, line #253, to the low pressure ret n loop, at 34 psig at T-240, line #254. This change will eliminate the need for xpensive bellows on the PRV's and the likely possibility of PRV chatter.

2) Change the PRV #2163 spec to a constant backpressure of 34 psig. Maintain th 120 psig set pressure. No bellows required. The flow of 30 gpm is retained. I order not to change the piping inlet and outlet sizes, retain the PRV with a 1" let and 2" outlet, but change the orifice size to conform to the delta P and flow.This may slightly oversize the valve, but this involves the minimum piping changes.

3) Change the PRV #2173 spec to a constant backpressure of 34 psig. Maintain the 20 psig set pressure. No bellows required. The flow changes to 235 gpm. Based n our conversations with Ferris the 1.5 X 3 PRV shown on the piping drawings can andle a maximum flow of 270.7 gpm at the pressure differential of 120 to 34 psig ith an "H" orifice. Again this involves the minimum piping changes.

4) In regard to item 1) above, the tie-in to line #254 for the discharge of each RV must be on the downstream side of valve V-129 so that the relief flow can pro ed to T-240 unobstructed.

We appreciate the involvement of iCE and Ferris because resolution of these issuesas recommended above, improves the detailed system design.

Answers to
Questions By Cam
McKernan 12/31

1.1 - Oil for oil piping
- Water on pitch piping
- Air used for leak detection
- flanges - no.

1.2 Yes.
Soils report - foundation - bid separate

1.3 Stakes - more - willing to accept stakes movement
- NW Nat Gas gone
- Drainage Ditch - don't encroach on lake & ditch
- Sampling - trained to recognize bad conditions
- brought to attention of Koppers
- Soil off-site or packaging as change
- No allowance for hazmat handling
- Personnel trained to recognize - on-site condition.

1.4 Align Pumps or motors
Flush or cooling - assume none

1.5 1.5 can't answer - interface not clear

1.6 Yes

1.7 yes - no socket welds on dock. 100%

1.8 Koppers will pick-up inspections - notify
All radiography - independent agency.
UBC stuff by Koppers
Test cylinders by concrete provider by us.

1.9 They will offload, receive, store, issue to us.
We to temporarily store
Small containers perhaps for instruments

1.10 flowmeters removed (in shed)
temporary spool.
Pressure gauges
1.11 By Koppers
1.12 Except in tank area, the exist. firemain water on plant, fire Hydrant by settling ponds & steam crossing under road.
1.13 By Contractor, Koppers will monitor what we're doing.
Circulate steam. Use Koppers steam for cleaning.
Must be some interface with operators.

2.1 By others.
2.2 Can't answer.
2.3 Work out with plant at Fmn
2.4 all yes - 5.0 we don't do
2.5 & heaters -
2.6 is part of spec.
2.7 yes.
2.8 No answer
2.9 Could have been. Needs to be removed. Yes.
2.10 5/16" Double Fillet. full length
2.11 Feet & suction to be adjusted (no pump rebuild)
2.12 A-105.
2.13 will clarify letter. Requires air test.
2.14 Water or oil - Koppers. Air by us.
2.15 OK
2.16 Yes.

2.17 Motor operated wedge plug valves by Koppers
Cameron says is confusing.

HV-2081
ZV-2082
HV-2083
HV-2008
} 3-8" wedge plug

2.18 yes, yes

2.19 Don't know answer.

3.1 yes.

3.2 all other work by others - dry line by others.

3.3 Bollards by us - others to else

3.4 Yes.

3.5 By insulating contractor

3.6 By us.

3.7 We bid -63 & -72 by us ✓

3.8 Strapping 30" centers for s.s.
50' is

3.9 Scale the drawing, yes

3.10 Drilled or blown hole. min. dia on reln.

3.11 elect. & light by others - passive ventilators

3.12 Tank comes with brackets on it!

4.1 By us.

4.2 - We install - pipe clips and heat transfer plates by us.
Coils by us. external by us

4.3 P013 - spec 1 Vogt class 300 #303, 600# 11403 550°F
SW or flanged.

Strainer and clap-on jackets
pitch valve jackets by us.

4.3 If we bought the valve, the pocket is ours. Vogt class 300 or 600

4.4 Don't think it is.

4.5 yes.

4.6 electrical

4.7. By others

4.8 S09 controlling drawing KPFF

4.9 - Don't need to sleeve if grating not self supporting

4.10 May need dulled A.B.

4.11 ?

4.12 20' long - thinks that ~~it~~ should be removed

4.13 bid like its seen.

4.14 - not answered

4.15 - don't know

4.16 - don't know - not practicle

4.17 Will clarify. - new seats, discs & trim - wear parts packing.

4.18 ?

4.19 - Stakes are galvanized, everything galvanized.
- External metal - corrugated sheeting.
- Internal structure not galvan
- All misc. steel is galvanized

42" Radius 90's - standard 5# diameter bends.

4.20 - ?

4.21 - Yes

4.22 yes

4.23 Will send instrument list

Instrument spec - electrical cables - 100 pages - won't send.

Koppers Liquid Pitch Unloading Project

Request for information/clarification for the Koppers project, RFQ 98016.

1. General Work Scope Related Issues

1.1. The specifications direct us to hydrostatically test the pipeline segments in stages. Para. 6.9.5.5 of the scope indicates that sections of the piping shall be turned over to the insulators as soon as possible in sections or segments. Is that still a requirement? How many stages? Should we put hours in for the installation of flange sets at intermediate locations not shown? There are no intermediate flange sets in the piping as designed. Should temporary welded blinds be installed? NO. NO.

1.2. We have been requested to separate demolition as a breakout from the price. Koppers personnel may do some of the demolition work. Also it appears that a majority of the demo and relocation work will be required by the tank foundation contractor in order to perform his work. Will the tank foundation contractor be on-site in advance of our work? Can you help us to determine if we should price the entire demolition now, or can we negotiate the work at a later date? YES

1.3. Can we have the soils report for help in determining the nature of the work required to install the staked pipeline foundations? A copy of the soils report would be helpful because of the stakes that need to be placed under the pipeline. Who supervises or is responsible for the sampling and analysis of potentially hazardous wastes? I believe you indicated that Sandy Hart with NW Natural Gas would be responsible. Is that correct? And if hazardous excavations are found, who is responsible for costs of the disposal? Do we need to dispose of the materials or can it be left on site? Will contaminated soils be handled on a change order basis? If soils can be left, can they be graded into the surrounding areas of the sleepers and the guides? The general terms and conditions indicate that we need to have full knowledge and appreciation for the site conditions. WILL DISCUSS FURTHER

1.4. Please verify that we are to align all the pumps and their motors. Is there any external piping required for seal flushing or seal cooling? — YES.

1.5. The MCC room expansion detail is not shown in the drawings, only described in the specification. We are to provide a break out bid for this as previously requested. Is the electrical contractor bidding this work as well?

1.6. We are to provide the bolt-up steel attachment to the foundations and concrete work in the hot oil furnace and new tank T-200 pad area, not the embedments as requested. Please verify that the bar grating over the trenching and the sump covers are by us. YES

1.7. All piping welds on the dock to be x-ray inspected. Do we assume that the small diameter tracing on the dock is also 100 % radiographed? — YES. YOU NOTIFY. NO

1.8. Are the costs of continuous and periodic special inspections to be borne by us? How will the coordination of the special inspections occur? Are the costs for all radiography by us? — YES

1.9. We are to provide a container for storage of owner supplied material. Can Koppers provide an estimate of the size of the container they believe they will require? Can MWP store material in the same container? WILL DISCUSS FURTHER

1.10. The scope states that in-line instruments are to be removed during testing. Can you provide a list of the items to be removed? Can some instruments be left in place? Do we need to construct bolt up through spools for testing purposes for in-line devices? NO YES — YES - FLOW METERS.

1.11. We are responsible for the unloading of all Koppers furnished material. Shall we include a full time forklift in the estimate for off load of these materials? NO — KOPPERS WILL UNLOAD.

1.12. Shall we include in our price a locating service for underground utilities? YES — FIRE WATER PIPE

1.13. Who is responsible for isolating, draining, and cleaning of the lines prior to piping tie-ins being made? If Koppers performs this work, will the piping be in an acceptably clean condition for welding at the tie-in point? — CONTRACTOR.

2. Mechanical Specification Related

2.1. Specification para. 4.6.4—Relocation of conduit, wire and electrical equipment is presumed by others in this context. — YES.

2.2. Please see scope item 4.6.5. The paragraph asks us to remove all associated foundations. It's difficult to bid what can't be seen. Can we negotiate this item after the work becomes revealed, or is it an insignificant amount of work?

2.3. Specification para. 4.6.2.9—demolition of conduit will be bid and done by us, as long as electrical contractor removes all fill/wiring. ?

2.4. Please verify that the entire scope element section 5.0, Civil Work, is outside of our scope of work. Specification para. 5.11.1.12 indicates cinch anchors for installation of steel. That should probably be by us. — YES

2.5. Is the number of heaters in para 6.4.5 supposed to read (8), not (4)? - 8 PER TANK

2.6. Para 6.7 of the spec will be ignored and will be included in the bid. - CORRECT

2.7. The term "construction superintendent" is used frequently in the scope. Is this the same as "Koppers Field Construction Supervisor", as originally defined in front matter of spec? / YES

2.8. Clamp on heat transfer surface spec 6526CLMP—five each shown on top, description shows two.

2.9. Should demolition section of scope (4.0) include removal of T-240 as mentioned per 6.8.3.11? - COULD HAVE BEEN

2.10. Spec 6.8.3.12. How much weld is required on the fixed end of the support as shown on drawing 6526-C003 for T-250? - 5/16 DOUBLE FILLET - FULL LENGTH

2.11. Spec 6.8.3.13—How shall the sump pump be revamped to fit in the sump? — ADJUST FEET & SUCTION PIPE TO FIT NEW LOCATION

2.12. In all pipe specifications, should the flange spec read A-105 instead of A-150? - YES

2.13. Spec 6.9.5.8 indicates testing of the hot oil piping. How should it be tested? —

2.14. Who will supply the pressure testing media; be it water, nitrogen or compressed air? The specification indicates only compressed air to be supplied by the contractor. See spec 6.9.5.11. WILL DISCUSS FURTHER KOPPERS

2.15. Spec para. 6.9.5.7 indicates all tracing connections to be silver soldered. Pipe spec 6526-PS01, page 4, indicate fittings outside of insulation can be compression type. We will presume that expansion loops for S/S tracing and connections to C/S piping can be compression type. All others inside to be silver brazed. O.K.

2.16. All references to I.A. (instrument air) in the specification and the drawings are presumed to mean nitrogen. YES

2.17. Could you verify the purchase responsibility of all the control valves? The bottom of the valve list in the spec show relief, control, remote operated and hand valves with position indicators are listed on the instrument list. We have not received the instrument list. We assume that all valves shown on the drawings with prefixes of TDV, TV, PSV, FV, PCV, ZY, ZV, and HV are by others or by Koppers. WILL BE CLEARIFIED. KOPPERS WILL FURNISH WGOCE PLUS. ALL OTHERS BY CONTRACTOR

2.18. Please verify that oil product transfer from T-250 to T-240 is by us. YES Spec para. 6.8.3.12.2—Will Koppers supervise or furnish procedures for the transfer? - YES.

2.19. Will any work regarding the burner replacement be by us? See Spec 6526E270.

3. McKernan Drawings No - BY PIER CONTRACTOR

3.1. Is all the structural steel and anchorage on drawing 97010-63 by us? YES

3.2. Drawing 97010-38. Who relocates the existing pier office? There is a large quantity of small items on this drawing. Should we presume that the only work on the dock is pitch piping, tracing, fire line dry pipe, and slide foundation for pipeline terminus? YES.

3.3. Drawing 97010-41. All work is by others we presume, primarily landscaping and roadway. Are the twelve bollards on this drawing by us? - YES

3.4. Do we bid the bollards on drawing 97010-046? - YES

3.5. The metal storage box "for blankets" on drawing 97010-057 is not detailed. Should we include in our price? BY INSULATION CONTRACTOR

3.6. Fence modifications on drawing 97010-047 to be bid by us? - YES

3.7. Dwg. 97010-72. Crossover stile at dock is presumed by others since it is steel on the dock. - YOU BID. Drawing 97010-63 is the only structural work on the dock that we presume we will perform. Is that correct? No - -63 + CROSS OVER STILE ON 97010-72

3.8. Drawing 97010-060 mentions 50' center spacing for tracing, dwg. 97010-53 shows 5' centers? Please clarify. 30' CTRS FOR S.S. STRAPPING 5' CTRS FOR CLAMPS: 2" BAND

3.9. There is no detail of the aluminum pan "portable spill catchment" on drawing 97010-057. Is that by us? - YES

3.10. Drawing 97010-064, note 4, indicates 5" clearance for the rebar, should be 3" per the drawing. How does the rebar penetrate the WF pile for the guides? Welded or drilled? preferred.

YES.

3.11. Drawing 97010-73. Barn shed design, fabrication and erection are by us. Is the electrical and lighting by others? Are the roof ventilators powered? — NO

3.12. Drawing 97010-67. Should the sway brace brackets welded to the tank by us? — NO: TANK CONTRACTOR.

4. ChemTech Drawings

4.1. Who relocates the existing oil lines as shown in section GG of drawing 6526-C004? — CONTRACTOR

4.2. General comment drawing 6526-P012—Attachments to the tank. The direction from the bid meeting suggested that anything welded to the tank be by the tank manufacturer. See detail 4 pipe clips and heat transfer plates for the nozzles and suction area. Should we install these items? Is internal coil piping in the tank by us or by others? The direction on the drawing seems to indicate it's clearly us. The API 650 data sheet notes #5 and 11 indicate internal coils by other than tank manufacturer. The notes also indicate manufacturer to install all internals except heater inlet and outlet piping. — CONTRATOR YOU DO THIS.

4.3. Drawing 6526-P013 shows a lot of unmarked valves. Which spec do they fall under? It looks like either pipe spec 1 or 2. Can you indicate a representative make and model for these valves? The pipe specifications are somewhat vague in that regard. Also on this drawing—can you send us a catalog description of the valve and strainer clamp-on jackets so we can estimate installation time for the jackets? For some valves on this drawing, there will be multiple 1" or 1 ½" tracers that pass by the jacketed valves. We will attempt to route the tracers such that the pitch valves could be removed at a later date for maintenance. Do you have a recommended detail showing how Koppers would like to see this arranged? — VOGT Class 300 Class 600 #1403 #363 NEED TO VERIFY TEMP-PRESS RATING

4.4. Please verify that the new maintenance building shown on the general arrangement drawing 6526-G002 is not a part of our bid.

4.5. PVC reroute at tank T-250, dwg 6526-G002, by us? — YES

4.6. Verify that the panel rack and support on dock as shown in the electrical drawings is by the electrical contractor? YES.

4.7. Drawing 6526-A006. The tank chairs are shown "by others" on the drawings, which implies us. We assume that they are by the tank manufacturer. — CORRECT.

4.8. In case of conflict of competing general notes for civil/strucutural work on the drawings, which one takes precedence? Dwg 6526-S004 or 98567-S09?

4.9. Are sleeves required in the grating for any vertical pipe penetrations through the grating? — DEPENDS ON GRATING

4.10. Dwg's. 6526-C003, C004 show E-270 foundation but not cast in place anchor bolts. Spec indicates this large piece of equipment bolts down to anchor bolts installed in civil part. See spec section 6.8.3.9. — MAY NEED TO USE DRILLED ANCHOR BOLTS.

4.11. Drawing 6526-A003. We presume that the 3/8" rectangular plate coil supports for fin tubes E-201, E-202 are by coil manufacturer. Installation only by us of the fin tube assemblies. Are the support stand brackets by tank manufacturer? What is the pipe schedule and material of the internal piping to connect to E-200, E-201? — ?

4.12. Dwg. 6526-D010 shows a nitrogen pipeline from a bottle. How long is this pipeline? — 20'

4.13. Steam purge and nitrogen purge are shown on drawing 6526-P019. How many are required? We found one or two on the piping plans. Perhaps you can give us an allowance for this item. — ?

4.14. Detail 11 on drawing 6526-P002 indicates four strainers and traps on stainless tracing. Do we provide strainers and traps? If so, we previously used stainless steel Armstrong 1811 inverted bucket traps for Koppers. Is that acceptable? Koppers specification S13-050-0 (not included in this project spec) indicates sch. 80 piping for tracing supply. This design stipulates sch. 40.

4.15. We assume that only one expansion loop is required on the S/S tracing on the vent line per detail 12 on drawing 6526-P002. Do we need to extend the tracing outside of the insulation to enable the removal of fume line valves on top of the tank? Or at any other in-line device?

4.16. On hot oil tracing of pitch piping. The tracer pipe welds are ground so the tracer can be tight to the pipe. Must the pitch product piping welds be ground also to maintain contact?

4.17. To what extent should the 4" valves in the pitch transfer manifold be reconditioned? See drawing 6526-P003, Section C-C. WILL CLARIFY.

4.18. Should the stile on drawing 6526-P006 (note 4) be oriented in the other direction across the piping? — ?

Koppers Liquid Pitch Unloading Project

4.19. Can you verify that all structural steel on the entire project is galvanized as shown on note 4.0 on drawing 6526-S004? - YES -

4.20. Drawing 6526-P011 indicates a new stack required on E-270. Could you please indicate the work that may be required to install it? - ?

4.21. Is the asphalt repair specified on drawing 6526-P017 by us? - YES

4.22. General comment on drawings 6526-P005 through P007. Some of the piping runs show fitting to fitting make-up. Can short spools be added to the piping to ease fit-up problems that may occur? - No. Can the dimensional requirements be relaxed slightly in some circumstances? YES

4.23. Drawings 6526-P011 and P&I's D004, D005 and D006. Instrument air (nitrogen) requirement for the control valves. We are trying to takeoff all of the IA piping supply work. The P&I's indicate the following valves will require air: ZY-2044, PV-2001, PV-2003, ZY-2123, FV-2145, TV-2106, TV-2156, TV-2166, TDV-2176, FV-2105, TV-2146, TV-2144, TV-2143, and TV-2141. In the absence of the instrument list, could verify this count? Are solenoids ZY-2044 and ZY-2123 integrally mounted and tubed to their respective control valves, ZV-2044 and ZV-2123? } ?

All pipeline bends. 5 dia bends. 42" Radius Forged or bent OK. Not std. 90's

nated by the engineer or architect responsible for the structural design, to perform structural observation as defined in Section 220. Observed deficiencies shall be reported in writing to the owner's representative, special inspector, contractor and the building official. The structural observer shall submit to the building official a written statement that the site visits have been made and identifying any reported deficiencies that, to the best of the structural observer's knowledge, have not been resolved.

SECTION 1703 — NONDESTRUCTIVE TESTING

In Seismic Zones 3 and 4, welded, fully restrained connections between the primary members of ordinary moment frames and special moment-resisting frames shall be tested by nondestructive methods for compliance with approved standards and job specifications. This testing shall be a part of the special inspection requirements of Section 1701.5. A program for this testing shall be established by the person responsible for structural design and as shown on plans and specifications.

As a minimum, this program shall include the following:

1. All complete penetration groove welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.

EXCEPTIONS: 1. When approved, the nondestructive testing rate for an individual welder or welding operator may be reduced to 25 percent, provided the reject rate is demonstrated to be 5 percent or less of the welds tested for the welder or welding operator. A sampling of at least 40 completed welds for a job shall be made for such reduction evaluation. Reject rate is defined as the number of welds containing rejectable defects divided by the number of welds completed. For evaluating the reject rate of continuous welds over 3 feet (914 mm) in length where the effective throat thickness is 1 inch (25 mm) or less, each 12-inch increment (305 mm) or fraction thereof shall be considered as one weld. For evaluating the reject rate on continuous welds over 3 feet (914 mm) in length where the effective throat thickness is greater than 1 inch (25 mm), each 6 inches (152 mm) of length or fraction thereof shall be considered one weld.

2. For complete penetration groove welds on materials less than $^5/_{16}$ inch (7.9 mm) thick, nondestructive testing is not required; for this welding, continuous inspection is required.

3. When approved by the building official and outlined in the project plans and specifications, this nondestructive ultrasonic testing may be performed in the shop of an approved fabricator utilizing qualified test techniques in the employment of the fabricator.

2. Partial penetration groove welds when used in column splices shall be tested either by ultrasonic testing or radiography when required by the plans and specifications. For partial penetration groove welds when used in column splices, with an effective throat less than $^3/_4$ inch (19.1 mm) thick, nondestructive testing is not required; for this welding, continuous special inspection is required.

3. Base metal thicker than $1^1/_2$ inches (38 mm), when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such welds after joint completion.

Any material discontinuities shall be accepted or rejected on the basis of the defect rating in accordance with the (larger reflector) criteria of approved national standards.

SECTION 1704 — PREFABRICATED CONSTRUCTION

1704.1 General.

1704.1.1 Purpose. The purpose of this section is to regulate materials and establish methods of safe construction where any structure or portion thereof is wholly or partially prefabricated.

1704.1.2 Scope. Unless otherwise specifically stated in this section, all prefabricated construction and all materials used therein shall conform to all the requirements of this code. (See Section 104.2.8.)

1704.1.3 Definition.

PREFABRICATED ASSEMBLY is a structural unit, the integral parts of which have been built up or assembled prior to incorporation in the building.

1704.2 Tests of Materials. Every approval of a material not specifically mentioned in this code shall incorporate as a proviso the kind and number of tests to be made during prefabrication.

1704.3 Tests of Assemblies. The building official may require special tests to be made on assemblies to determine their durability and weather resistance.

1704.4 Connections. See Section 1611.11.1 for design requirements of connections for prefabricated assemblies.

1704.5 Pipes and Conduits. See Section 1611.11.2 for design requirements for removal of material for pipes, conduit and other equipment.

1704.6 Certificate and Inspection.

1704.6.1 Materials. Materials and the assembly thereof shall be inspected to determine compliance with this code. Every material shall be graded, marked or labeled where required elsewhere in this code.

1704.6.2 Certificate. A certificate of approval shall be furnished with every prefabricated assembly, except where the assembly is readily accessible to inspection at the site. The certificate of approval shall certify that the assembly in question has been inspected and meets all the requirements of this code. When mechanical equipment is installed so that it cannot be inspected at the site, the certificate of approval shall certify that such equipment complies with the laws applying thereto.

1704.6.3 Certifying agency. To be acceptable under this code, every certificate of approval shall be made by an approved agency.

1704.6.4 Field erection. Placement of prefabricated assemblies at the building site shall be inspected by the building official to determine compliance with this code.

1704.6.5 Continuous inspection. If continuous inspection is required for certain materials where construction takes place on the site, it shall also be required where the same materials are used in prefabricated construction.

EXCEPTION: Continuous inspection will not be required during prefabrication if the approved agency certifies to the construction and furnishes evidence of compliance.

Koppers010322

Discussion Items For 3/23/99 Meeting With Bill Meisinger

1. Verify that holes and plate edges can be plasma cut.
2. Verify that pipe bridges, pipe support and support embed fabrication can begin without third party inspection.
3. Verify that wire feed welding with E70XX filler is acceptable instead of stick.
4. Verify ¼" in 10Ft general fabrication tolerance for pipe supports and miscellaneous fabrications.
5. Verify that plugging of galvanizing holes is not necessary. ok, Add bottom drain hole.
6. Verify that the elbow at the dock can be rotated below grade so that all pipe supports in the adjacent expansion loop have 12" soil bearing depth.
7. Verify that concrete and asphalt demo under the maintenance shop and new tank are by others.
8. Establish a schedule for start of Harder Pile driving so that we can set our demo and pile driving dates.
9. Verify that the metering shed will be in the fence and that no walls or additional fence will be installed to fill this break in the fence.
10. Verify that the rail car unloading area will not be relocated or modified in the modified scope of this project.
11. Verify that the underground steam pipe and culvert has been eliminated.
12. Verify that embeds and base plates for pipe supports at the pitch building and the future tank foundation are by Harder.
13. Request new tank foundation details that specify the trench pit and grating required for the new design.
14. Clarify that MWP quoted hazardous material collection whenever product pipes or vessels are cut or modified for the new system. We did not quote cleaning of pipes and vessels prior to demolition or disposal of hazardous substances. We can arrange for a company to vacuum clean vessels and pipes for an added charge.
15. Verify that electrical panels in sheds are pedestal mounted so that walls are not required for mounting. MWP to add 1 more post.
16. Verify that two monitor wells along cargo line around pitch building can be cut off and heavy non welded caps installed in the tops. ok
17. Verify date that MWP can start on dock pipe line.
18. Coordinate disposal of horizontal and vertical vessels with pitch inside. Do we hire a third party to clean prior to demo or can we store as a complete unit on the property. Yes.
19. What are the notification requirements prior to pile driving for DEQ?
20. What are the notification requirements prior to pipe support excavation for DEQ?
21. Verify the modified inspection criteria for the cargo pipe line and the hot oil piping.
22. Verify that Koppers will have full time on site supervision. (McDowell did not quote project management)

Memorandum

To: Terry Allen
Quality Control Manager
McDowell Welding and Pipefitting

Fred Harris
Production Manager
McDowell Welding and Pipefitting

CC: Carl Maurhoff
Engineer
ChemTech Consultants Inc.

Cameron McKernan
Engineer Of Record
J Cameron McKernan Company

Bill Meisinger
Project Manager
Koppers Industries

From: Gray Johnson
Engineering Manager
McDowell Welding and Pipefitting

Date: 03/22/99

Subject: Fabrication Procedure Revisions By Chemtech and J Cameron McKernan

Terry,

McDowell has requested and received approval for three exceptions to the fabrication notes on ChemTech drawing 6526-S004.

1. Under 3.0 Connections: The welding specification is per AWS D1.1 Code with "Electrode" (stick). We have been approved to weld with wire feed instead of electrode to the same code with E70XX filler wire.
2. Under 5.0 Inspections: All pipe supports depicted on 6526-S004 and 6526-S005 as well as the pipe support embedments on 97010-64 can be shop fabricated without continuous or partial third party welding inspection. This will allow us to begin fabrication. Koppers has confirmed that these structural details are not a concern to the Portland building inspector who would require this type of inspections. McDowell Welding and Pipefitting should still perform visual inspections of all welds.
3. In general: All bolt holes and plate shapes depicted on the drawings listed above can be cut using a CNC plasma/flame cutter machine that will maintain a ~~1/8"~~ 1/16" tolerance. All plate edges are to be clean cut without burrs and slag. All cut plate edges are to be free from flame/plasma cut marks deeper than 1/32".

Please call with any questions.

Regards

Gray Johnson

Recommended Non Destructive Testing Methods
Koppers Project

Hot Oil Piping

- 100% PT all root welds
- 100% VT all final welds
- 100% MT all welds over dock
- 10% MT all remaining welds

Cargo Line

- 100% PT all root welds
- 100% VT all final welds
- 100% RT all welds over dock
- 5% RT all remaining welds

Notes:

- VT by McDowell Welding & Pipefitting Quality Assurance in accordance with ASME/ANSI Piping Codes
- PT & MT by McDowell & Pipefitting Quality Assurance in accordance with ASME/ANSI Piping Codes
- RT by Third Party Inspection (We recommend use of our ASME Code designated NDE Examiner)
- This work will be subject to the McDowell Welding & Pipefitting ASME Code Quality Assurance System.

FAX RFI

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	03/22/99
Number of pages including cover sheet	1

To:	
	Cameron McKernan
	McKernan Co.
Phone	**503-232-7211**
Fax Phone	**503-232-7658**
CC:	

From:	
	Gray Johnson
	McDowell Welding
Phone	**503-241-2410**
Fax Phone	**503-241-2767**

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Cameron;

RFI #2

It appears that the field inside the fence, upstream of the dock is slightly lower than the road at the dock. (See pipe segment 11 drawings) The first pipe support beyond the dock is located in the road at the end of the dock. This pipe support elevation must be set based on the pipe elevation on the dock. We can excavate and set the pre-cast block in the road with no problem and we can maintain 12" soil bearing on the sides of the block. The next blocks going upstream however are progressively higher above grade with less than minimum soil bearing because the ground level is lower in this area. We can not slope the pipe with the grade because all the pipe supports in this area are on a plane and the plane has been set by the dock elevation.

We have four recommendations that can resolve this problem.

1. Bring in fill dirt and raise the soil elevation in this area. This would be a change order because we did not quote fill dirt.
2. Fabricate pre-cast blocks taller than 18" that will extend into the grade the required 12".
3. Install grout more than 1" above the pre-cast block and set the base plate at the proper elevation. The grout will be finished in the field to match the block.
4. Rotate the elbow at the dock entrance to match the upstream grade and install all the unguided pipe supports in the first expansion loop at a slight angle relative to level. This will get all the pre-cast blocks deep enough in the ground but it will also create a low spot in the pipeline that will never drain. Since this pipe line will never be empty we do not see this as a problem.

Please call and comment on your preferred solution. We believe #4 will be acceptable.

Regards

Gray Johnson

FAX

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	03/16/99
Number of pages including cover sheet	3

To:	
	William Meisinger
	Koppers
Phone	**412-826-3962**
Fax Phone	**412-826-3999**
CC:	**Jack Stephenson**

From:	
	Gray Johnson
	McDowell Welding
Phone	**503-241-2410**
Fax Phone	**503-241-2767**

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill;

We reviewed the pitch pipe layout with Cameron McKernan again today. We had relocated all of the pipe supports based on the meeting notes of 3/15/99. The pipe route now seems to be finalized and we clear all obstructions with enough room for fire trucks.

The only unexpected change was that we were short by one pipe support. Cameron, Amos, and myself agreed that we could not revise the pipe support layout any further with out causing major changes, so we agreed to add one more guided pipe support. The additional charge to install one more pipe support is $2,429.00. We will make every effort to install the additional pipe support without exceeding the current project budget but we are entitled to an increase in the "not to exceed" contract amount from $866,275.00 to $868,704.00.

Please call with any questions or comments and return the attached Change Order form with an approval signature.

Regards,

Gray Johnson

FAX

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	03/16/99
Number of pages including cover sheet	1

To:	
	William Meisinger
	Koppers
Phone	**412-826-3962**
Fax Phone	**412-826-3999**
CC:	**Jack Stephenson**

From:	
	Gray Johnson
	McDowell Welding
Phone	**503-241-2410**
Fax Phone	**503-241-2767**

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill;

We understand that the concrete foundation for the future pitch tank will not be installed at this time. There are four 10" pipe supports on this foundation (segment 03 of the pipeline drawing 97010-45) along the west wall of the pitch building, where we supply top plates, but we do not install the concrete or the pile. Currently these pipe supports are not in our scope of work and we wanted to make sure that Harder was still providing the pile and the concrete pipe support. We are currently purchasing materials for the piles and establishing contracts for the pile driving and the pre-cast concrete blocks. We could easily add these four pipe supports on a change order basis to our scope of work.

Please confirm that these pipe supports have not "fallen through the cracks"

Please call with any questions or comments.

Regards,

Gray Johnson

McDowell Welding
& Pipefitting, Inc.

NOTIFICATION OF CONTRACT CHANGE OR DELAY

CLIENT: KOPPERS IND

DATE OF NOTIFICATION: 03 / 16 / 99

TIME: 6:00 am (pm) SHFT: 1 2 3

ATTN: WILLIAM MEISINGER

APPROVAL REQ'D BY: / /

SUBJECT: ADD ONE EACH PIPE SUPPORT

MCDOWELL NUMBER: 92070 (Job no.) - 02 (Change no.)

CLIENT NUMBER:

We respectfully direct your attention to the following ☒ items:

A. ☒ McDowell has received this date a ☐ WRITTEN ☒ VERBAL order issued by: CAMERON MCKERNAN of MCKERAN ENGINEERS directing us to:

- ☒ Perform work as described in Item C below.
- ☐ Stop work in progress as described in Item C below.

B. ☐ McDowell is unable to start work scheduled to commence on _____, for the reason described in Item C below

C. REASON FOR THE CHANGE: ADD ONE PIPE SUPPORT IN PIPE SEGMENT #7

☐ See Attached.

WE CONSIDER THE FOLLOWING ☒ ITEMS TO BE APPLICABLE:

D. ☒ The order is for work not within the scope of our present contract and will involve: ☒ ADDITIONAL COST, ☐ TIME EXTENSION.

E. ☐ The inherent delay of C above, will involve: ☐ ADDITIONAL COST, ☐ TIME EXTENSION, ☐ PREMIUM TIME, for contract completion.

IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

F. ☒ McDowell ☐ IS ☒ IS NOT proceeding with the work as directed before issuance of a formal change order, per Client Rep's Authority.

G. ☒ McDowell is submitting a proposal covering added cost directly* attributable to the work order:

☐ Lump Sum $_____. ☒ Per McDowell T & M Rates. ☐ See Attached. INCREASE NOT TO EXCEED CONTRACT BY $2,429.00

*Total cost due to change/delay and effect on completion date(s) cannot be completely determined at this time; McDowell will advise total impact upon further analysis of change/delay and overall project effect.

Respectfully Submitted,
McDowell Welding and Pipefitting

GRAY JOHNSON
McDowell Representative Date

Approval to Proceed:

Client Rep. Date

FAX

McDowell Welding & Pipefitting, Inc.
4000 NW St. Helens Road
Portland, OR 97210

Date	03/16/99
Number of pages including cover sheet	3

To:	
	William Meisinger
	Koppers
Phone	412-826-3962
Fax Phone	412-826-3999
CC:	Jack Stephenson

From:	
	Gray Johnson
	McDowell Welding
Phone	503-241-2410
Fax Phone	503-241-2767

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Bill;

After further discussions with Cameron McKernan about pre-cast concrete pipe supports we have arrived at a design that will meet his criteria and will not require recalculation of the pipeline stresses. The pipe supports will be pre-cast with an 18" diameter hole in the center, which is placed over the pile in the field and aligned with the pipeline route. A top plate with rebar embeds is then placed over this hole and the hole is filled with grout to bond the pre-cast block to the pile and the top plate. Cameron has been very cooperative and helpful while trying to improve the design of these pre-cast blocks but he also informs us that a soil bearing depth of at least 12" is required on all sides of these pipe supports to avoid changes to the pipeline stress analysis.

McDowell offered a $6,400.00 deduct for pre-cast concrete pipe supports based on two criteria. First, we planned only to connect the top plate, pile and concrete block with field welds. We did not plan to fill the void with grout and we do not know if this will be cheaper and less labor intensive. Secondly, we intended minimal excavation at each pipe support. We planned to place the pre-cast block above ground with no back fill or excavation. We know that this additional earthwork will reduce the deduct.

McDowell still intends to make every effort to reduce the overall project price. We are tracking all hours on a T&M basis in hopes of providing Koppers with a final price that is less than the "not to exceed" budget. We still believe that the pre-cast pipe supports will be easier to install, but, we must request that the "not to exceed" budget be increased by $4,400.00 from $861,875.00 to $866,275.00 since both of the justifications for the pre-cast pipe support deduct have been compromised.

Please call with any questions or comments.

Regards,

Gray Johnson

McDowell Welding
& Pipefitting, Inc.

NOTIFICATION OF CONTRACT CHANGE OR DELAY

CLIENT: KOPPERS IND

DATE OF NOTIFICATION: 03 / 16 / 99

TIME: 12:00 (am) pm SHFT: (1) 2 3

ATTN: WILLIAM MEISINGER

APPROVAL REQ'D BY: / /

SUBJECT: ELIMINATE PIPE SUPPORT DEDUCT

MCDOWELL NUMBER: 92070 (Job no.) - 01 (Change no.)

CLIENT NUMBER:

We respectfully direct your attention to the following ☒ items:

A. ☒ McDowell has received this date a ☐ WRITTEN ☒ VERBAL order issued by: CAMERON MCKERNAN of MCKERNAN ENGINEERS directing us to:

- ☒ Perform work as described in Item C below.
- ☐ Stop work in progress as described in Item C below.

B. ☐ McDowell is unable to start work scheduled to commence on _____, for the reason described in Item C below

C. REASON FOR THE CHANGE: PIPE SUPPORTS MUST BE A MINIMUM OF 12" BELOW GRADE. PIPE SUPPORT DESIGN REQUIRES FIELD GROUTING AND THE LABOR IMPACT IS UNKNOWN.

☐ See Attached.

WE CONSIDER THE FOLLOWING ☒ ITEMS TO BE APPLICABLE:

D. ☒ The order is for work not within the scope of our present contract and will involve: ☒ ADDITIONAL COST, ☐ TIME EXTENSION.

E. ☐ The inherent delay of C above, will involve: ☐ ADDITIONAL COST, ☐ TIME EXTENSION, ☐ PREMIUM TIME, for contract completion.

IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

F. ☐ McDowell ☐ IS ☒ IS NOT proceeding with the work as directed before issuance of a formal change order, per Client Rep's Authority.

G. ☒ McDowell is submitting a proposal covering added cost directly* attributable to the work order:

☐ Lump Sum $_____. ☒ Per McDowell T & M Rates. ☐ See Attached. INCREASE NOT TO EXCEED CONTRACT BY $4,400.00

*Total cost due to change/delay and effect on completion date(s) cannot be completely determined at this time; McDowell will advise total impact upon further analysis of change/delay and overall project effect.

Respectfully Submitted,
McDowell Welding and Pipefitting

GRAN JOHNSON 3-16-99
McDowell Representative Date

Approval to Proceed:

_____
Client Rep. Date

Meeting Notes

Koppers Pitch Pipe

Work Order 92070

Date: 3/16/99
Time: 3:00 PM
Attendees: Amos Kamerer, Cameron McKernan, Gray Johnson
Distribution: William Meisenger, Jack Stephenson, Kurt Liebe, and attendees
Subject: Second Field Review Of Pitch Pipe Route
Written By: Gray Johnson

1. The pipe bend at reference point N 10139.76, E 9945.65 on drawing 97010-49 is not properly supported. An additional guided pipe support must be added between this elbow and the next expansion loop in pipe segment 07.
2. Cameron McKernan requested drawings of the new pre-cast pipe support for approval prior to purchase of the blocks.
3. Cameron McKernan recommended that the 8" pipe stake be filled with grout to a depth of at least 18" from the top of stake to secure the rebar in the stake.
4. Cameron McKernan requested that McDowell contact the pre-cast pipe support manufacturer and request a slope on the top of the pre-cast blocks instead of a flat surface. This slope will insure rain water run off. He also requested a rounded edge around the top of the block. McDowell will determine if these requests will increase the price of the pre-cast block and report the results to Koppers.

Please notify sender of any corrections or omissions.

ATTENTION! AMOS KAMERER
CAMERON MCKERNAN

ATTN: AMOS KAMERER

Meeting Notes

Koppers Pitch Pipe

Work Order 92070

Date: 3/15/99
Time: 3:00 PM
Attendees: Steve Hinds, Amos Kamerer, Cameron McKernan, Gray Johnson
Distribution: William Meisenger, Jack Stephenson, Kurt Liebe, and attendees
Subject: Field Review Of Pitch Pipe Route
Written By: Gray Johnson

1. Monitor wells on south and east sides of pitch building must be cut off and capped below pipe level. (two each)
2. Offset in pipe segment 04 that moves pipe line to 3' south of building instead of 4'-6" must remain to allow clearance for the roadway.
3. Koppers maintenance will relocate the large metal containment bin and scrap pipe on the ground south of the pitch building.
4. The elbow at N 9989.63, E 10042.03 is no longer 90 degree because the pipeline interferes with the monitor well bump posts. The angle will be changed to approximately 92 degrees to route the pipe between the road and the pond and to keep the elbow at N 10139.76, E 9945.65 out of the roadway. The road clearance must be greater than 27' from the centerline of pipe to meet fire code.
5. The elbow at N 10456.53, E 10051.12 is no longer 90 degree because the pipeline interferes with the roadway. The angle will be changed to approximately 92 degrees to keep the pipeline parallel to the ditch instead of the NW Natural drain pipe. The expansion loop at N 10330.09, E 9969.68 will move approximately 5' south to increase roadway clearance. The elbow closest to N 10330.09, E 9969.68 will increase from 65 degrees to 70 degrees to keep the pipeline route evenly spaced between the pond berm and the road. The road clearance must be greater than 27' from the centerline of pipe to meet fire code.
6. The pipe bridge at N 10451.50, E 10051.12 will not be moved to match the road. Additional gravel will be installed to match the road to the pipe bridge.
7. The pipe spacing of 8' off the main fence perpendicular to the river was confirmed and approved.
8. The metering shed location in the fence is approved. The fence will be broken at the shed. If Koppers wishes to seal the fence with siding on the shed this will be an adder.
9. The pipe length between elbow N 10744.84, E 10019.04 and the dock will be increased 2' so that the pipeline running parallel to the river is clear of the fence enough to avoid demolition of the fence. The 2' addition will be removed from pipeline segment 11 between the expansion loop and the metering shed.
10. The pre-cast pipe sleepers may have square flat tops as long as the blocks are placed with a quarter inch slope from one edge of the block to the other for rain drainage.
11. Pre-cast pipe sleepers must be installed at least 12" in the ground and back filled.
12. The re-bar in the pre cast pipe sleeper is not required to be attached to the 18" corrugated drain pipe sleeve.
13. The pipe stakes can be 8" sch. 40 SA 53 B welded pipe without caps. (dirt will rise up the center of the pipe as the pipe is driven into the ground.)
14. The pipe stake will be perforated on 3" centers from 13' to 16' with 1 ¼" holes for #8 rebar. Each hole will be 90 degrees out of phase with the next. Unused holes will be underground or trimmed off. All other holes will be filled with #8 rebar prior to the pre-cast pipe sleeper being installed.
15. The pipe stake will not be welded to the top plate of the pipe sleeper but grout will connect the two components.
16. The top plate will have two U shaped rebar embedments that match the curvature of the 8" pipe. These U shaped embedments in the grout will connect the top plate to the pre-cast concrete sleeper.

Please notify sender of any corrections or ommissions.

FAX

McDowell Welding & Pipefitting, Inc.
4000 NW ST. HELENS ROAD
PORTLAND, OR 97210

Post-it® Fax Note 7671	Date 3/12	# of pages ▶ 4
To AMOS	From Cam	
Co./Dept.	Co.	
Phone #	Phone # 232-7211	
Fax # 285-2831	Fax #	

Date 3-10-99

Number of pages including cover sheet 4

To:

CAMERON MCKERNAN

Phone 232-7211

Fax Phone 232-7658

CC:

From:

GRAY JOHNSON

MCDOWELL

Phone 503-241-2410

Fax Phone 503-241-2767

REMARKS:

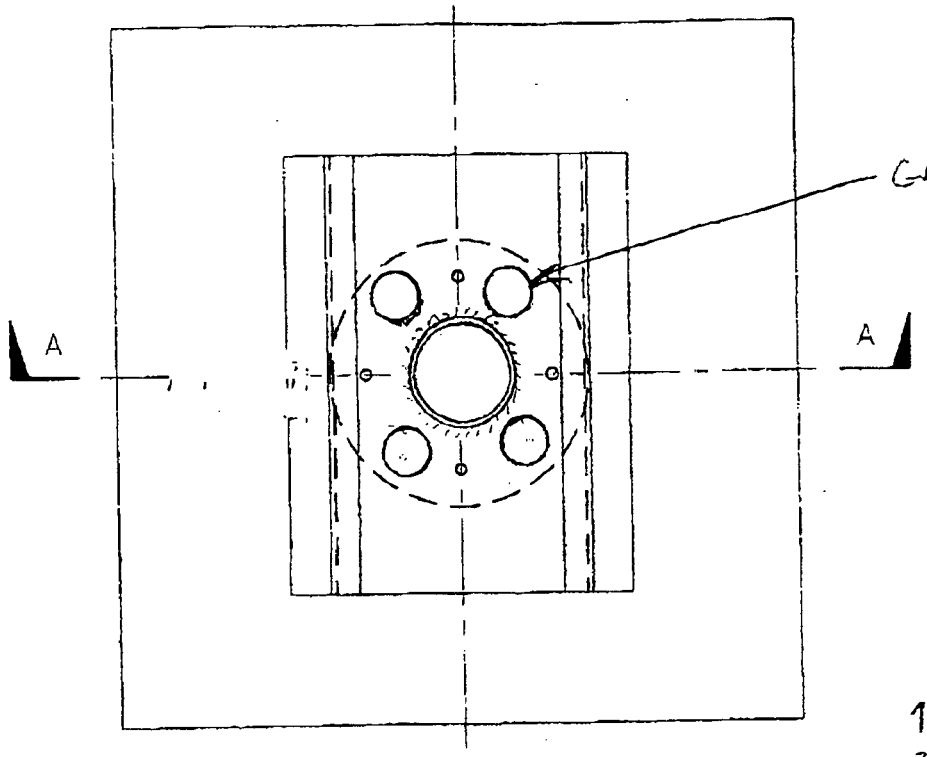
☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

CAMERON

PLEASE REVIEW THE TWO ATTACHED CONCEPTS FOR PRECAST PIPE SUPPORTS. PLEASE CALL WITH QUESTIONS OR COMMENTS. I WILL CALL FRIDAY A.M. TO SCHEDULE A REVIEW OF THE PIPELINE ROUTE

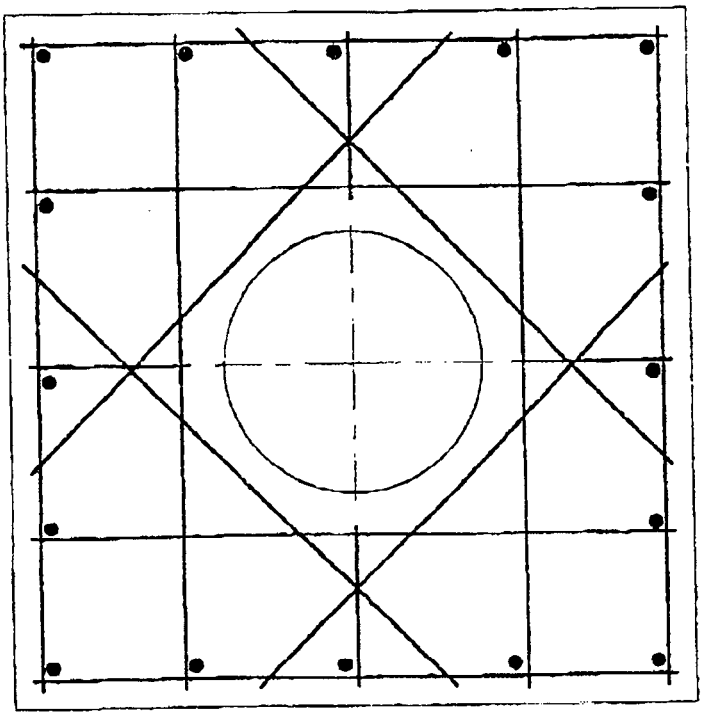
REGARDS

GRAY



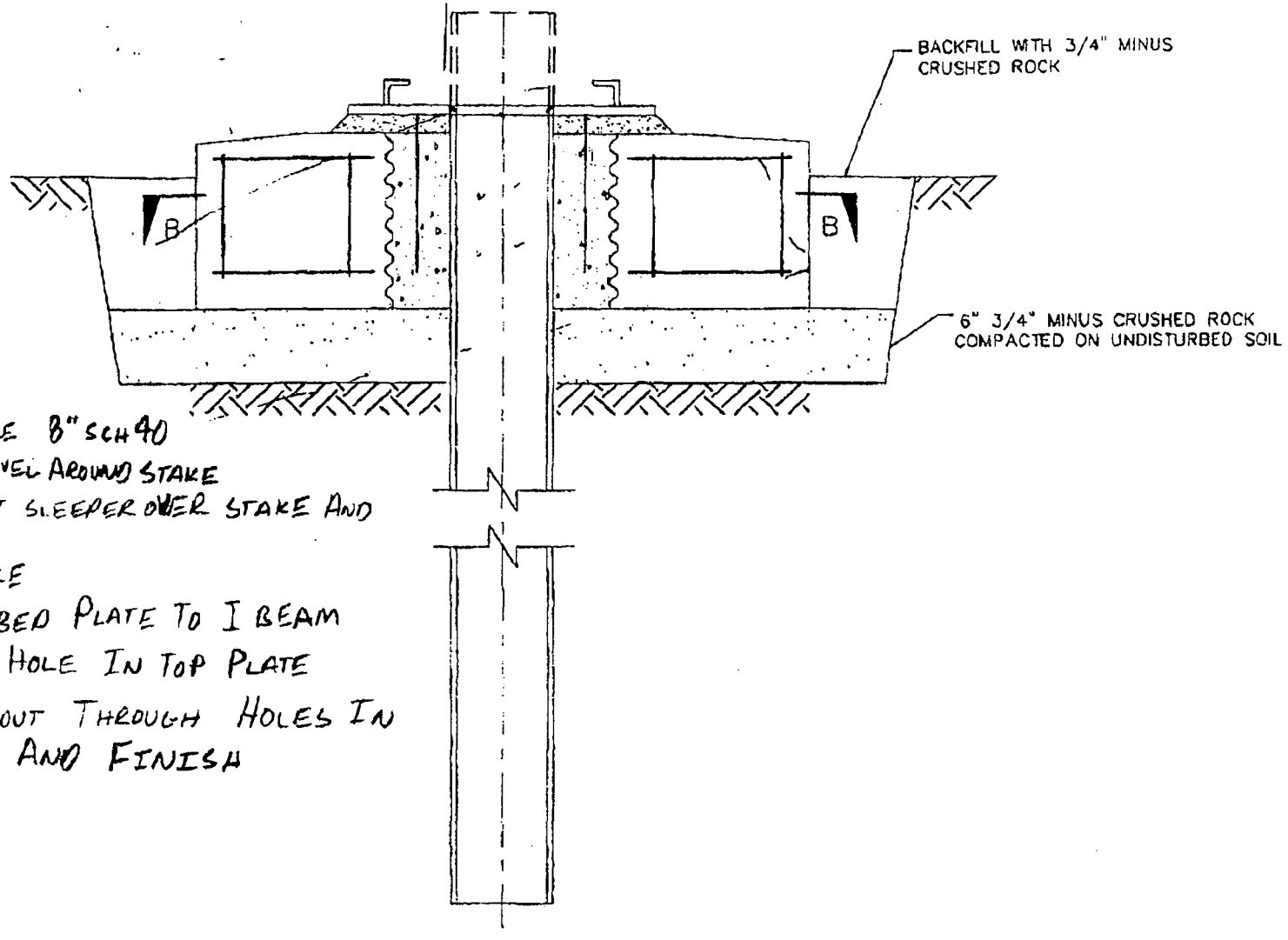
PLAN

1. DRIVE STAKE 8" SL
2. COMPACT GRAVEL AROUN
3. PLACE PRECAST SLEEPE ALIGN
4. TRIM STAKE
5. WELD EMBED PLA THROUGH HOLE I
6. PUMP GROUT TH PLATE AND



SECTION B-B

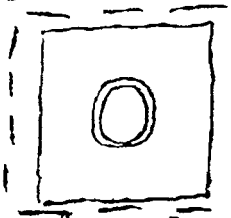
GROUT HOLES



1. DRIVE STAKE 8" SCH 40
2. COMPACT GRAVEL AROUND STAKE
3. PLACE PRECAST SLEEPER OVER STAKE AND ALIGN
4. TRIM STAKE
5. WELD EMBED PLATE TO I BEAM THROUGH HOLE IN TOP PLATE
6. PUMP GROUT THROUGH HOLES IN PLATE AND FINISH

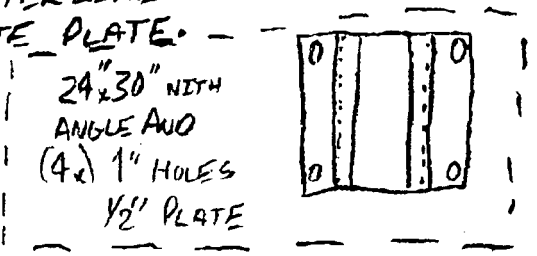
SECTION A

1. DRIVE 8" PIPE STAKE $I^4 = 72.5 IN^4$
   (W8 x 31 $I_x = 109.7 IN^4$ $I_y = 37 IN^4$
2. COMPACT GRAVEL AROUND STAKE TO NEAR LEVEL
3. PLACE PRECAST CONCRETE SLEEPER OVER STAKE AND ALIGN
4. TRIM STAKE AND SLEEVE
5. WELD INTERMEDIATE PLATE TO STAKE + SLEEVE LEVEL



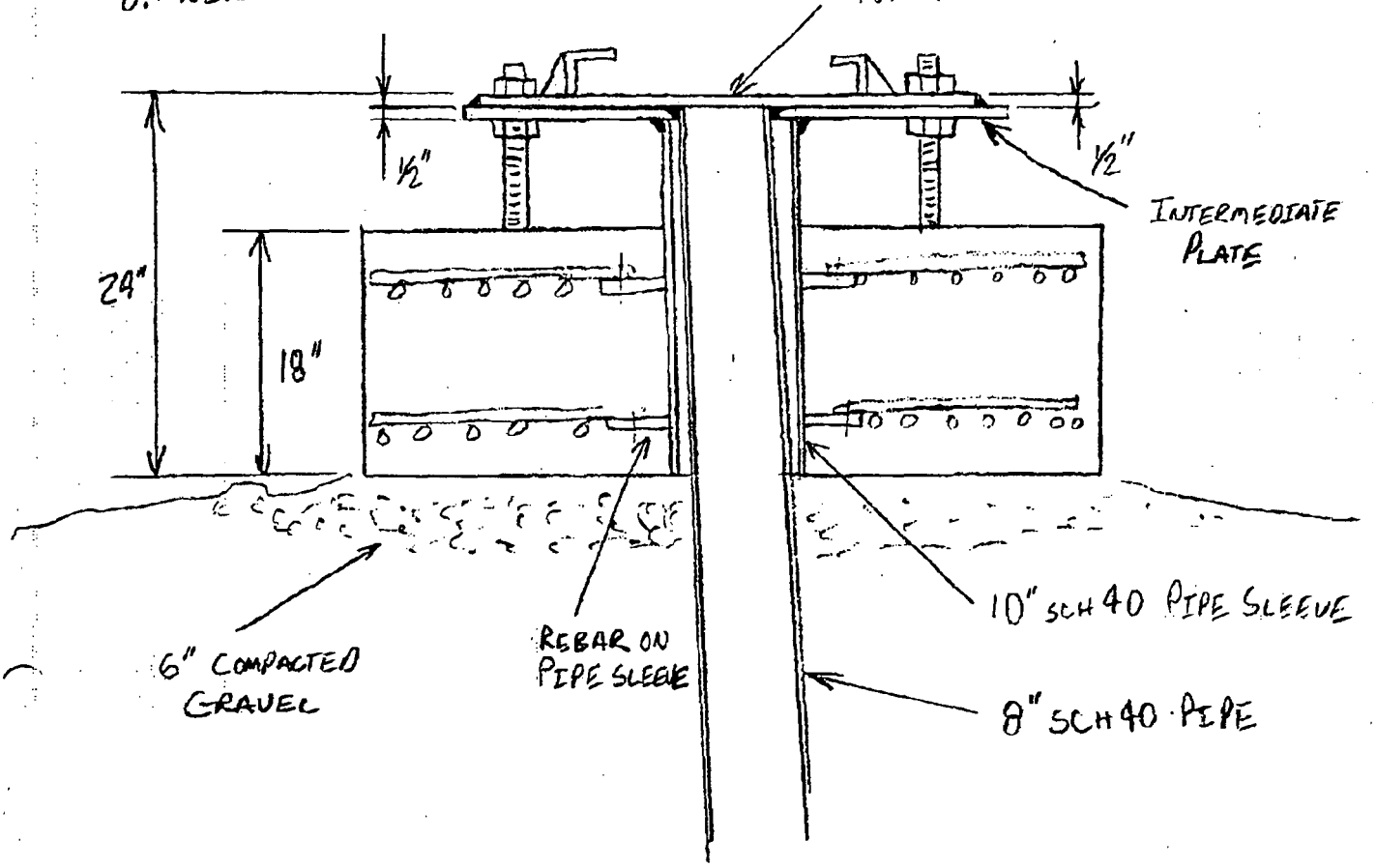
30" x 30" WITH 8 3/4" BEVELED HOLE IN CENTER
1/2" PLATE

6. ALIGN TOP PLATE WITH PIPE CENTERLINE AND DRILL HOLES THROUGH INTERMEDIATE PLATE.



24"x30" WITH ANGLE AND (4x) 1" HOLES
1/2" PLATE

7. INSTALL THREADED ROD AND BOLTS.
   (THE THREADED ROD DOES NOT ATTACH TO THE CONCRETE ONLY RESTS ON IT)
8. WELD TOP PLATE TO INTERMEDIATE PLATE.



Liquid Pitch Unload Line Project

Discussions with Koppers Industries—Meeting Minutes
Regarding Mechanical Scope of Work
Date: January 18, 1999
Attendees: Jack Stephenson
Bill Meisinger
Amos Kamerer—faxed copy 285-2831
Cameron McKernan—faxed copy 232-7658
Kurt Liebe–McDowell
Rodger Vignery--McDowell

Summary: Koppers Industries wants to work with McDowell Welding on the project, the only catch is that Koppers is $500,000 over budget for the entire job, even with a healthy deduct already considered for the second future T-210 foundation.
Objective: Cut 10-15% of our price by any means. Below is a discussion of potential items.

1. Give a detailed breakout for the contractor supplied materials. Indicate any up-charges that have been applied that the owner may be able to save.
2. Provide a price discount for the difference between A106 Gr B, versus A53 welded pipe.
3. Provide a cost break out for all the work shown on the isometric for the hot oil piping modifications, dwg. 6526-P011.
4. Show an **add-in** for additional conduit supports for electrical on the long pipeline route. Will be about 120 supports. The pipe guides must have an additional angle support welded to them. Supports will not be attached to the pitch piping. Consider square galvanized tubing similar to traffic stop signs.
5. Determine if there is a deduct available for work on the short additional pipeline for T-210. Also see if the manual valve was originally estimated on the same line and if it can be deducted.
6. Eliminate the underground steam line near the maintenance shop.
7. Eliminate the prefabricated metal building for the hot oil metering station. Include a simple structure in its place that has a roof only. Foundation (containment) to remain.
8. Evaluate the two pump sheds to determine if some of the structure can be eliminated.
9. When the second tank foundation area is eliminated, some of the demo and relocation can be eliminated. We may be able to break out some costs.
10. There may be some confusion with regard to the valve list and subsequent valve count: in the area of the hot oil piping by the dock, there may be conflict between the McKernan schematics and the ChemTech P&ID's.
11. Can Koppers' save any money by purchasing the piping and fittings?
12. Use a precast concrete block for the long pipeline supports in lieu of the cast in place work. Also consider using wire mesh in place of reinforcing bar for the concrete.
13. Koppers to determine if the tank coil and coil supports can be installed prior to buttoning up the tank. Determine if Morse Construction can work alongside of McDowell's fitters and what affect it may have on their operation. There may be labor savings if that can be accomplished.
14. Bill Meisinger may reconsider the use of impedance heating of the pipeline instead of hot oil. This method was discounted from the start because of unknown safety concerns and operations at the shared dock.
15. No braided hose shall be considered for the tracing piping.
16. Determine if there is a cost differential by using welded fittings versus long diameter sweeps on the pipeline. Any savings may be offset by additional stress analysis evaluation or additional weld time.
17. Koppers is willing to improve the payment schedule for the project. Their standard terms are net 45 days. They may be willing to pay within net 10 days.
18. Non-destructive testing: there may be savings on the NDE by substituting dye penetrant inspections on the piping root welds versus full radiography of joints. McDowell to suggest alternates within Code allowable an potential savings.

Prepared by McDowell Welding and PipeFitting

Send note to Don Stevens

KII to supply discharge hose

1/18/99

- Dietz/Meisinger's review of possible changes or modifications
- foundation
  - concrete mix
  -

- McDowel - Kirt & Roger
  - price includes the valves on the valve list, plus other's shown on the P&ID that were not on the list.
  - pipe type: A106 vs. A53B
  - steam @ shop
  - hot oil upgrade to original system - separate capital
  - demolition

Their ideas

- pipe foundations prefabed ?
- interior tank piping & coils, installed while tank is open.
- hot oil stainless steel braided flex. ? - NO
- non-distructive testing

Bill prefabed Angles

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Purchase Order

KOPPERS INDUSTRIES

Date: June 21, 1999 Purchase Order # 3000-9-13027

Page: 1 Contact: JACK L. STEPHENSON 412/227-2265 FAX: 412/227-2935

To: Chandler Electric
P.O. Box 80696
Portland OR 97280-1696

Ship To: Koppers Industries, Inc.
7540 N.W. Street, St. Helens Rd.
Portland, OR 97210-3663

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	REQUEST: W. MEISINGER, 5/18/99 ACCOUNT:	
	ELECTRICAL WORK	
	***Electrical and Instrumentation Specification-Liquid Pitch Unloading-Koppers Industries, Inc., Project P-6526 dated 11/18/98.** ***KI-63, REV. 6** ***SAFETY REGULATIONS FOR CONTRACTORS' EMPLOYEES WORKING IN KOPPERS INDUSTRIES, INC. PLANTS** ***EXHIBIT A - OSHA COMPLIANCE**	
	Contractor is to supply all labor, tools, materials, equipment, insurance and supervision necessary to perform the work described in the above referenced specification at Koppers Industries, Inc. Portland, OR facility.	$326,219.99 LOT
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RECEIVED
JUN 28 1999
KOPPERS INDS, INC.
PORTLAND OR
COPY

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Pittsburgh, PA 15219-1800

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	Send one copy to: Koppers Industries, Inc. Attention: Jack L. Stephenson Room 1950, 436 Seventh Avenue Pittsburgh, PA 15219-1800 Seller shall not assign, transfer, convey, subcontract or authorize disposition of this agreement or its right, title, or interest in or to the same or any part thereof without the previous consent in writing of KOPPERS INDUSTRIES, and it shall not assign by power of attorney or otherwise any of the monies to become due and payable under this agreement without like consent. In the event of an approved subcontractor, Seller shall be fully responsible for the performance of his contractors in all matters including, but not limited to, accounting, cost distribution, purchasing, labor and material control, and proper and economical performance of the work. **WAIVER OF LIEN** SELLER SHALL SUBMIT WITH FINAL BILLING ONE EXECUTED NOTARIZED COPY OF THE ATTACHED AFFIDAVIT AND WAIVER OF LIEN. ALL FEDERAL EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION REQUIREMENTS IN REGARD TO RACE, SEX, RELIGION, NATIONAL ORIGIN, HANDICAP AND VIETNAM VETERAN OR DISABLED VETERAN STATUS, AS FOUND IN 41 CFR 60-1.4, 41 CFR 60-250.3 AND 41 CFR 741.3, ARE HEREIN INCORPORATED BY REFERENCE. KOPPERS INDUSTRIES IS ENTITLED TO ALL REMEDIES PURSUANT TO THE UNIFORM COMMERCIAL CODE. **FORCE MAJEURE:** Neither party hereto shall be liable for its failure to perform hereunder due to contingencies beyond its reasonable control including, but not limited to strikes, riots, wars, fire, acts of God, compliance with any law, regulation or order, whether valid or invalid, of the United States of America or any other governmental body or instrumentality thereof, whether now existing or hereafter created. All costs herein described shall be subject to Koppers Industries' audit and all records pertaining thereto shall be made available to Koppers Industries upon request. The Seller agrees to observe and abide by all applicable laws, regulations, ordinances and other rules of the state, territory or political subdivision thereof wherein the work is done or any other duly constituted public authority.	

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	CONTACTS: Portland, OR (Plant) – Charlie Norris Pittsburgh, PA (Technical) – William Meisinger 412/826-3962 Pittsburgh (Commercial) - J. L. Stephenson 412/227-2265 Send original and two copies of all invoices to: KOPPERS INDUSTRIES, INC. 7540 NW ST. HELENS ROAD PORTLAND, OR 97210-3663 Send one copy of all invoices to: KOPPERS INDUSTRIES, INC. ATTENTION: JACK L. STEPHENSON ROOM 1950, 436 SEVENTH AVENUE PITTSBURGH, PA 15219-1800 **NOTE:** Failure to follow above invoice instructions will result in delay of payment. Confirming verbal order to Dave Chandler – DO NOT DUPLICATE **PRICE:** Based on Seller's quotation dated 3/03/99 and 3/24/99 **FOB:** Installed **COMPLETE:** 10/31/99 **TERMS:** Net 30 days – As agreed to in an onsite meeting, June 8, 1999, Contractor will submit a correlated schedule of values with a production schedule that will then correspond with invoicing and ultimate payments. Payments for materials, other than that of a minor nature, is to be done via two-party checks made payable to Chandler Electric and the appropriate material supplier. Materials will be verified for site presence before initiation of the payment process. For tax purposes, KII is registered in Oregon; but this state does not charge a sales tax.	

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Pittsburgh, PA 15219-1800

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	PLEASE ACKNOWLEDGE YOUR ACCEPTANCE OF THIS ORDER BY SIGNING AND RETURNING THE ATTACHED COPY.	
	ACCEPTED BY:	
	KOPPERS INDUSTRIES, INC. AUTHORIZED SIGNATURE JACK L. STEPHENSON/sad CC: W. Meisinger - HTC A. Kamerer - Portland	SELLER'S AUTHORIZED SIGNATURE TITLE _____ DATE _____
		TOTAL: $326,219.99

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

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QUANTITY	DESCRIPTION	PRICE
	Send one copy to: Koppers Industries, Inc. Attention: Jack L. Stephenson Room 1950, 436 Seventh Avenue Pittsburgh, PA 15219-1800 Seller shall not assign, transfer, convey, subcontract or authorize disposition of this agreement or its right, title, or interest in or to the same or any part thereof without the previous consent in writing of KOPPERS INDUSTRIES, and it shall not assign by power of attorney or otherwise any of the monies to become due and payable under this agreement without like consent. In the event of an approved subcontractor, Seller shall be fully responsible for the performance of his contractors in all matters including, but not limited to, accounting, cost distribution, purchasing, labor and material control, and proper and economical performance of the work. **WAIVER OF LIEN** SELLER SHALL SUBMIT WITH FINAL BILLING ONE EXECUTED NOTARIZED COPY OF THE ATTACHED AFFIDAVIT AND WAIVER OF LIEN. ALL FEDERAL EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION REQUIREMENTS IN REGARD TO RACE, SEX, RELIGION, NATIONAL ORIGIN, HANDICAP AND VIETNAM VETERAN OR DISABLED VETERAN STATUS, AS FOUND IN 41 CFR 60-1.4, 41 CFR 60-250.3 AND 41 CFR 741.3, ARE HEREIN INCORPORATED BY REFERENCE. KOPPERS INDUSTRIES IS ENTITLED TO ALL REMEDIES PURSUANT TO THE UNIFORM COMMERCIAL CODE. **FORCE MAJEURE:** Neither party hereto shall be liable for its failure to perform hereunder due to contingencies beyond its reasonable control including, but not limited to strikes, riots, wars, fire, acts of God, compliance with any law, regulation or order, whether valid or invalid, of the United States of America or any other governmental body or instrumentality thereof, whether now existing or hereafter created. All costs herein described shall be subject to Koppers Industries' audit and all records pertaining thereto shall be made available to Koppers Industries upon request. The Seller agrees to observe and abide by all applicable laws, regulations, ordinances and other rules of the state, territory or political subdivision thereof wherein the work is done or any other duly constituted public authority.	

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Purchase Order

KOPPERS INDUSTRIES

Date: June 21, 1999 Purchase Order # 3000-9-13027

Page: 4 Contact: JACK L. STEPHENSON 412/227-2265 FAX: 412/227-2935

To: Chandler Electric
P.O. Box 80696
Portland OR 97280-1696

Ship To: Koppers Industries, Inc.
7540 N.W. Street, St. Helens Rd.
Portland, OR 97210-3663

Koppers requests that Seller furnish the material and/or services listed below. Acceptance of this purchase order is expressly limited to the terms and conditions on the face and on the reverse side hereof.

The purchase order number must be shown on all correspondence, shipping papers, invoices, etc.

QUANTITY	DESCRIPTION	PRICE
	CONTACTS: Portland, OR (Plant) – Charlie Norris Pittsburgh, PA (Technical) – William Meisinger 412/826-3962 Pittsburgh (Commercial) - J. L. Stephenson 412/227-2265 Send original and two copies of all invoices to: KOPPERS INDUSTRIES, INC. 7540 NW ST. HELENS ROAD PORTLAND, OR 97210-3663 Send one copy of all invoices to: KOPPERS INDUSTRIES, INC. ATTENTION: JACK L. STEPHENSON ROOM 1950, 436 SEVENTH AVENUE PITTSBURGH, PA 15219-1800 **NOTE:** Failure to follow above invoice instructions will result in delay of payment. Confirming verbal order to Dave Chandler – DO NOT DUPLICATE **PRICE:** Based on Seller's quotation dated 3/03/99 and 3/24/99 **FOB:** Installed **COMPLETE:** 10/31/99 **TERMS:** Net 30 days – As agreed to in an onsite meeting, June 8, 1999, Contractor will submit a correlated schedule of values with a production schedule that will then correspond with invoicing and ultimate payments. Payments for materials, other than that of a minor nature, is to be done via two-party checks made payable to Chandler Electric and the appropriate material supplier. Materials will be verified for site presence before initiation of the payment process. For tax purposes, KII is registered in Oregon; but this state does not charge a sales tax.	

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Purchase Order

KOPPERS INDUSTRIES

Date: June 21, 1999

Purchase Order # 3000-9-13027

Page: 5

Contact: JACK L. STEPHENSON 412/227-2265 FAX: 412/227-2935

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QUANTITY	DESCRIPTION	PRICE
	PLEASE ACKNOWLEDGE YOUR ACCEPTANCE OF THIS ORDER BY SIGNING AND RETURNING THE ATTACHED COPY.	

ACCEPTED BY:

KOPPERS INDUSTRIES, INC.
AUTHORIZED SIGNATURE
JACK L. STEPHENSON/sad
CC: W. Meisinger - HTC
A. Kamerer - Portland

SELLER'S AUTHORIZED SIGNATURE

TITLE _____

DATE _____

TOTAL: $326,219.99

Phone:
Fax:

Change Order

03/24/99

TO: Koppers Industries

JOB:
Project: Koppers extra to unload job grnding dock Job Number:

Change Order Number: 10

Work Decscription:

Other Information: 4/0 ground wire to dock 1750' away

The total amount of this Change Order is: **$33,219.99**

Attached are the following supporting reports:

- **Extensions** (Material Quantities, Prices and Labor Units with Extended Totals)
- **Summary Totals** (recap sheet)

Sincerely,

David W Chandler

Chief Estimator

JOB NAME: Koppers extra to unload job grnding dock
Summary Totals Only (All)

Material		
Non-Quoted	$	6,987.91
Quoted	$	0.00
Total Material	$	6,987.91
Labor		
Direct (449.66 hours @ $40.87)	$	18,375.76
Non-Productive	$	0.00
Direct Job Expenses	$	200.00
Subcontracts	$	0.00
Job Subtotal (Prime Cost)	$	25,563.67
Overhead (13%)	$	3,323.28
Profit (15%)	$	4,333.04
Sales Tax (0%)	$	0.00
Job Total	$	33,219.99

Material to labor ratio: 0.28		
Cost per square foot	$	0.00
Selling price per square foot	$	0.00

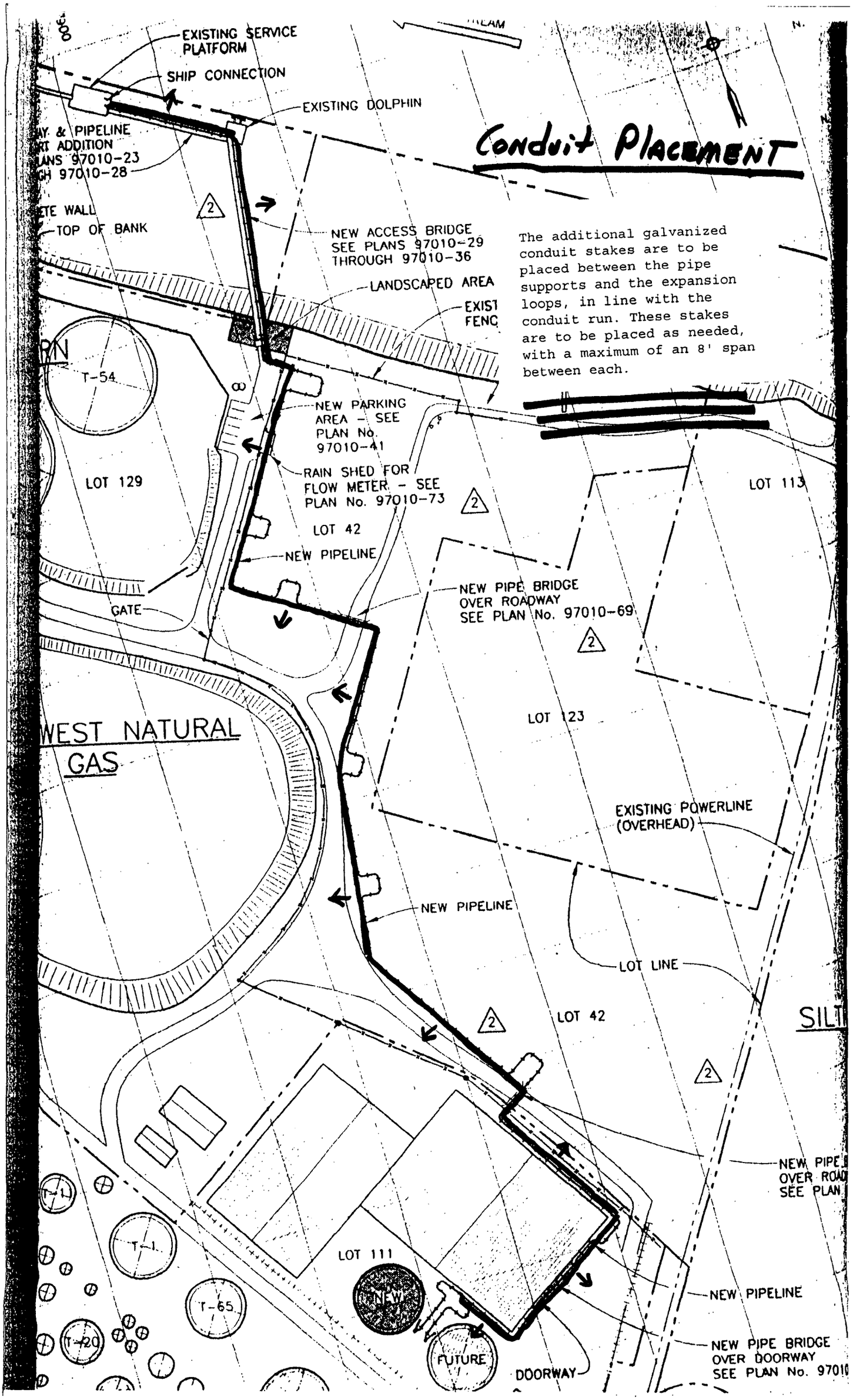
Koppers extra to unload job grnding dock

EXTENSION BY PHASE

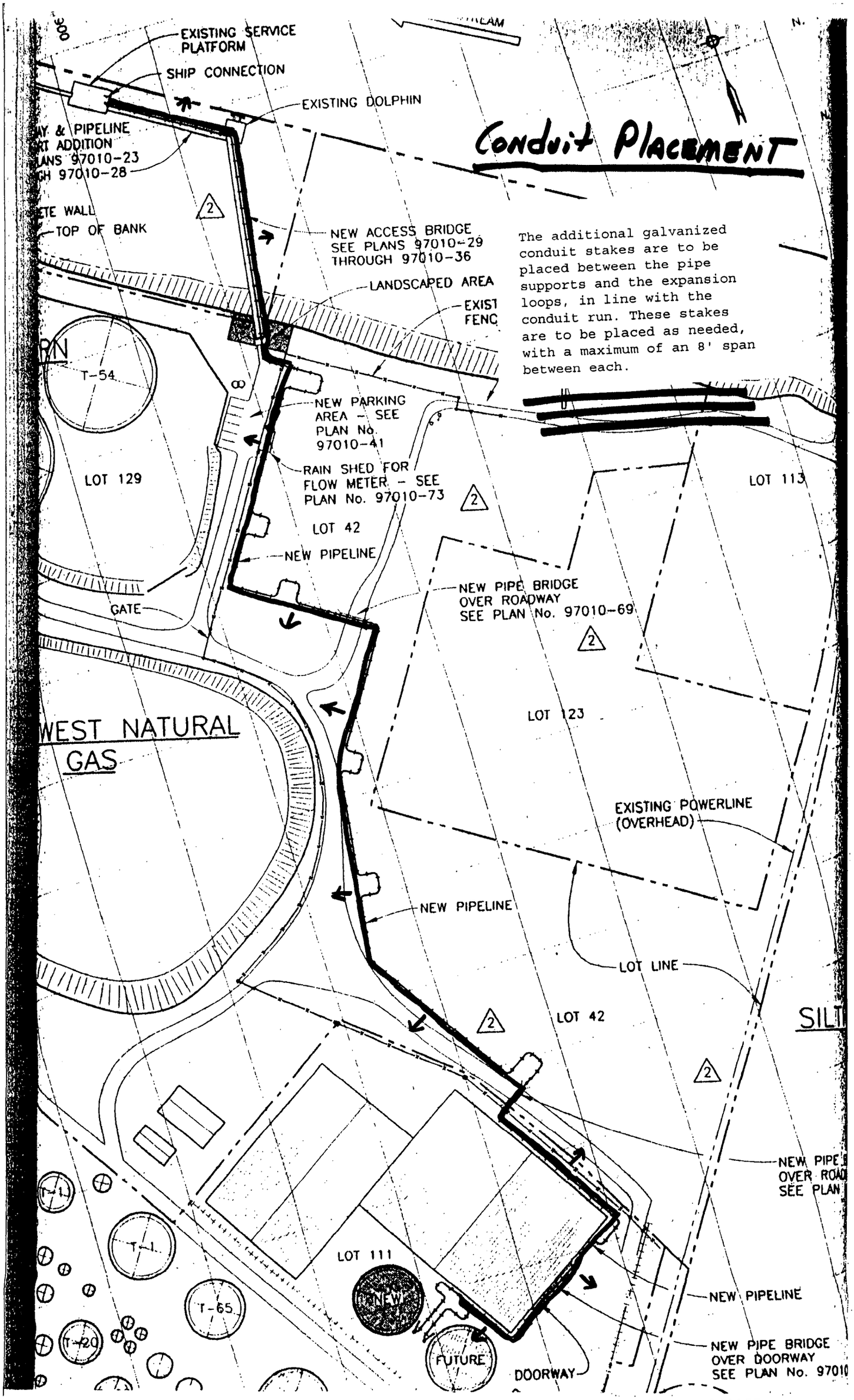
Item #	Description	Qty	Price U	Ext Price	Labor U	Ext Labor
	--- 01 Raceway, Ftgs, & Boxes ---					
1064	1" GRC (Difficult)	1,750.00	124.89 C	2,185.58	5.63 C	98.52
1349	1" GRC Elbow	16.00	356.26 C	57.00	0.20 E	3.20
1637	2" T Condulet w/Cover & Gasket	6.00	32.04 E	192.24	0.60 E	3.60
1644	1" Grounding Bushing	14.00	193.94 C	27.15	0.09 E	1.26
1767	1" Cut & Thread	25.00	0.00 E	0.00	0.18 E	4.50
2347	1" Unistrut Strap-Rigid	325.00	72.10 C	234.33	7.00 C	22.75
6656	3/8x2-1/4" Bolt (Hex Head Cap Screw)	650.00	29.39 C	191.04	11.00 C	71.50
6659	3/8" Flat Washer	700.00	5.69 C	39.83	0.00 E	0.00
6662	3/8" Nut	700.00	6.58 C	46.06	0.03 E	21.00
	--- 01 Raceway, Ftgs, & Boxes Total ---			2,973.23		226.33
	--- 02 Wire & Cable ---					
2817	#6 XHHW CU Stranded Wire	100.00	207.96 M	20.80	7.50 M	0.75
2825	#4/0 XHHW CU Stranded Wire	1,750.00	1,371.91 M	2,400.84	21.00 M	36.75
	--- 02 Wire & Cable Total ---			2,421.64		37.50
	--- 07 Misc ---					
3109	1/4" Pull Line	1,750.00	47.93 M	83.88	6.00 M	10.50
6644	Unistrut (Deep)	325.00	184.26 C	598.85	7.00 C	22.75
6650	Cut 12 Gauge 1-5/8x1-5/8 Channel (la	650.00	0.00 E	0.00	0.15 E	97.50
6673	3/4"x10' Copper Ground Rod	8.00	2,170.63 C	173.65	0.37 E	2.96
6676	3/4" Ground Rod Clamp	8.00	320.02 C	25.60	0.20 E	1.60
6880	Wire Lube - 1 Gallon	1.00	10.26 E	10.26	0.00 E	0.00
6892	Tape (Cheap)	4.00	0.49 E	1.96	0.01 E	0.04
6902	1-1/4" x 1" RE Bushing	12.00	2.03 E	24.36	0.02 E	0.24
6903	2" x 1-1/4" RE Bushing	12.00	537.34 C	64.48	0.02 E	0.24
6928	cad welds	30.00	12.00 E	360.00	1.00 E	30.00
6929	cad weld stud plates welded to pipe	20.00	12.50 E	250.00	1.00 E	20.00
	--- 07 Misc Total ---			1,593.04		185.83
	Job Total			6,987.91		449.66

Koppers extra to unload job grnding dock
MATERIAL LIST BY PHASE

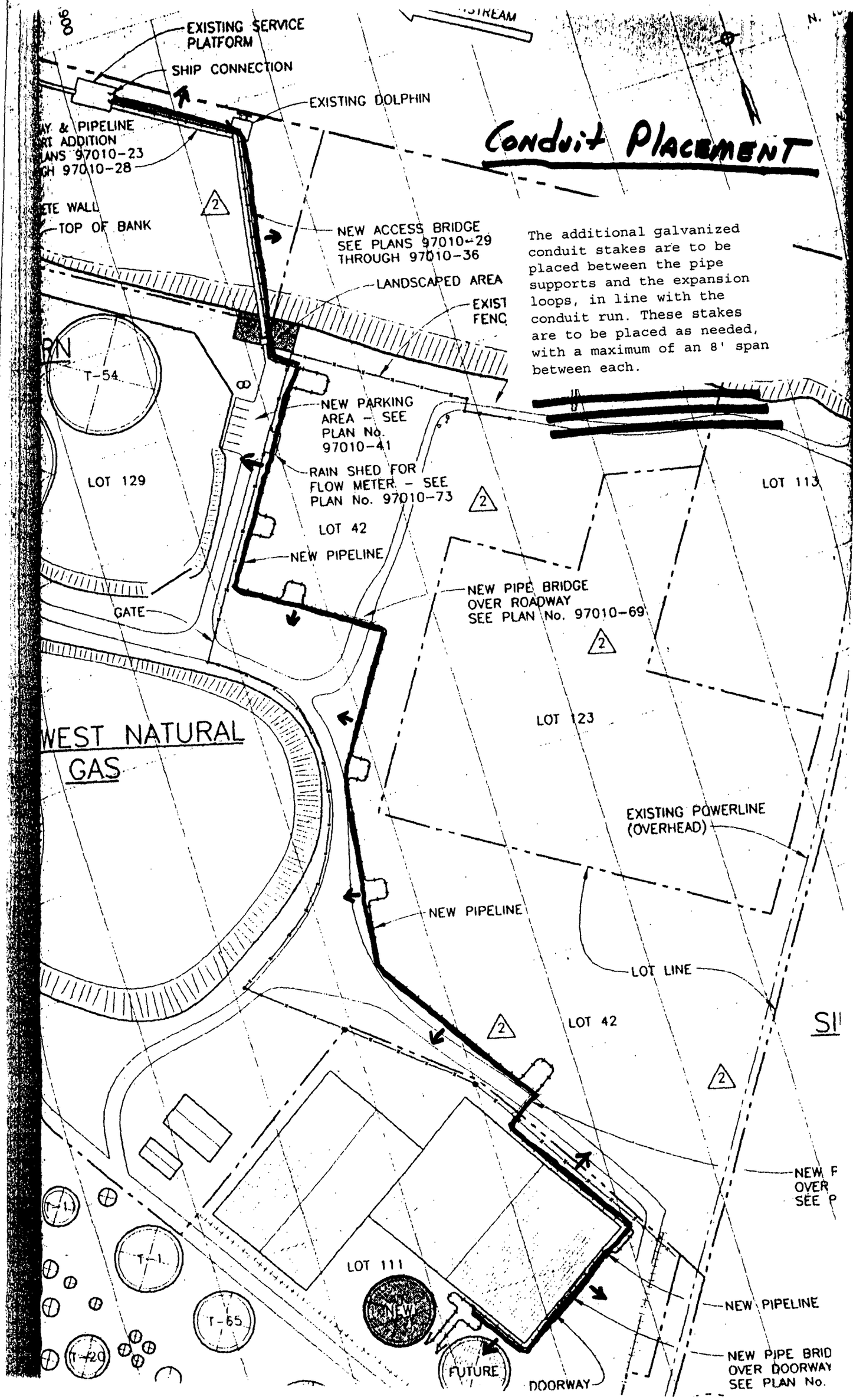
Item #	Description	Qty
	--- 01 Raceway, Ftgs, & Boxes ---	
1064	1" GRC (Difficult)	1,750.00
1349	1" GRC Elbow	16.00
1637	2" T Condulet w/Cover & Gasket	6.00
1644	1" Grounding Bushing	14.00
1767	1" Cut & Thread	25.00
2347	1" Unistrut Strap-Rigid	325.00
6656	3/8x2-1/4" Bolt (Hex Head Cap Screw)	650.00
6659	3/8" Flat Washer	700.00
6662	3/8" Nut	700.00
	--- 02 Wire & Cable ---	
2817	#6 XHHW CU Stranded Wire	100.00
2825	#4/0 XHHW CU Stranded Wire	1,750.00
	--- 07 Misc ---	
3109	1/4" Pull Line	1,750.00
6644	Unistrut (Deep)	325.00
6650	Cut 12 Gauge 1-5/8x1-5/8 Channel (la	650.00
6673	3/4"x10' Copper Ground Rod	8.00
6676	3/4" Ground Rod Clamp	8.00
6880	Wire Lube - 1 Gallon	1.00
6892	Tape (Cheap)	4.00
6902	1-1/4" x 1" RE Bushing	12.00
6903	2" x 1-1/4" RE Bushing	12.00
6928	cad welds	30.00
6929	cad weld stud plates welded to pipe	20.00



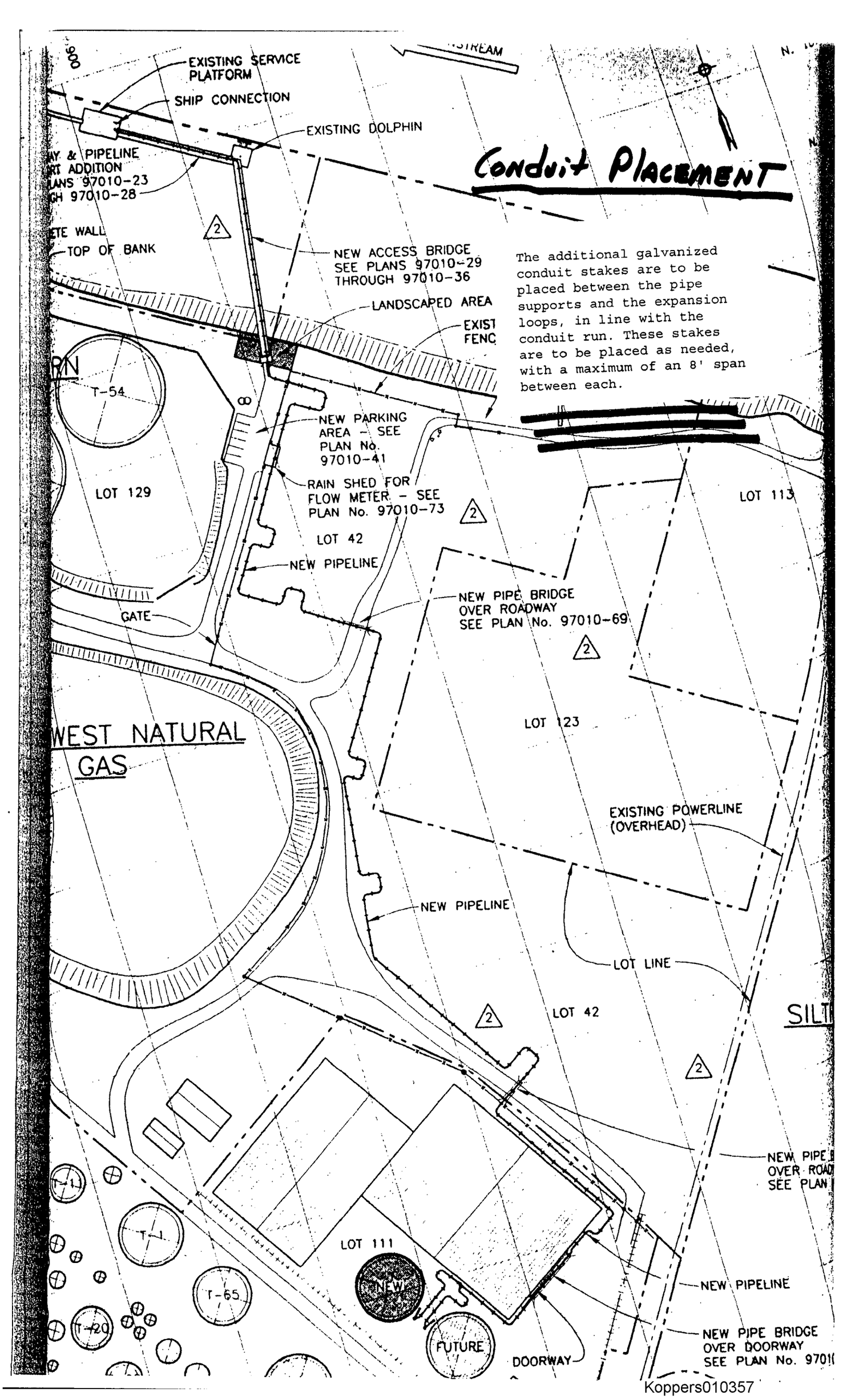
Koppers010354



Koppers010355



Koppers010356



Koppers010357

Author: Jim Dietz at Techctr
Date: 1/19/99 1:56 PM
Priority: Normal
TO: Amos Kamerer at PITT
TO: BILL MEISINGER at Techctr
TO: Jack Stephenson at Techctr
CC: BOB WOMBLES at Techctr
Subject: Tank Foundation Calcs

---------- Message Contents ----------

I reviewed the calcs provided by KPFF on Saturday and put together the following list of questions for your meeting today. The following list will be faxed with copies of the calc pages:

1. Jack Tuttle report to KII, May 9,1997: Page 5,

   16" diameter pile vertical static loading can be 120-140 tons per pile with an increase of 1/3 for seismic-induced loads

   Was this 1/3 used and does it make a difference between 120 and 140 tons?

2. Same report: Page 6,

   Lateral load resistance: about 22 kips for 16"?
   Does KPFF consider the 2.5 safety factor again in their calcs?

   NOTE: Later in Jack's report to KII, September 18, 1998, piles are confirmed to be designed for downward load of 240 kips and lateral of 22 kips for 1" deflection.

3. Jack Tuttle report to Grant Davis, KPFF, August 7, 1998:

   Fax page 4: At 1" design deflection for 16" piles on 64" centers, lateral load appears to be 44 kips.

   Was the 1.5 safety factor figure into this graph or subsequently by KPFF? Even if not considered, the result is 44/1.5 = 29.3 kips

4. KPFF design calculations to KII, November 30,1998: Calcs pages 6,7

   For passive lateral resistance, projection of final octagonal foundation is 70.4 feet, not assumed 2/3's, resistance is 95.0k. Lateral load is taken at 21.5 - same disagreement with 22 or 29.3.

5. KPFF design calculations to KII, November 30,1998: Calc page 12 and sheet P3.

   Why can't the controlling load of 192.9 kips be increased 65% to the 319.2 kip limit by reducing the pile count proportionately?

6. KPFF design calculations to KII, November 30,1998: Calc sheets P4, P5.

   Piling is called out as A53, Grade B. Why do specs call out A252 Grade 2?

7. General: Please explore the tank height tradeoff. Is there a breakpoint or threshold beyond which the design became costly? Please review that KII will be pretesting the concrete per Jack's recommendation.

Please call with any questions. I am sorry if these didn't arrive until late-morning your time, but they were a little tough to assemble. Bill, please call me at home on 412/487-0316 before you leave today.

Jim

Author: Ted Andersen <tsandersen@chemtech88.com> at internet
Date: 11/4/98 10:46 AM
Priority: Normal
TO: "'Sam Moss'" <smoss@kpff.com> at Internet
TO: "'GeoEngineers Jack Tuttle'" <jtuttle@geoengineers.com> at Internet
TO: "'Koppers Bill Meisinger'" <Bill_Meisinger@Koppers.com> at Internet
TO: "'Roberts Engineers Fai AuYoung'" <CFMAuYoung@aol.com> at Internet
CC: "'TSAndersen@aol.com'" <TSAndersen@aol.com> at Internet
CC: Amos Kamerer at PITT
CC: JIM DIETZ at TECHCTR
CC: morse@greatnorthern.net at Internet
Subject: 652tT055 Follow-up Review of Tank Design
---------- Message Contents ----------

This responds to a Roberts FAX received from Fai Auyoung last night and an email rom Sam Moss (below)

Roberts Response to ChemTech 6526t053:
Items 1-3 agreed.
Item 4. Has the unsupported compression (lower) flange on the roof rafter been evaluated with the calculated uplift condition?
Item 5. Bearing pressure under the 1.5' sq. column base plate would appear to be on the order of 50,000 psf. Soil / Sand / Insulation bearing capacity is expectedto be much lower. KPFF is requested to define the appropriate design value. ChemTech suggests consideration of a symmetrical shape like a pipe column in place o the asymmetric double channel column shown in SK4.

KPFF Comments:
1. ChemTech recommends insulating the inside of the ring wall to keep it's temp ature below approximately 160 F to avoid thermal expansion problems and personne hazard. We had agreed on the bolt circle specifically to allow insulation betweenthe bolts and the tank and air cooling of the bolts and ringwall.

2. ChemTech suggests allowance for 1" thickness of structural thermal insulation(the isolation plate) between a washer under the anchor nut and the chair. Bearing surface will need to be on the order of 36 sq. in to stay within the nominal 3 0 psi bearing strength of the structural insulation.

Ted Andersen

From: Sam Moss
Sent: Tuesday, November 03, 1998 11:02 AM
To: 'TSAndersen@aol.com'
Subject: FW: Review of Tank Design

-----Original Message-----
From: Sam Moss
Sent: Tuesday, November 03, 1998 7:36 AM
To: 'tsandersen@chemtech88.com'
Cc: 'jtuttle@geoengineers.com'; 'Bill_Meisinger@Koppers.com'; 'morse@greatnorthern.net'
Subject: Review of Tank Design

KPFF has performed a brief review of the structural tank calculations which were submitted by Roberts Engineers. Please address the following issues and

notify us if there are any changes.

1. The temperature of the concrete ring wall is going to be almost 500 degrees (F). Has the allowable bolt strength been reduced to account for the elevated temperatures ? Refer to API 650, Table M-1, "Yield Strength Reduction Factors".

2. Sketch SK-2 shows an isolation plate. What purpose will this plate serve ?
I need to know how thick it will be so the correct anchor bolt projection can be called out. Please specify.

Thanks,

Sam Moss

Author: Ted Andersen <tsandersen@chemtech88.com> at internet
Date: 11/2/98 12:14 PM
Priority: Normal
TO: "'Koppers Bill Meisinger'" <Bill_Meisinger@Koppers.com> at Internet
TO: "'Morse Construction Steve Adolphsen'" <morse@greatnorthern.net> at Internet
TO: "'GeoEngineers Jack Tuttle'" <jtuttle@geoengineers.com> at Internet
CC: "Exley Randy" <Windows/catena/exley@chemtech88.com> at Internet
CC: "Logan Dave" <Windows/catena/logan@chemtech88.com> at Internet
CC: Amos Kamerer at PITT
CC: "'KPFF Sam Moss'" <smoss@kpff.com> at Internet
CC: "'Roberts Engineers Fai AuYoung'" <CFMAuYoung@aol.com> at Internet
Subject: 6526T053 Review of Morse Tank Design Calculations
---------- Message Contents ----------

6526T053
2 November 1998

ChemTech has completed a quick review of the Pitch Tank T-200 Design Calculation eport received from Roberts Engineers / Morse Construction on 30 October 1998. e comments and questions below have been discussed with Bill Meisinger and are f warded at his request.

KPFF and GeoEngineers are requested to provide any additional comments or questi s by 4 November to expedite design completion.

Page 4. Insulation loads are omitted. ChemTech experience has been that such l ds are largely self-compensating. Such a statement should be confirmed and incl ed.

Page 4. Anchor Bolts are indicated as (optional) on page 4 but the note on page 7says anchors are required for Section E-6.
Page 9 and SK-2 State Assumption that all shear is taken by soil friction betwee base plate and subgrade. Soil Friction coefficients need to be agreed on by Geo gineers.

Page R2 omits evaluation of dynamic wind uplift on the roof in addition to the 0 44 psig (4" WC) internal pressure. This factor should be addressed.

Tank vendor needs to position the 40 roof rafters so as to not interfere with th identified roof nozzles.

R5 and SK1 show a center column and bearing plate with no size or design calcula ons. These details should be included.

SK2 omits confirming detail on size and orientation of slotted hole in chair top late adequate for both location tolerance and tank thermal radial growth.

Ted Andersen

Author: Ted Andersen <tsandersen@chemtech88.com> at internet
Date: 10/29/98 5:58 PM
Priority: Normal
TO: "'Koppers Bill Meisinger'" <Bill_Meisinger@koppers.com> at Internet
CC: "Exley Randy" <Windows/catena/exley@chemtech88.com> at Internet
CC: "Logan Dave" <Windows/catena/logan@chemtech88.com> at Internet
CC: JIM DIETZ at TECHCTR
CC: Amos Kamerer at PITT
CC: "'KPFF Sam Moss'" <smoss@kpff.com> at Internet
Subject: Morse Tank Design Calculations
---------- Message Contents ----------

Steve Adolphsen called Thu evening for guidance on where to send hardcopies of hisnewly completed tank design report. I suggested Meissinger, Moss, Logan. I expect them to be in Federal Express for Friday Delivery.

Steve had not yet received new tank drawings that Dave Logan Fed Exed out on Wed sday. He will call Dave if nothing arrives by Friday.

Bill, Do you want us to review Morse design for consistency with our drawings andspec?

Ted

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

KOPPERS INDUSTRIES

Purchase Order

Date: October 13, 1998
Page: 1

Purchase Order # 3000-8-13019
Contact: JACK L. STEPHENSON 412/826-3907

To: Morse Construction Group
5500 South First Avenue
Everett WA 98203

Ship To: Koppers Industries, Inc.
7540 N.W. Street, St. Helens Rd.
Portland, OR 97210-3663

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QUANTITY	DESCRIPTION	PRICE
	REQUISITION: W. MEISINGER ACCOUNT:	
	LIQUID PITCH STORAGE TANK	
	Data Sheet 6526 API Dwg. #6526-A001 Rev. B Dwg. #6526-A002 Rev. B Dwg. #6526-A003 Rev. A	
	KI-63, REV. 6 **SAFETY REGULATIONS FOR CONTRACTORS' EMPLOYEES WORKING IN KOPPERS INDUSTRIES, INC. PLANTS** **EXHIBIT A - OSHA COMPLIANCE**	
	Contractor is to supply all labor, tools, materials, equipment, insurance and supervision necessary to supply and erect a 79' dia. X 57' API liquid Pitch Storage Tank at Koppers Industries, Inc., Portland, OR facility.	
	Base Tank per Koppers Data Sheets	$428,812.00
	1. Shell Design per Morse "Grade 70" Data Sheets	($36.125.00)
	2. Full Penetration weld at floor – shell joint	$8,995.00
	3. Price Adjustment related to cost of pipe guides/supports	($6,752.00)
	4. Deletion of one (1) 36" X 48" shell cleanouts	($5,000.00)
	5. Price Adjustment for revision to a 2" water column	$2,623.00
	All performance of work must be authorized by Koppers Industries' plant representative before the outlined work or any new non-outlined work is started.	
	Should contractor encounter what he feels is an extra, no work is to be performed until the undersigned is contacted, confirms the validity of the extra and authorizes the extra work. Work will be done as dictated by construction superintendent, either on lump sum add-on, or time and material cost plus at current rates with time sheets approved and signed daily. In the event time and material work is utilized, one copy of the signed time sheet must be left with Koppers Industries' Superintendent. All T&M work must be invoiced separately from lump sum work. Insurance certificate(s) showing limits of liability as per form KI-63 are to be presented to the local plant manager and the undersigned prior to commencing field work.	

COPY

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

KOPPERS INDUSTRIES

Purchase Order

Date: October 13, 1998
Page: 2

Purchase Order # 3000-8-13019

Contact: JACK L. STEPHENSON 412/826-3907

To: Morse Construction Group
5500 South First Avenue
Everett WA 98203

Ship To: Koppers Industries, Inc.
7540 N.W. Street, St. Helens Rd.
Portland, OR 97210-3663

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QUANTITY	DESCRIPTION	PRICE
	CONTRACTOR AGREES TO COMPLY WITH THE FOLLOWING The above work will be done when, where and as instructed by KOPPERS INDUSTRIES' Representative. This work has been accepted by Seller subject to all the terms and conditions as set forth and contained in Form KI-63, Revision 6. In the event there are conflicting statements between the several documents incorporated in this purchase order, the following order of priority shall apply: 1. Typed portion of the purchase order. 2. Drawings, notes thereon and technical specifications. 3. Form KI-63, Revision 6. 4. Terms and conditiNATIONAL ORIGIN, HANDICAP AND VIETNAM VETERAN OR DISABLED VETERAN STATUS, AS FOUND IN 41 CFR 60-1.4, 41 CFR 60-250.3 AND 41 CFR 741.3, ARE HEREIN INCORPORATED BY REFERENCE. KOPPERS INDUSTRIES IS ENTITLED TO ALL REMEDIES PURSUANT TO THE UNIFORM COMMERCIAL CODE. **FORCE MAJEURE** Neither party hereto shall be liable for its failure to perform hereunder due to contingencies beyond its reasonable control including, but not limited to strikes, riots, wars, fire, acts of God, compliance with any law, regulation or order, whether valid or invalid, of the United States of America or any other governmental body or instrumentality thereof, whether now existing or hereafter created. The Seller agrees to observe and abide by all applicable laws, regulations, ordinances and other rules of the state, territory or political subdivision thereof wherein the work is done or any other duly constituted public authority **CONTACTS:** Portland, OR (Plant) – Amos Kamerer Pittsburgh (Technical) - W. Meisinger Pittsburgh (Commercial) - J. L. Stephenson 412/826-3907	

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

KOPPERS INDUSTRIES

Purchase Order

Date: October 13, 1998
Page: 4

Purchase Order # 3000-8-13019

Contact: JACK L. STEPHENSON 412/826-3907

To: Morse Construction Group
5500 South First Avenue
Everett WA 98203

Ship To: Koppers Industries, Inc.
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QUANTITY	DESCRIPTION	PRICE
	Send original and two copies of all invoices to: KOPPERS INDUSTRIES, INC. 7540 NW ST. HELENS ROAD PORTLAND, OR 97210-3663 Send one copy of all invoices to: KOPPERS INDUSTRIES, INC. PURCHASING DEPARTMENT 1005 WILLIAM PITT WAY PITTSBURGH, PA 15238-1362 ATTENTION: JACK L. STEPHENSON **Note:** Failure to follow above invoice instructions will result in delay of payment. Confirming verbal order of 9/18/98 to Brad Andrews – DO NOT DUPLICATE **PRICE:** Based on Seller's quotations dated 7/29/98, 8/26/98, 9/02/98, 9/14/98 and 9/16/98 **FOB:** Installed **SHIP:** Schedule: Submit Design Drawings 10/16/98 Submit Fabrication Drawings 11/13/98 Receive Materials and Start Fabrication 1/08/99 Start Erection 2/05/99 Complete Erection 4/23/99 Complete Hydrotest 4/30/99 **TERMS:** Progressive **PLEASE ACKNOWLEDGE YOUR ACCEPTANCE OF THIS ORDER BY SIGNING AND RETURNING THE ATTACHED COPY.** ACCEPTED BY: _____ KOPPERS INDUSTRIES, INC. AUTHORIZED SIGNATURE JACK L. STEPHENSON/sad CC: W. Meisinger - HTC _____ SELLER'S AUTHORIZED SIGNATURE TITLE _____ DATE _____ TOTAL:	$392,553.00

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

KOPPERS INDUSTRIES

Purchase Order

Date: October 13, 1998
Page: 1

Purchase Order # 3000-8-13019
Contact: JACK L. STEPHENSON 412/826-3907

To: Morse Construction Group
5500 South First Avenue
Everett WA 98203

Ship To: Koppers Industries, Inc.
7540 N.W. Street, St. Helens Rd.
Portland, OR 97210-3663

Koppers requests that Seller furnish the material and/or services listed below. Acceptance of this purchase Order is expressly limited to the terms and conditions on the face and on the reverse side hereof.

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QUANTITY	DESCRIPTION	PRICE
	REQUISITION: W. MEISINGER ACCOUNT:	
	LIQUID PITCH STORAGE TANK	
	Data Sheet 6526 API Dwg. #6526-A001 Rev. B Dwg. #6526-A002 Rev. B Dwg. #6526-A003 Rev. A	
	KI-63, REV. 6 **SAFETY REGULATIONS FOR CONTRACTORS' EMPLOYEES WORKING IN KOPPERS INDUSTRIES, INC. PLANTS** **EXHIBIT A - OSHA COMPLIANCE**	
	Contractor is to supply all labor, tools, materials, equipment, insurance and supervision necessary to supply and erect a 79' dia. X 57' API liquid Pitch Storage Tank at Koppers Industries, Inc., Portland, OR facility.	
	Base Tank per Koppers Data Sheets	$428,812.00
	1. Shell Design per Morse "Grade 70" Data Sheets	($36.125.00)
	2. Full Penetration weld at floor – shell joint	$8,995.00
	3. Price Adjustment related to cost of pipe guides/supports	($6,752.00)
	4. Deletion of one (1) 36" X 48" shell cleanouts	($5,000.00)
	5. Price Adjustment for revision to a 2" water column	$2,623.00
	All performance of work must be authorized by Koppers Industries' plant representative before the outlined work or any new non-outlined work is started.	
	Should contractor encounter what he feels is an extra, no work is to be performed until the undersigned is contacted, confirms the validity of the extra and authorizes the extra work. Work will be done as dictated by construction superintendent, either on lump sum add-on, or time and material cost plus at current rates with time sheets approved and signed daily. In the event time and material work is utilized, one copy of the signed time sheet must be left with Koppers Industries' Superintendent. All T&M work must be invoiced separately from lump sum work. Insurance certificate(s) showing limits of liability as per form KI-63 are to be presented to the local plant manager and the undersigned prior to commencing field work.	

COPY

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	CONTRACTOR AGREES TO COMPLY WITH THE FOLLOWING The above work will be done when, where and as instructed by KOPPERS INDUSTRIES' Representative. This work has been accepted by Seller subject to all the terms and conditions as set forth and contained in Form KI-63, Revision 6. In the event there are conflicting statements between the several documents incorporated in this purchase order, the following order of priority shall apply: 1. Typed portion of the purchase order. 2. Drawings, notes thereon and technical specifications. 3. Form KI-63, Revision 6. 4. Terms and conditions printed on the back of Sheet 1 of the purchase order form. Contractor is an independent contractor and not an agent KOPPERS INDUSTRIES, INC. Labor is to be used to the extent lawful, which will be harmonious with that labor now employed by KOPPERS INDUSTRIES at its plant. Contractor and/or Seller agree to be governed and abide by the rules and regulations as set forth in pamphlet entitled "Safety Regulations for Contractor Working in KOPPERS INDUSTRIES' Plants." A copy of this pamphlet is to be obtained from the local plant manager. **PRIOR TO PERFORMING ON-SITE WORK ON OR ASSOCIATED WITH THIS ORDER, CONTRACTOR IS REQUIRED TO SUBMIT ONE COPY OF AN INSURANCE CERTIFICATE (HIS AND ALL OF HIS SUBCONTRACTORS) CLEARLY SHOWING KOPPERS INDUSTRIES AS ADDITIONAL INSURED TO KOPPERS INDUSTRIES PLANT, ATTENTION PLANT MANAGER. FAILURE TO COMPLY WITH THIS REQUIREMENT WILL CAUSE A DELAY IN START OF WORK AND/OR THIS ORDER TO BE TERMINATED.** Send one copy to: Koppers Industries, Inc. 1005 William Pitt Way Pittsburgh, PA 15238-1362 ATTENTION: JACK L. STEPHENSON	

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

KOPPERS INDUSTRIES

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	Seller shall not assign, transfer, convey, subcontract or authorize disposition of this agreement or its right, title, or interest in or to the same or any part thereof without the previous consent in writing of KOPPERS INDUSTRIES, and it shall not assign by power of attorney or otherwise any of the monies to become due and payable under this agreement without like consent. In the event of an approved subcontractor, Seller shall be fully responsible for the performance of his contractors in all matters including, but not limited to, accounting, cost distribution, purchasing, labor and material control, and proper and economical performance of the work. **WAIVER OF LIEN** SELLER SHALL SUBMIT WITH FINAL BILLING ONE EXECUTED NOTARIZED COPY OF THE ATTACHED AFFIDAVIT AND WAIVER OF LIEN. ALL FEDERAL EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION REQUIREMENTS IN REGARD TO RACE, SEX, RELIGION, NATIONAL ORIGIN, HANDICAP AND VIETNAM VETERAN OR DISABLED VETERAN STATUS, AS FOUND IN 41 CFR 60-1.4, 41 CFR 60-250.3 AND 41 CFR 741.3, ARE HEREIN INCORPORATED BY REFERENCE. KOPPERS INDUSTRIES IS ENTITLED TO ALL REMEDIES PURSUANT TO THE UNIFORM COMMERCIAL CODE. **FORCE MAJEURE** Neither party hereto shall be liable for its failure to perform hereunder due to contingencies beyond its reasonable control including, but not limited to strikes, riots, wars, fire, acts of God, compliance with any law, regulation or order, whether valid or invalid, of the United States of America or any other governmental body or instrumentality thereof, whether now existing or hereafter created. The Seller agrees to observe and abide by all applicable laws, regulations, ordinances and other rules of the state, territory or political subdivision thereof wherein the work is done or any other duly constituted public authority **CONTACTS:** Portland, OR (Plant) – Amos Kamerer Pittsburgh (Technical) - W. Meisinger Pittsburgh (Commercial) - J. L. Stephenson 412/826-3907	

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

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QUANTITY	DESCRIPTION	PRICE
	Send original and two copies of all invoices to: KOPPERS INDUSTRIES, INC. 7540 NW ST. HELENS ROAD PORTLAND, OR 97210-3663 Send one copy of all invoices to: KOPPERS INDUSTRIES, INC. PURCHASING DEPARTMENT 1005 WILLIAM PITT WAY PITTSBURGH, PA 15238-1362 ATTENTION: JACK L. STEPHENSON **Note:** Failure to follow above invoice instructions will result in delay of payment. Confirming verbal order of 9/18/98 to Brad Andrews – DO NOT DUPLICATE **PRICE:** Based on Seller's quotations dated 7/29/98, 8/26/98, 9/02/98, 9/14/98 and 9/16/98 **FOB:** Installed **SHIP:** Schedule: Submit Design Drawings 10/16/98 Submit Fabrication Drawings 11/13/98 Receive Materials and Start Fabrication 1/08/99 Start Erection 2/05/99 Complete Erection 4/23/99 Complete Hydrotest 4/30/99 **TERMS:** Progressive **PLEASE ACKNOWLEDGE YOUR ACCEPTANCE OF THIS ORDER BY SIGNING AND RETURNING THE ATTACHED COPY.** ACCEPTED BY: _____ KOPPERS INDUSTRIES, INC. AUTHORIZED SIGNATURE JACK L. STEPHENSON/sad CC: W. Meisinger - HTC _____ SELLER'S AUTHORIZED SIGNATURE TITLE _____ DATE _____ TOTAL:	$392,553.00

This Order shall be subject to the following Terms and Conditions:

1. This order must be acknowledged promptly on the enclosed acceptance copy, giving the information requested.

2. Seller's acknowledgement of, or fulfillment of this order, shall constitute Seller's acceptance of all the terms and hereof of terms specifically incorporated by reference herein, which shall control, if they conflict with the terms of Seller's quotation.

3 The Seller agrees to defend and save harmless Koppers from all costs, expenses and damages occasioned by any alleged infringement of patents by any articles covered by this order.

4. The goods and/or services covered by this order are guaranteed to be free of defects in material and workmanship. The cost of repair or replacement of defective or non-conforming parts, including labor and freight, shall be borne by Seller.

5 In connection with any castings, machinery, apparatus, etc. of Koppers design covered by this order, Seller shall not in any manner cast, inscribe, or placard such castings, machinery, apparatus, etc. with its trademark or name.

6 Koppers shall have the right to inspect the work covered by this order at any time during its progress. Any inspection by Koppers does not relieve the Seller of its responsibility for correctness in fabrication, the quality or workmanship in accordance with the specifications and/or drawings.

7 The Seller agrees to accept exclusive liability for the payment of any payroll taxes or contributions for unemployment insurance or old age pensions or annuities which are measured by the wages, salaries, or other remuneration paid to the employees of the Seller, to reimburse Koppers for any of the aforesaid taxes or contributions which, by law, Koppers may be required to pay, and to comply with valid administrative regulations respecting the assumption of liability for the aforesaid contributions by subcontractors.

8. Seller warrants that in the production of goods and services purchased hereunder, he has complied and will comply with all applicable statutes of the United States and lawful regulations issued thereunder, including, Fair Labor Standards Act of 1938, as amended, Davis-Bacon Act, as amended, the Walsh-Healey Act, as amended, and the Occupational Safety and Health Act of 1970, as amended. Seller further warrants that he has complied and will comply with all statutes and regulations of any state, territory or other duly constituted public authority or political subdivision thereof wherein the work hereunder shall be performed.

9. Bills of lading, express receipts, invoices, shipping lists, etc. must be sent forward the day shipment is made with order number indicated on all papers. All shipments must be made in name of firm with whom order is placed and all shipping and invoice requirements must be complied with in every particular.

10. All barrels, boxes, bags, crates or other packages must be labeled with tag (linen tag preferred) securely fastened to packages showing shipper's name and Koppers order number. If impossible to attach tags, information must be painted on packages.

11. Koppers shall not be responsible for any drayage, blocking or packaging and no reels, drums or packages shall be returned to Seller except as set out on the reverse side of this sheet.

12. Net invoices for goods and/or services shall be paid 30 days following the date of invoices.

13. Cash Discount Invoices - Cash discount shall be deducted at expiration of grace period dating from date of receipt of invoices.

14. NET invoices and CASH discount invoices received without supporting papers complete shall not be paid until complete as specified. The date of receipt of final supporting papers complete shall, in all cases, govern dates of payment.

15. It shall be strictly understood and agreed that this order shall be treated confidentially in every respect, and that the Seller shall refrain from any publicity or advertising concerning the sale of articles herein.

16. In no event shall Koppers be liable to Seller, regardless of the form of action, whether in contract or in tort or otherwise, for any incidental or consequential damages of any nature whatsoever, including without limitation, lost profits.

17. Koppers is entitled to all remedies, without limitation, available pursuant to the Uniform Commercial Code.

18. Seller shall defend, indemnify and save Koppers harmless from and against any and all claims, demands, causes of action, suits and all other liabilities whatsoever, including without limitation reasonable attorney fees, incurred by Koppers on account of, or by reason of, or arising out of personal injuries or death to Seller, or a subcontractor of Seller, Koppers, or any other third party, or the employee(s) thereof, it being the intent of this provision to absolve and protect Koppers from any and all loss or liability arising out of the performance of this purchase order or the goods and/or services provided hereunder.

19. Seller's or Koppers' waiver of any breach, or failure to enforce any of the terms and conditions of this contract, at any time, shall not, in any way, affect, limit or waive Seller's or Koppers' rights thereafter to enforce and compel strict compliance with every term and condition hereof.

20. Seller shall not assign, transfer, convey, subcontract or authorize disposition of this agreement or its right, title or interest in or to the same or any part thereof without the previous consent in writing of Koppers.

21. This order constitutes the entire agreement, and no additions or changes are to be made without written authority from Koppers Purchasing Department.

22. During the performance of this purchase order, for amounts exceeding $10,000 unless exempt, the Seller agrees as follows:

(a) The Seller will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Seller will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training including apprenticeship. The Seller agrees to post, in conspicuous places, available to employees and applicants for employment, notices to be provided by the government contracting office setting forth the provision of this non-discrimination clause.

(b) The Seller will, in all solicitations or advertisements for employees placed by or on behalf of the Seller, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(c) The Seller will sent to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer, advising the labor union or worker's representative of the Seller's commitments under Section 202 of the Executive Order 11246 of September 24, 1965 and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Seller will comply with all provisions of Executive Order 11246 of September 24, 1965 and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The Seller will furnish all information and reports required by Executive Order 11246 of September 24, 1965 and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereof, and will permit access to his books, records and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of Seller's non-compliance with the non-discrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated or suspended in whole or in part and the Seller may be declared ineligible for further government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965 and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965 or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.

(g) The Seller will include the provision of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Seller will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for non compliance, provided, however, that in the event the Seller becomes involved in, or is threatened with litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Seller may request the United States to enter into such litigation to protect the interest of the United States.

(h) Seller certifies, in the form prescribed in 41 CFR, Chapter 1, Section 1-12. 803-10, regarding non-segregated facilities.

(i) Seller agrees to file with the appropriate federal agency a complete and accurate report of Standard Form 100 (EEO 1) within 30 days after the signing of this agreement or the award of such purchase order, as the case may be (unless such a report has been filed in the last 12 months, or unless Seller does not meet the 100 employee test set forth in Section 701(b) of Title VII of the Civil Rights Act of 1964), and agrees to continue to file such reports annually, on or before March 31.

23 All Federal Equal Opportunity and Affirmative Action requirements in regard to race, sex, religion, national origin, handicap and Vietnam veteran or disabled veteran status, as found in 41 CFR 60-1.4, 41 CFR 60-250.3 and 41 CFR 741.3, are herein incorporated by reference.

RECEIVED
OCT 1 [illegible]
KOPPERS IND'S. INC.
PORTLAND OR

KOPPERS INDUSTRIES, INC.

KOPPERS INDUSTRIES, INC.

PROJECT:
LIQUID PITCH UNLOADING

HEAT INSULATION
SPECIFICATION 6526AS06

JANUARY 1999

PETROCHEM'S

MISSION STATEMENT

We are committed to being the best Insulation contractor in the industry, through safety, quality, performance, and continuous improvement to enhance our greatest assets - our customers and our employees.

"Whatever you do, work at it with all your heart, as working for the Lord, not for men"
Col. 3:23

2119 SE Columbia Way, Suite #310
Vancouver, Washington 98661-8037
Ph. (360) 695-3226 • Fax (360) 695-3180

insulation, inc.

License #PETROCI 110MQ
Unified I.D. #601 116 909
www.petrocheminc.com

January 20, 1999

Mr. T.J. Turner
Koppers Industries
1005 William Pitt Way
Pittsburgh, PA 15238-1362

Subject: **Insulation Quotation**

RE: Liquid Pitch Unloading

Dear T.J.,

Petrochem is pleased to submit our pricing for the above referenced project. Our pricing is based upon the following clarifications:

1. Strict accordance with plans and specifications.
2. Hot oil piping indicated on the drawings as insulate for personal protection has been included in this bid as insulate for heat conservation.
3. Scaffold and manlift equipment is included in our pricing.
4. Disposal of scrap materials by others.
5. Materials to be invoiced for payment when received on site.
6. Our terms are ½% ten days, net 30. Late charges in the amount of 1 ½% per month will be charged on all invoices over 30 days.

Our pricing is as follows:

Item	Unit	Qty	Material	Labor	Total
Pitch Tank Area Piping	LF	2,986	$ 38,900.00	$ 56,600.00	$ 95,500.00
Ship Transfer Piping	LF	2,565	$ 69,500.00	$ 54,400.00	$123,900.00
T-200 Pitch Tank	SF	19,827	$ 62,400.00	$ 73,500.00	$135,900.00
Breakout Price Dwg. P014	LF	186	$ 2,500.00	$ 3,000.00	$ 5,500.00
Column Totals			**$173,300.00**	**$187,500.00**	
				TOTAL LUMP SUM PRICE:	***$360,800.00***

Should you have any questions or need additional information, please don't hesitate to call.

Sincerely,

Tim's
6 weeks on the tank
10-12 weeks for total job

John Meindersee

PETROCHEM INSULATION, INC.

2119 SE Columbia Way Suite 310
Vancouver, Wa
Phone: 360-695-3226 Fax: 360-695-3180
www.petrocheminc.com

"TANK PROJECTS"

Partial List of Customers Served

CUSTOMER	TYPE OF WORK	CONTACT
Chevron Asphalt Portland, OR	All Tank Work	Jerry Henderson (541) 273-4705
Chevron Light Oils Portland, OR	All Tank Work	Dale Bullock (503) 221-6571
Colt Construction Bellingham, WA	Various Tanks	Bill Colgrove (360) 676-4905
G.P. Resins Albany, OR	All Tank Work	Jim Barr (541) 928-4171
Norpac Longview, WA	Tanks and Piping	Brian Hewitt (360) 636-6486
Willamette Industries Eugene, OR	Various Tanks	Tom Quesinberry (541) 744-4639
Neste Resins Springfield, OR	All Tank Work	Mike Miksis (541) 746-6501
Tosco Northwest Ferndale, WA	All Tank Work	Frank Sanchez (360) 384-1011
Smurfit Newsprint Oregon City, OR	Tanks and Piping	Steve May (503) 650-4211
Tanco Engineering Longmont, Co	120' Storage Tank	Clyde Inman (303) 772-5420
Liquid Sugars, Inc. Portland, OR	Product Tanks	Kevin Lewis (503) 238-4345
Liquid Sugars, Inc. Puyallup, WA	Product Tanks	Roger Peters (206) 845-b4833

ACORD CERTIFICATE OF LIABILITY INSURANCE

OP ID DU PETRO-2 | DATE (MM/DD/YY) 06/10/98

PRODUCER
California Coastal Insurance
License #0381524
262 Camino Ramon PO BOX 5076
San Ramon CA 94583-1328

H.M. Vawter
Phone No 925-866-7050 Fax No 925-866-8275

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

COMPANIES AFFORDING COVERAGE

COMPANY A	United Capitol Insurance Co.
COMPANY B	Reliance National Indemnity Co
COMPANY C	American Motorists Insurance
COMPANY D	

INSURED

Petrochem Insulation Inc.
Attention: Cindy
2119 S/E Columbia Way #310
Vancouver WA 98661-8037

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY				GENERAL AGGREGATE	$ 2,000,000
A	X COMMERCIAL GENERAL LIABILITY	GLA1002822	07/01/98	07/01/99	PRODUCTS - COMP/OP AGG	$ 2,000,000
	CLAIMS MADE X OCCUR				PERSONAL & ADV INJURY	$ 1,000,000
	OWNER'S & CONTRACTOR'S PROT				EACH OCCURRENCE	$ 1,000,000
					FIRE DAMAGE (Any one fire)	$ 50,000
					MED EXP (Any one person)	$ Excluded
	AUTOMOBILE LIABILITY					
C	X ANY AUTO	3MJ77083402	07/01/98	07/01/99	COMBINED SINGLE LIMIT	$ 1,000,000
	ALL OWNED AUTOS				BODILY INJURY (Per person)	$
	SCHEDULED AUTOS					
	HIRED AUTOS				BODILY INJURY (Per accident)	$
	NON-OWNED AUTOS					
					PROPERTY DAMAGE	$
	GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT	$
	ANY AUTO				OTHER THAN AUTO ONLY:	
					EACH ACCIDENT	$
					AGGREGATE	$
	EXCESS LIABILITY				EACH OCCURRENCE	$ 9,000,000
B	X UMBRELLA FORM	NUA0147166	07/01/98	07/01/99	AGGREGATE	$ 9,000,000
	OTHER THAN UMBRELLA FORM					$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				WC STATUTORY LIMITS / OTHER	
	THE PROPRIETOR/ PARTNERS/EXECUTIVE OFFICERS ARE ___ INCL ___ EXCL				EL EACH ACCIDENT	$
					EL DISEASE - POLICY LIMIT	$
					EL DISEASE - EA EMPLOYEE	$
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS
All Operations by Named Insured

CERTIFICATE HOLDER

EVIDE-1

Evidence Purposes Only

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE
H.M. Vawter

ACORD CORPORATION 1988

ITEMS FOR INCLUSION IN CONTRACTOR PRE-QUALIFICATION AND QUALIFICATION FORMS

Petrochem's Workers' Compensation Insurance and Interstate experience modification rate for the three most recent years. Our current Experience Modification Rate (EMR) is valid through July 1, 1998.

INTRASTATE:	1997 .58	1996 .59	1995 .55
INTERSTATE:	1997 .70	1996 .76	1995 .92
WASHINGTON:	1997 .61	1996 .60	1995 .60

Workers' Compensation Insurance Loss-Ratio Data:

1997 21% 1996 10% 1995 14%

Using the last three years **OSHA No. 200 Logs**, fill in the number of injuries/illness in the following blanks.

	1997	1996	1995
Number of fatalities each year	0	0	0
Number of **lost work day** injury cases	2	0	2
Number of **restricted** injury cases	5	4	6
Number of **non-lost work day** injury cases	3	5	4
TOTAL OSHA 200 LOG:	10	9	12

Total employee hours worked for the last three years (field, supervisory and clerical). Do not include any non-work time, even though paid.

	1997	1996	1995
Total Hours Each Year	636,286	494,772	464,882
Total Lost Workday Frequency Rate (Lost Day Cases Only)	.63	0	.86
Total Lost Time Frequency Rate (Lost Days/Restricted Days)	2.2	1.6	3.4
Total Incident Rate:	3.1	3.68	5.16

Accident reports and report summaries sent to the following: If YES, how often?

	NO	YES	MONTHLY	QUARTERLY	ANNUALLY
Field Superintendent	[ ]	[X]	[X]	[ ]	[ ]
Vice President Construction	[ ]	[X]	[X]	[ ]	[ ]
President of Firm	[ ]	[X]	[X]	[ ]	[ ]

Do you conduct Project Safety Inspections: NO [ ] YES [X]

If YES, who conducts this inspection (Title) and how often? Field Supervisor - Weekly; Corporate Safety Director - unannounced.

How are accident records and accident summaries kept? How often are they reported?

Records and summaries are kept on file by hard copy/computer in Corporate Safety Director's office following immediate notification.

	NO	YES	Frequency
Accidents totaled for the entire company	[ ]	[X]	Monthly
Accidents totaled by project:	[ ]	[X]	Monthly
*Subtotaled by Superintendent:	[ ]	[X]	Monthly
*Subtotaled by Foreman:	[ ]	[X]	Monthly

	NO	YES
Do you have a written safety program?	[ ]	[X]
a. A manual to cover safety activities?	[ ]	[X]
b. Incentives for safe manhours worked?	[ ]	[X]
c. Subcontractors?	[ ]	[X]

	NO	YES
Do you have an orientation program for new hires?	[ ]	[X]
a. Are comprehension exams given?	[ ]	[X]
b. How many hours are spent on safety orientation?	8 hours	

c. How is safety orientation delivered?

VERBALLY [X] WRITTEN [X] AUDIO-VISUAL [X]

	NO	YES
Do you hold craft "toolbox" safety meetings?	[ ]	[X]
a. Are subcontractors included?	[ ]	[X]

b. How often? Daily [ ] Weekly [X] Other [ ] As Needed [ ]

c. How are they documented? Daily Job Hazard Analysis forms and/or Safety Meeting forms on file at Corporate Office.

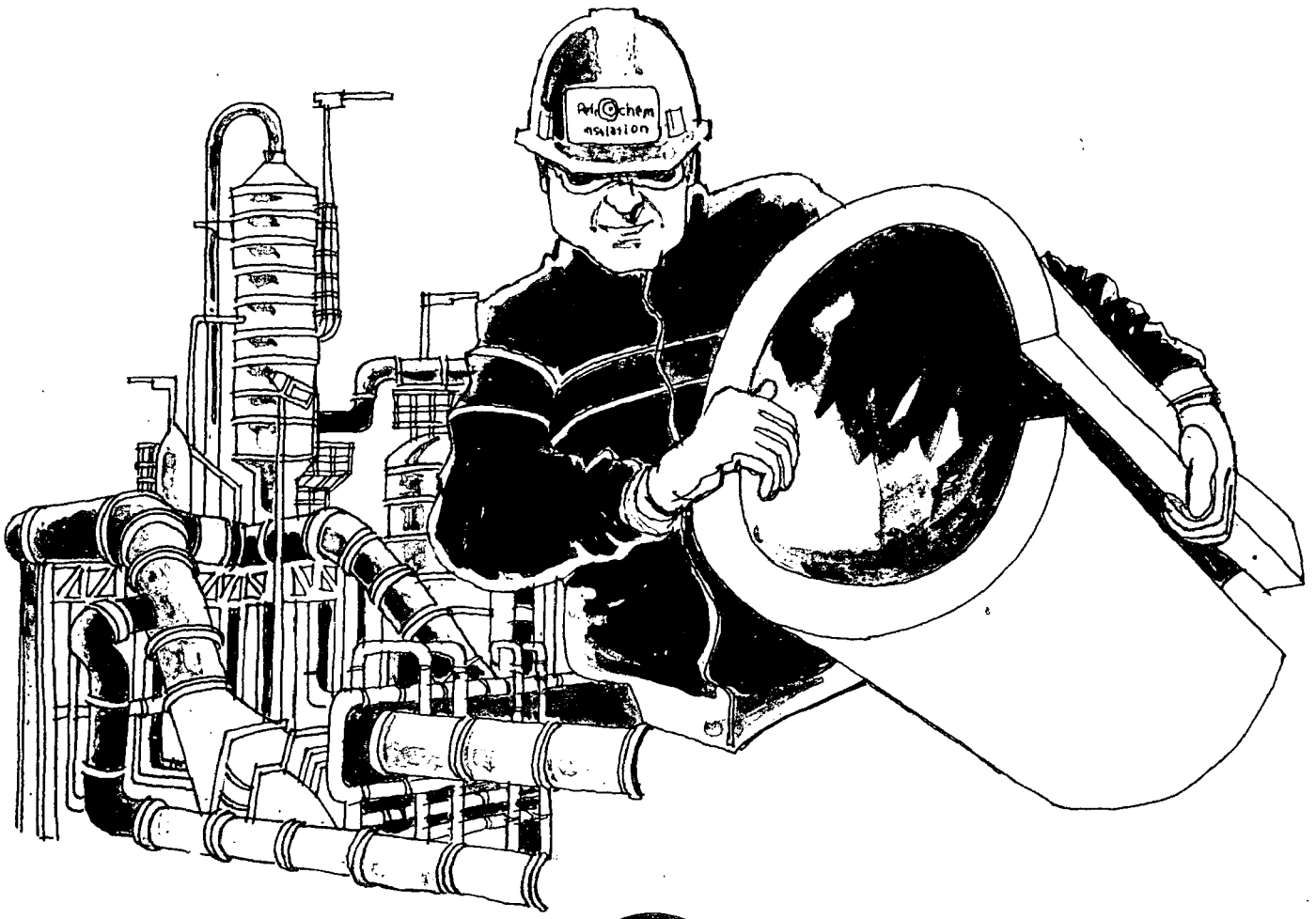
List key personnel planned for this project. Please list names, expected position and safety performance on last three projects worked on. Assigned at time of project

Daryl J. Spieker
COMPLETED BY

Safety Director
TITLE

SIGN

January 28, 1998
DATE



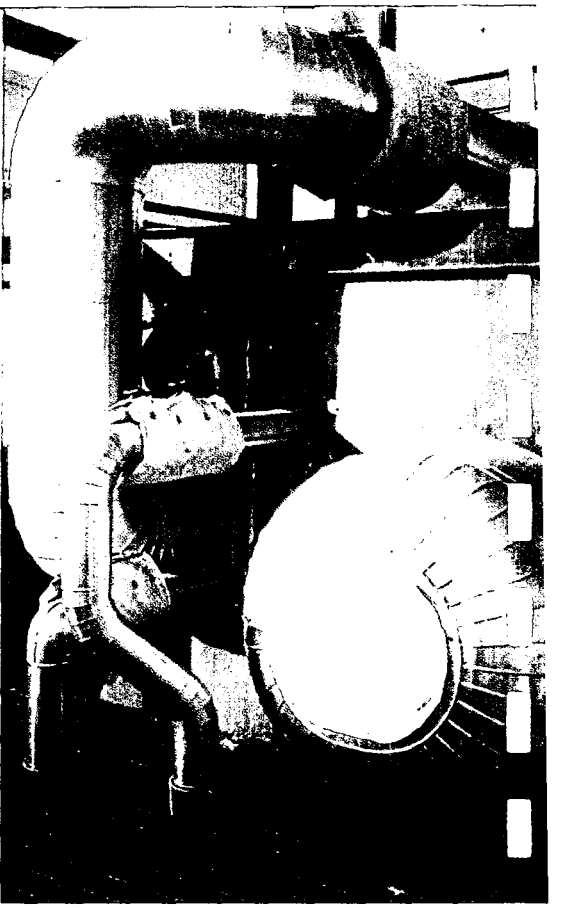
insulation, inc.

ACCREDITED QUALITY CONTRACTOR
CHARTER MEMBER
SAFETY·BENEFITS·TRAINING
COMMUNITY

Koppers010380

What We Do

Petrochem provides quality, company trained craftsmen and owner specified materials to complete your project on time and under budget. Experienced supervisors direct work to safe and timely completion, with maximum compatibility for client operations. The agreement may be lump sum, time and materials or cost plus fixed fee.



Petroleum

Storage tanks, refining columns, reactors, exchangers, spheres, pumps, steam and process piping, all insulated by skilled craftsmen to owner specifications using proven techniques.

Chemical

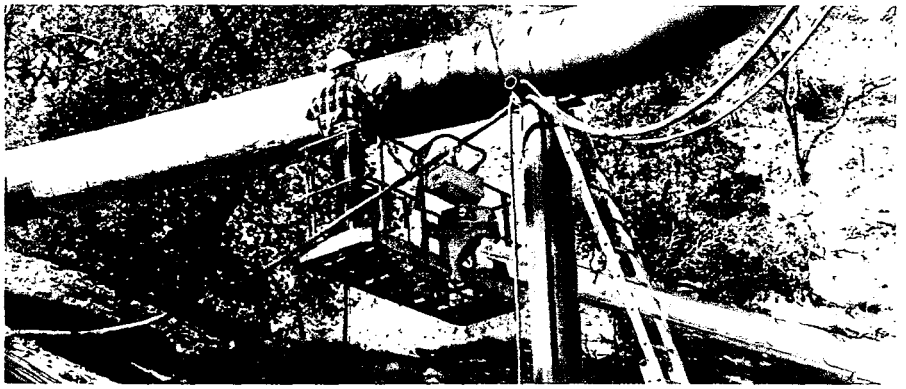
Hot and cold vessels and piping require special attention in chemical process areas. Exchangers, steam and process lines are covered with special care to ensure temperature stability. Petrochem can also install electrical heat tracing.

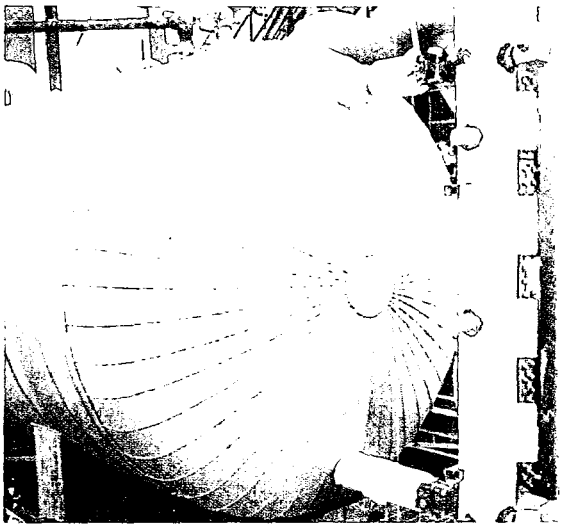
Geothermal

Large cross country pipelines carrying steam and hot brine in desert and mountainous terrain require maximum insulation from wellhead to power plant. Environmental compatible aluminum jacketing and bands can be furnished in colors to blend with natural surroundings.

Power

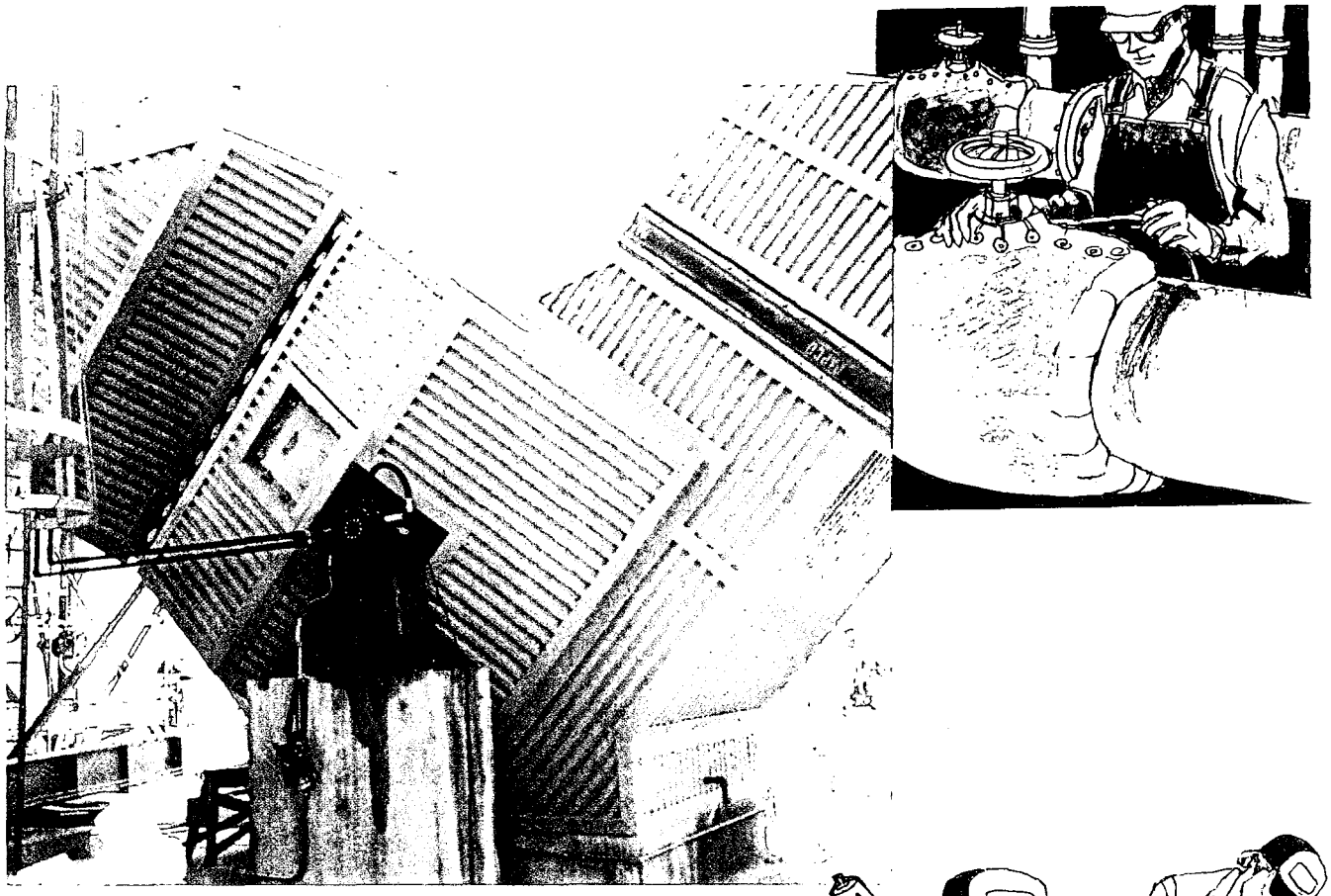
Field innovation is a daily test for creative insulation supervisors of boilers, cyclones, ducting, driers, baghouses, reactors, precipitators and I.D. fans. Expert quality control is essential.





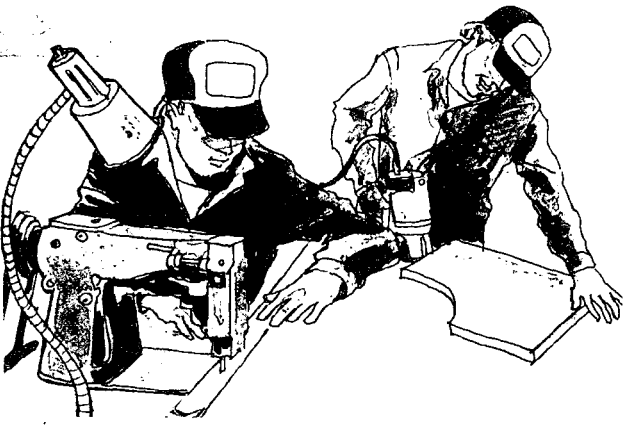
Since 1974

Petrochem provides expert teams of mechanical insulators to serve the industrial community. Small jobs are given equal quality as large projects. Our skilled mechanics have completed almost every possible form of mechanical insulation including pipelines, storage tanks, ammonia spheres, exchangers, evaporators, and electrical power generating facilities. We were the first Merit Shop in California dedicated to industrial insulation. We remain one of the largest and most dedicated in our field.



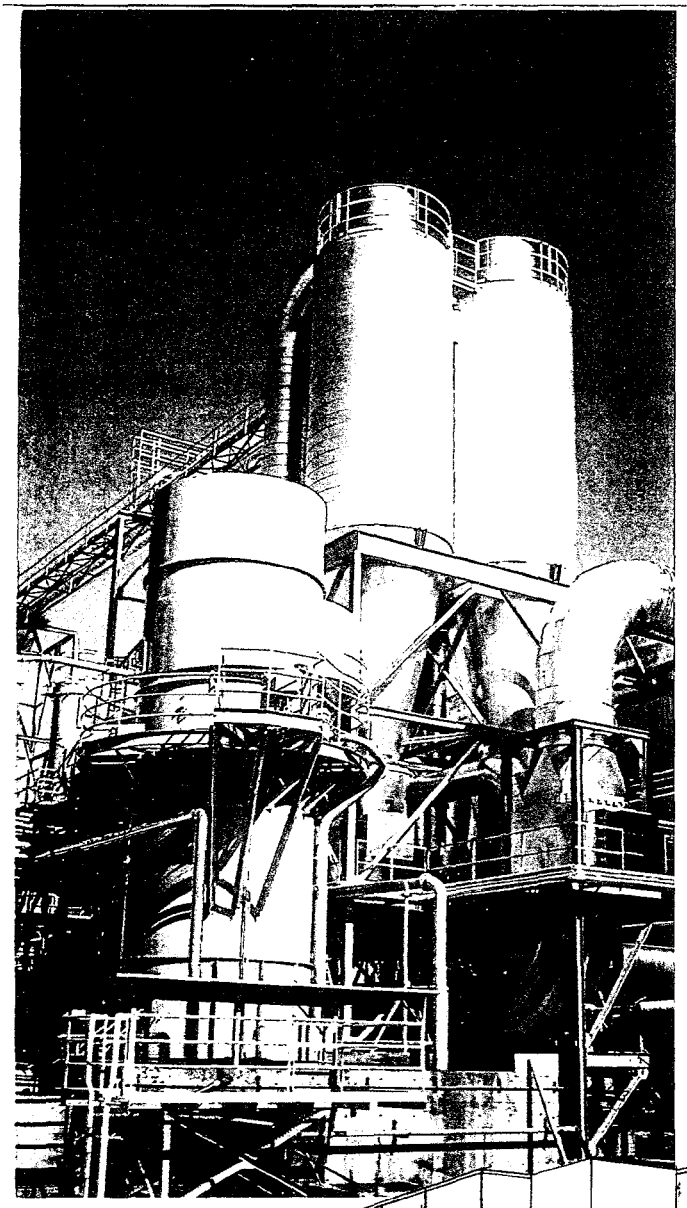
Custom Fabrication

Petrochem fabricates and installs custom made removable insulation blankets for valves, flanges and other frequently serviced equipment. We also custom fabricate various sheet metal items which are not available as stock items. All our warehouse locations are set up for fabrication of these custom fit insulation items to meet your needs.



Special Services, Equipment and Material

Material handling and personnel placement on site may require the use of specialized manlift equipment, scaffold, trucks and hoisting equipment from our yard. Proper tools and equipment mean savings for our clients. Petrochem warehouses stock a wide variety of calcium silicate, mineral wool, fiberglass, foamglass and urethane products from major manufacturers. Jacketing, adhesives, and sundry materials are stocked to meet your needs.



Safety First

If anything ranks above completing on time and under budget, it is SAFETY! Working from corporate office, a full time Safety Director is responsible for implementing injury and illness prevention programs. Petrochem's Workmens Compensation experience modification rate is substantially under national average and it maintains a better than average national OSHA incident rate. This demonstrates dedication to providing intensive hazard training, proper tools, equipment and a safe environment for our workers.

Innovative

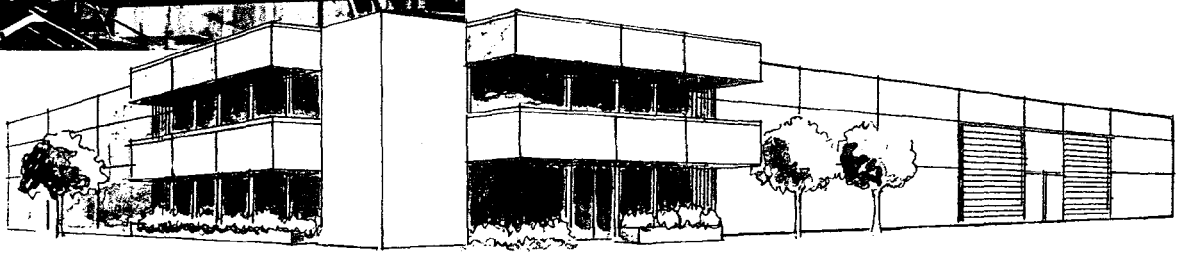
Consultation with client engineers on aspects of new materials and application techniques may result in job specifications that achieve major savings for the client. Many projects can be completed without any down time to client operations.

Financial

- **Bonding, banking and insurance information upon request**
- **Job size to $5,000,000**
- **Current Dun & Bradstreet number 07-395-3119, Rating 3A2**

Member of:

- **Associated Builders and Contractors (ABC)**
- **Western Council of Construction Consumers (WCCC)**
- **National Safety Council (NSC)**
- **National Insulation Association (NIA)**
- **Scaffold Industry Association (SIA)**



insulation, inc.

ABC
ASSOCIATED BUILDERS AND CONTRACTORS, INC. GOLDEN GATE CHAPTER

National Safety Council

NIA
National Insulation Association

SCAFFOLD INDUSTRY ASSOCIATION SIA

Western Council

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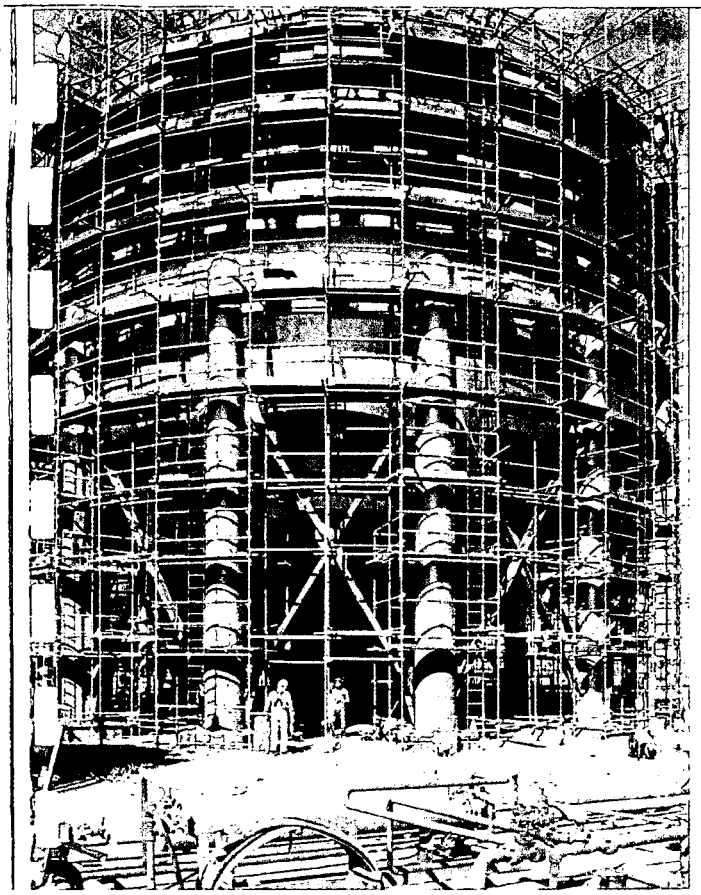
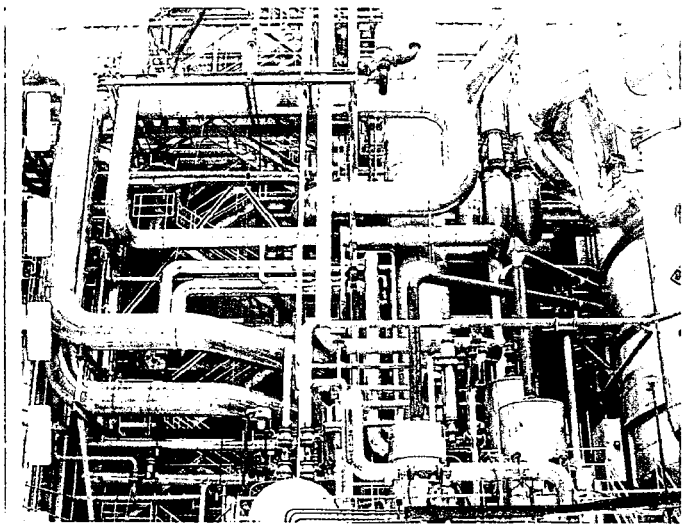


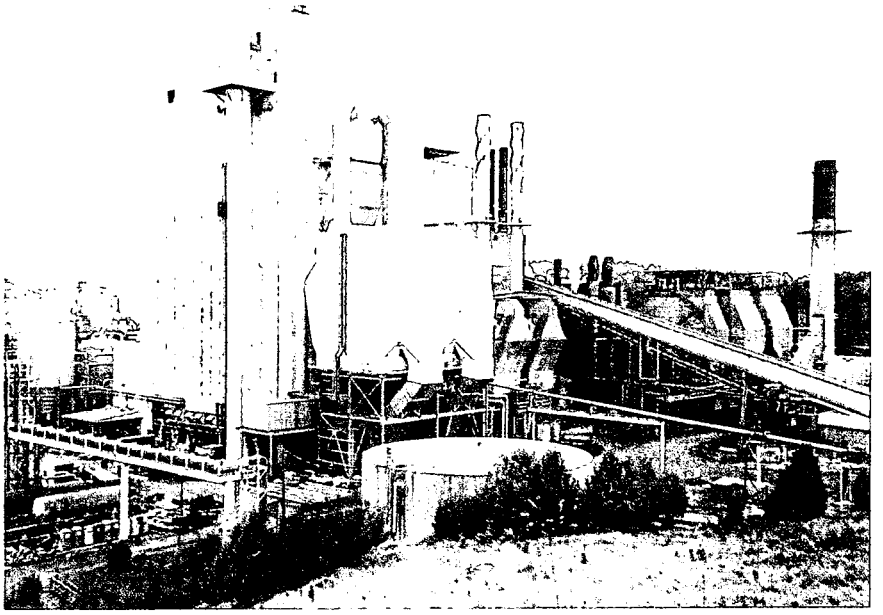
Fireproofing

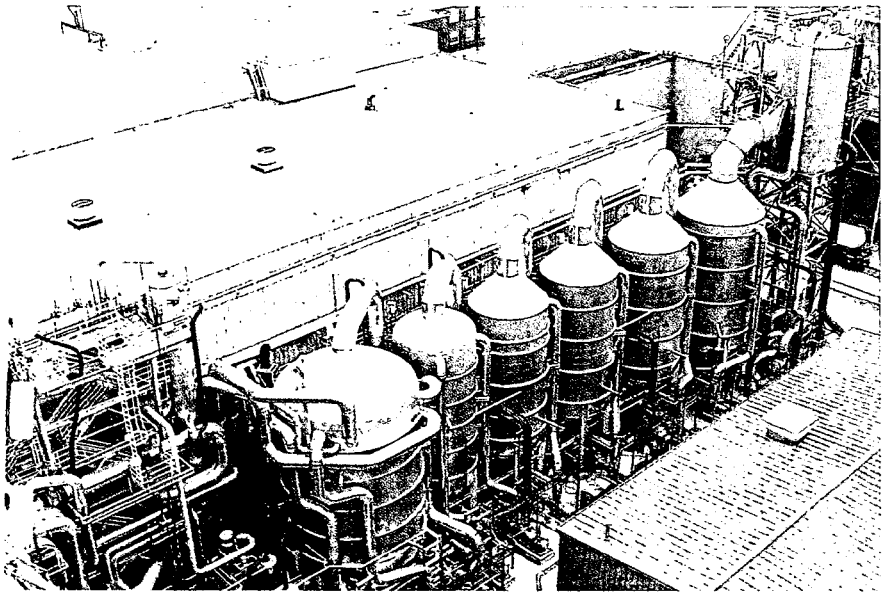
Petrochem also offers skilled installers of conventional concrete fireproofing. Employees are factory trained in the installation of Carboline fireproofing materials.

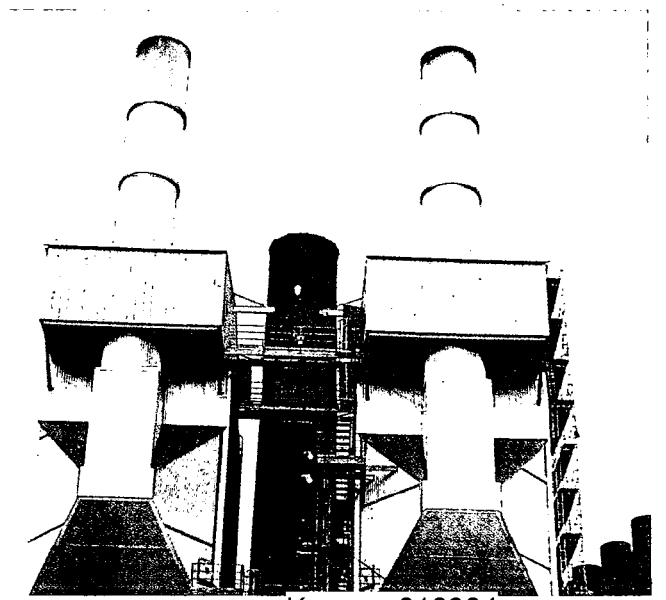
National Labor Pool

Petrochem attracts insulators with its extensive qualified employee benefits which include health insurance, life insurance, dental insurance, vacation pay, and employee stock ownership plan. The longevity of skilled mechanics is well above national averages. Most supervisors and journeymen have over 10 years continuous employment.









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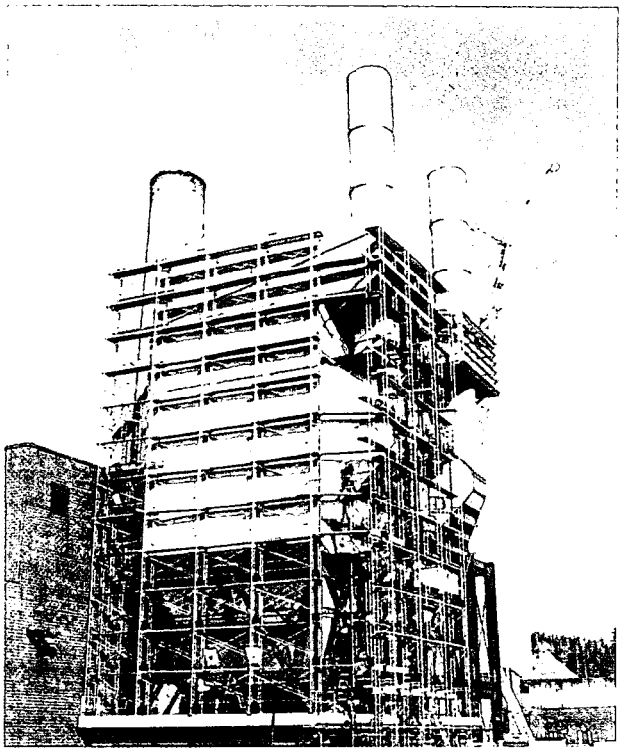

Nationwide Service

Registered to work in all 50 states, British Columbia, and Alberta. Petrochem is prepared to work on any terrain in any weather condition. Merit Shop operations ensure flexible scheduling of work hours and provide craftsmen that must maintain high skill levels rather than rely on seniority. Qualified local insulators are hired wherever available.

Include Petrochem on Your Bid List

Petrochem estimators are available for consultation, daily; your inquiries are invited without obligation.

SOUTHERN CALIFORNIA
Rancho Dominguez, CA 90221
19010 South Alameda Street
(310) 638-6663 • Fax (310) 638-6572

HEADQUARTERS
Vallejo, CA 94890 • 110 Corporate Place
(707) 644-7455 • Fax (707) 644-4908
California License 300201

NORTHWEST
Vancouver, WA 98661
2119 S. E. Columbia Way #310
(360) 695-3226 • Fax (360) 695-3180

insulation, inc.

MID AMERICA
Jeffersonville, IN 47130
3313 Industrial Parkway
(812) 284-4490 • Fax (812) 284-4406

HAWAII
Kapolei, HI 96707
Phone and Fax
(808) 682-2438

ROCKY MOUNTAIN STATES
Murray, UT 84107
6117 S. Stratler Street
(801) 288-1155 • Fax (801) 288-9988

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CHARTER MEMBER
SAFETY-BENEFITS-TRAINING
COMMUNITY

GeoEngineers

November 30, 1998

Consulting Engineers and Geoscientists
Offices in Washington, Oregon, and Alaska

Koppers Industries, Inc.
1005 William Pitt Way
Pittsburgh, PA 15238-1362

Attention: William A. Meisinger

Ringwall Concrete Design Considerations
Coal Tar Pitch Storage Tanks
7540 Northwest St. Helens Road
Portland, Oregon
File No. 5823-001-01

Issues keep arising with respect to the design of the special thermal-resistant concrete for the ringwall foundation at the Portland project that could have a significant impact on schedule if they are not anticipated. These issues have been raised by CTL as they have provided us with design criteria.

The first of these is the design validation testing that they recommend be completed to show that the concrete mix will result in the necessary strengths under long-term high temperatures. CTL recommends that thermal expansion tests be performed on the aggregate to be used in the concrete. I would expect this could be eliminated if the supplier can produce documentation of acceptable test results on the aggregate source. If not, it would be prudent to proceed with these tests well in advance so the suitability of the aggregate has been demonstrated well before construction starts.

The second, and likely the most important tests from both the physical considerations and time schedule, are to validate the compressive strength and modulus of elasticity of the design mix (or mixes, if more than one design is used in the foundation). CTL recommends that six sets of six specimens of each mix design be prepared for the two types of tests. These specimens would be under normal conditions and under elevated temperature conditions (250, 410, and 450 degrees F) and tested at intervals stretching up to 90 days after the specimens are cast.

A similar, though less lengthy, test schedule is recommended for the bedding grout to go immediately under the tank bottom around the ringwall.

Sam Moss has pointed out that many of the ready-mix suppliers in the Portland area may not have experience with concrete of this type. It will be very important for the concrete supplier to

GeoEngineers, Inc.
8410 154th Avenue N.E.
Redmond, WA 98052
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Fax (425) 861-6050
www.geoengineers.com

Printed on recycled paper.

demonstrate familiarity with the type of concrete specified. An inexperienced concrete supplier may inadvertently cause project delays due to the rigid testing requirements. Considering the time required for design mix testing, it would seem prudent for Koppers to consider having this work initiated now and simply presenting the concrete supplier with the performance specification to be met. This should enable the bulk of the testing to be done fairly close to when the building permit would be issued. We offer this thought for your consideration.

One final issue (at least for this letter) is the rate of temperature rise in the foundation as the tank receives the initial filling of product. CTL has indicated that it would be beneficial to limit the temperature increase during the first filling to 75 degrees F per day. To achieve this type of control it would seem necessary to install some thermocouples in the foundation to monitor temperatures. Heating the foundation too rapidly could result in serious cracking and even explosive type break up of the concrete because of the residual moisture in the structure. Limiting temperature rise would likely mean pumping product into the tank at a much slower rate than normal. Will there be provision at the plant to offload a ship efficiently while still changing which tank is receiving product as needed to control temperature rise in the new foundation? Based on CTL's input, this appears to be an issue that needs to be considered (or may be it already has been). What has been your experience with other high temperature product storage tanks when they have been put into service the first time? Has this been an issue?

Yours very truly,

GeoEngineers, Inc.

Jack K. Tuttle, P.E.
Principal

JKT:ss
P:\5823001\01\finals\582300101ltr2.doc

cc: KPFF Consulting Engineers
111 S.W. Fifth Avenue, Suite 2500
Portland, OR 97204-3628
Attn.: Sam Moss, P.E.

kpff Consulting Engineers
Portland, Oregon

Project		By	Sheet No.
Location		Date	
Client		Revised	Job No.
		Date	

BILL / AMOS

ATTACHED IS A SKETCH SHOWING A CROSS SECTION OF THE EXISTING SUMP W/ A NEW CURB. DO YOU KNOW WHAT THE ELEVATION OF THE EXISTING SUMP?

ALSO ATTACHED IS SOME INFORMATION ON MARTHA VANGEEM FROM CTL. I LEFT A MESSAGE W/ HER AND ASKED HER TO GIVE YOU A CALL.

PLEASE GIVE ME A CALL IF YOU HAVE ANY QUESTIONS.

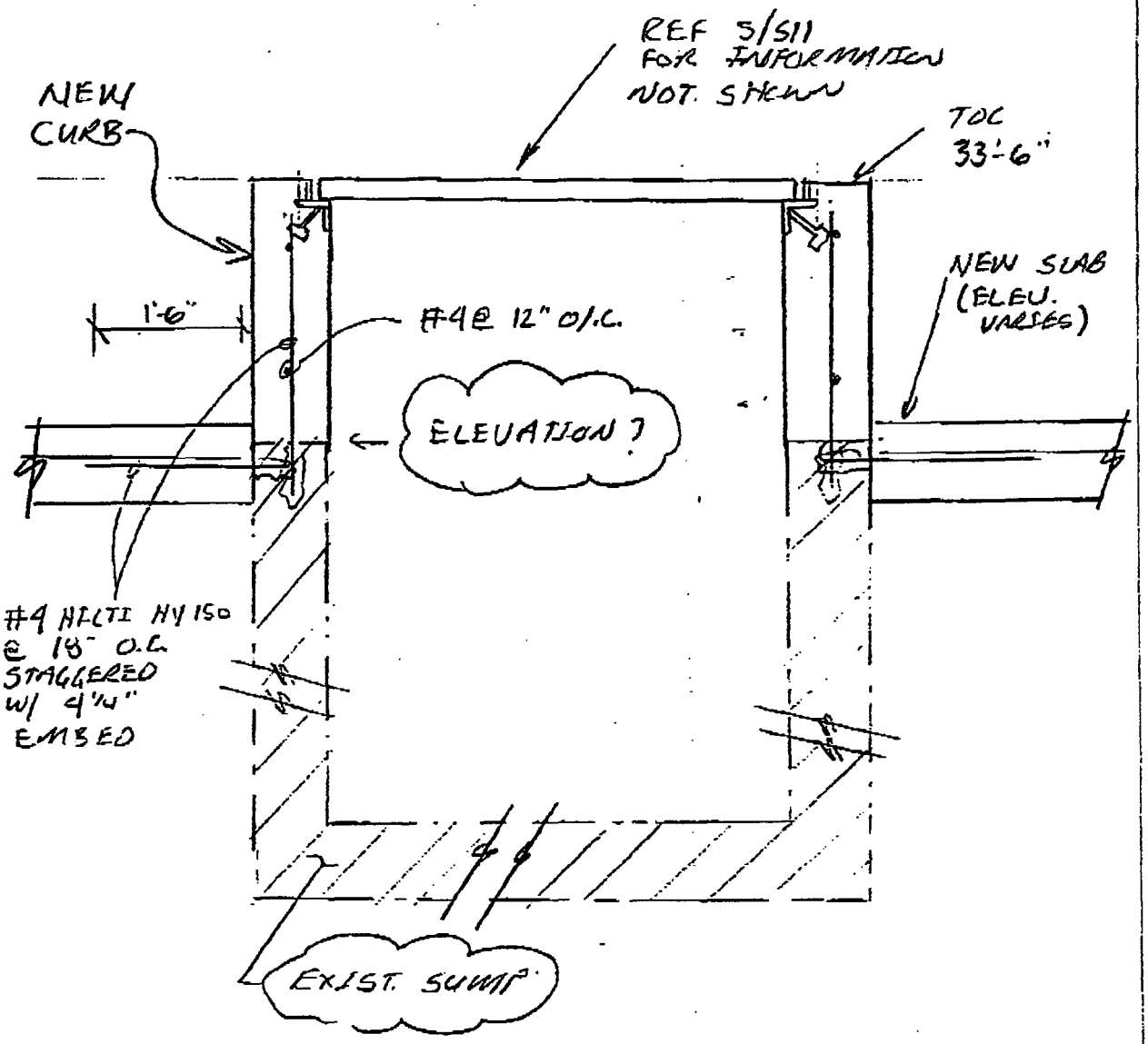
THANKS!

SAM AMOS

(1/94)

kpff Consulting Engineers
Portland, Oregon

Project		By	Sheet No.
Location		Date	
Client		Revised	Job No.
		Date	



2 EXIST. SUMP DETAIL

S12

(1'94)

CTL

Structural/Architectural Engineering, Testing and Materials Technology

5420 Old Orchard Road, Skokie, Illinois 60077-1030
1-800-522-2CTL

Martha G. VanGeem
Principal Engineer

Educational Background •
University of Illinois -
B.S. Civil Engineering with high honors, 1976
University of Chicago
M.B.A. Finance and Marketing, 1981

Registration •
Licensed Professional Engineer - Illinois

CTL Experience • Ms. VanGeem is a principal engineer and group manager of CTL's Materials Engineering and Consulting Group. She serves as a project principal investigator and specialized in-house consultant in the areas of heat transfer, thermal properties, energy conservation, moisture migration, and environmental sustainability.

Since Ms. VanGeem joined CTL in 1982, her experience has included over 200 large and small consulting, research and testing projects. She has determined the cause of moisture problems and proposed solutions for single-family homes, high-rise construction, condominiums, indoor swimming pools, an indoor ice rink, and an auditorium. In addition to field inspections and moisture measurements, she utilizes a computer model to evaluate moisture flow rates and the potential for condensation.

Ms. VanGeem has performed numerous analyses to predict heat flow, heat dissipation, energy use, condensation potential, temperature gradients and thermal resistance for simple and complex building components. She has assisted numerous clients in solving cement heat generation problems in high cement or mass concrete pours, including analyses to determine concrete temperatures and differentials, the potential for cracking and possible alignment problems.

In the area of environmental sustainability, Ms. VanGeem was principal investigator of projects to develop environmental life cycle inventories (LCI's) of cement and concrete.

Ms. VanGeem is responsible for and has performed material property tests and analyzed test results for a variety of materials, including insulation, masonry, concrete and innovative composite systems. Tests performed include thermal conductivity, thermal expansion, specific heat, thermal diffusivity and water vapor permeance. She has also been responsible for contract work related to strength properties of materials at high and low temperatures. Work has included long term strength properties of concrete at moderately high temperatures and creep of concrete at elevated temperatures. She has extensive experience performing calibrated hot box tests to determine heat flow through concrete and masonry walls for steady-state and dynamic temperature conditions.

Prior Experience • After graduating from the University of Illinois in 1976, Ms. VanGeem worked as a structural engineer at Sargent & Lundy Engineers in Chicago, Illinois. There she designed and analyzed steel and concrete structural members for nuclear and fossil fuel power plants. She played a lead role in implementing nuclear quality

(Continued on reverse)

Koppers010390

assurance programs and supervised up to 16 engineers and technicians.

Publications and Professional Activities

Martha VanGeem has authored more than twenty publications dealing with moisture problems in buildings, environmental issues, energy conservation, heat transfer properties of construction materials, and thermal storage properties of concrete, lightweight concrete and masonry materials. Ms. VanGeem also is actively involved in the development of building codes for energy efficient residential and non-residential buildings through her membership in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). She is a voting member of ASHRAE SSPC 90.1 on energy conservation of non-residential buildings. She is also active on ASHRAE's Technical Committee 4.4 on Building Materials and Building Envelope Performance and is responsible for the masonry and concrete information in the *ASHRAE Handbook of Fundamentals*.

Ms. VanGeem is an active member of the American Concrete Institute serving on Committee 207 on Mass Concrete, 305 on Hot Weather Concreting, 306 on Cold Weather Concreting, and 122 on Energy Conservation. As a member of the American Society of Testing and Materials, she participates on Committee E6 on Building Performance, C16 on Thermal Insulation, and E50 on Environmental Assessment. She is also a Life Member of the Society of Women Engineers.

Structural/Architectural Engineering, Testing and Materials Technology

5420 Old Orchard Road
Skokie, Illinois 60077-1030
800-522-2CTL

EVALUATION SERVICES RELATED TO THERMAL PROPERTIES, HEAT, AND MOISTURE

Construction Technology Laboratories Inc. (CTL) offers laboratory testing and specialized consulting services to:

- Determine heat generation and dissipation in concrete, and potential for thermal cracking
- Determine heat transfer and thermal resistance
- Evaluate thermal effects on material properties
- Predict thermal performance
- Evaluate moisture-related problems in buildings

CTL services and capabilities include:

- Prompt assistance and test date scheduling
- Reliable turnaround time for final reports
- Analysis techniques to fit your needs
- Assistance in development of test programs
- Assistance in specimen construction and preparation

Standard Thermal Testing and Rating Services

CTL can provide independent third party testing and rating of materials and systems in accordance with provisions of:

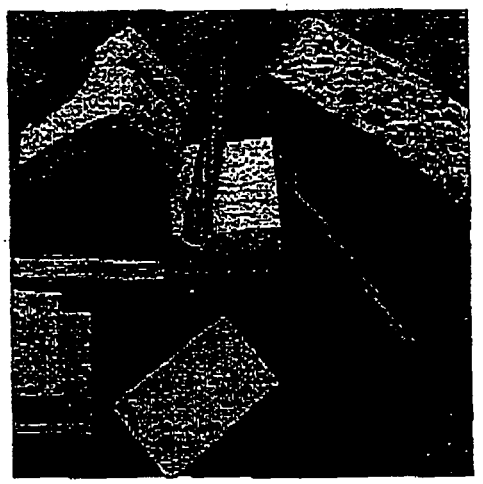
ASTM C 177, Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

US Army Method CRD-C36-73, Test for Thermal Diffusivity of Concrete

US Army Method CRD-C44-63, Calculation of Thermal Conductivity of Concrete

US Army Method CRD-C124-73, Test for Specific Heat of Aggregates, Concrete and other Materials

Concrete samples are prepared for thermal resistance measurement using the guarded hot plate (ASTM C177).



CTL's capabilities in heat and moisture movement cover virtually all structural, insulating and decorative construction materials, including concrete, stone, wood, insulation, vapor and air barriers, polymers, paint and metals.

Koppers010392

ASTM E 96, Test for Water Vapor Transmission of Materials

ASTM C 186, Test for Heat of Hydration of Hydraulic Cement

Tests can also be performed to determine:

- Thermal expansion
- Thermal diffusivity of construction materials using guarded hot plate apparatus
- Creep at high and low temperatures
- High temperature shrinkage
- Thermal effects on material strength and elastic properties

Most tests can be performed on a variety of construction and industrial materials at high, moderate, and low temperatures.

Thermal Resistance and Heat Flow

The guarded hot plate test method (ASTM C 177) is the most widely accepted primary test method for measuring thermal resistance. Tests are performed using two 12 in. square specimens, up to 3 in. thick. Specimens may be concrete, clay brick, wood, insulation, or other homogeneous materials. When necessary, materials can be pieced together to make 12 in. square specimens. Composite sections consisting of layers of different materials also can be tested. Thermal resistance can be measured for extreme temperature conditions ranging from 90 to 1150°F. Tests are generally completed within seven days after receipt of specimens.

CTL engineers are experienced in using analytical methods for determining heat flow and solving other thermal related problems. For example, thermal resistance and temperature gradients of nonhomogeneous systems such as insulated concrete forming systems can be estimated. Analytical solutions can range from simple design calculations to complex finite element computer analyses.

Temperature Rise of Concrete and Potential for Thermal Cracking

CTL provides numerous services for evaluating temperature of mass concrete structures and the potential for thermal cracking due to heat generation of fresh concrete. The potential for thermal cracking should be investigated for any structure with the least dimension 2 ft or more or any structure with high cement content.

CTL engineers investigate and analyze moisture problems in buildings, such as this efflorescence on a brick exterior wall. This problem was caused by lack of a vapor barrier in a building with an indoor pool.

Heat of hydration of cement and pozzolans can be measured using ASTM C 186. Values are generally provided at 7 and 28 days in calories per gram of material. Conduction calorimetry can provide detailed information regarding heat output over the first few days of hydration. Adiabatic temperature rise of concrete can be measured or calculated. Heat generation and dissipation, and resulting temperature differentials within a structure, can be measured or calculated for any size structure, in the laboratory or field. Calculation techniques range from one to three dimensional.

CTL staff has extensive experience recommending measures to prevent large temperature differentials and thermal cracking.

Moisture-Related Consulting

Moisture may not be a hazardous material, but it has potential to cause damage to structures. CTL provides consulting services to investigate moisture-related damage due to condensation, high humidity, or moisture in construction materials. Services include identifying sources of moisture, correct placement of a vapor retarder, analyzing paths of moisture migration, and recommended remediations.

For additional information, contact:
Martha G. Van Geem, Principal Engineer
(847) 965-7500 Ext. 449

CTL

Structural/Architectural Engineering, Testing and Materials Technology

5420 Old Orchard Road, Skokie, Illinois 60077-1030
1-800-522-2CTL

DATA SHEET

CTL is the complete source for resolving problems relating to construction materials and structural systems. We have the engineering, consulting, and research and development expertise, as well as in-house laboratory and testing facilities, to evaluate the most complex situations. While extensive experience guides our thinking, we embrace the innovative, looking beyond traditional approaches and materials to satisfy client needs. Our objective is clear: to provide knowledgeable assessments, practical recommendations, enduring solutions. CTL operates as an independent subsidiary of the Portland Cement Association.

CORPORATE OFFICE

Chicago/Skokie	5420 Old Orchard Road, Skokie, Illinois, 60077-1030 • (847) 965-7500 • Fax (847) 965-6541 or (847) 965-8997
	After Hours Emergencies - 7 days a week (847) 470-1400
DENVER OFFICE	7800 South Elati Street, Suite 220, Littleton, Colorado 80120 • (303) 730-9055 • Fax (303) 730-9058

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John Fraczek, SE, PE - President

W. Gene Corley, SE, PE - Vice President

Marion (Marty) J. Szczech - Vice President

PROFESSIONAL STAFF

Senior Engineering and Scientific Staff	45	Licensed Structural Engineers	12
		Registered Architect	1
Project Engineers (Architectural, Ceramic, Chemical, Civil, Masonry and Mechanical)	19	Registered Roof Consultant	1
		Certified Construction Specifier	1
Specialized Scientists (Chemistry, Geology, Material and Petrography)	12	Certified Special Inspector Structural Masonry	1
Licensed Professional Engineers	31 in 24 states 1 in Canada 1 in South Africa	Quality Engineer	2 in 2 states
		Ph.D.s	16

SERVICES PROVIDED

- Chemical Analysis
- Facade and Roof Evaluation
- Fire Damage Analysis and Thermal Technology
- Forensic Investigation and Litigation Support
- Industrial Floors and Pavements
- Materials Research
- Nondestructive Evaluation
- Package Testing
- Petrography
- Physical Testing
- Railroads/Transportation
- Structural Analysis
- Structural Evaluation
- Structural Testing and Research

Author: Sam Moss <smoss@kpff.com> at internet
Date: 9/23/98 8:17 AM
Priority: Normal
TO: "'jtuttle@geoengineers.com'" <jtuttle@geoengineers.com> at Internet
CC: "'tsandersen@aol.com'" <tsandersen@aol.com> at Internet
CC: Amos Kamerer at PITT
CC: BILL MEISINGER at TECHCTR
Subject: FW: Thermal Issues
---------- Message Contents ----------

We have researched the thermal issues associated with the Koppers tank foundation. I spoke with Martha Vangeem who is a principal engineer for Construction Technology Laboratories, Inc.(CTL) Martha specializes in the field of heat transfer, thermal conductivity and moisture mitigation. I faxed her a cross section of our foundation and she had the following comments:

- Concrete performs poorly at elevated temperatures. A chemical process called Delayed Ettringite Formation (DEF) will occur when the concrete temperature exceeds 160 degrees. Even at 160 degrees, a special concrete mix with stable aggregates and low water cement ratios should be used to prevent the concrete from deteriorating. This is outside of our normal area of expertise at KPFF. Recently there have been several lawsuits due to cracked concrete and DEF. CTM has several in house experts that can review the concrete mix design.

KPFF's drawings will have the following note: " Maximum temperature at inside face of concrete shall be 160 degrees (F)." The tank vendor will need to design and specify the correct type of insulation to ensure that the concrete never experiences temperatures greater than 160 degrees.

KPFF recommends that CTM be hired to perform a review of the concrete mix design. Martha stated the fee for this service would be $500.

We also spoke with Kathleen Postera of Pittsburgh Corning Insulation about the insulation design. We faxed her a copy of the tank foundation and explained the design to her. She had the following comments:

- The size of this tank will create extremely high compressive loads to the insulation especially when seismic is considered. The standard foam glass insulation will not work for this application. Koppers may need to use the HLB 1400 or 1200 which can withstand ultimate compressive stresses of 115 to 220 psi. Pittsburgh Corning can engineer an insulation system that will yield a maximum temperature of 160 degrees at the inside face of concrete. This work needs to be done in conjunction with the tank design. In order to do this the tank vendor needs to contact them and supply the appropriate cross section of the tank foundation interface. The design of rigid insulation is a very specialized field of engineering. The insulation is a built up composite material consisting of various interleaving layers and a capping material. A insulation specification needs to be created which clearly shows the acceptable materials, design considerations, application, inspection and quality assurance.

KPFF's drawings will schematically show the ring wall and base insulation. In addition, the following note will appear: " For insulation refer to mechanical and/or process drawings"

If you have any questions, please give me a call at (503) 227-3251.

Thanks,

Sam Moss

GeoEngineers

cc: JLS
Amos KAMBRAR

August 14, 1997

Consulting Engineers and Geoscientists
Offices in Washington, Oregon, and Alaska

Mr. Jim Dietz
Koppers Industries
1005 William Pitt Way
Pittsburgh, Pennsylvania 15328

Dear Jim,

We have sent the letter on environmental issues to you under separate cover. I appreciated your comments and incorporated them into the letter. Regarding the possible effect of relaxation of the soils below the pile tip, our experience is that whatever relaxation that may occur is not detectable because the ratio of surface area along the length of the pile to the pile tip area is so large that the build-up of side friction is dominant.

We are enclosing our final invoice for the services to date. We spent more time researching the pile contamination issue than I estimated when I prepared my letter to you on June 10, 1997. The total charges come out just over the upper end of the range I indicated at that time. We have not received an addendum to your original purchase order for the additional charges. The purchase order number for the original authorization is on the invoice and may stimulate some questions from your accounting department.

I hope you have been having a good summer and that everything is coming together on this project. Please let us know how we can help as your planning progresses.

Yours very truly,

GeoEngineers, Inc.

Jack K. Tuttle, P.E.
Principal

JKT:ms
Document ID: 5823001.l2

Attachment: Invoice No. 007739

RECEIVED
AUG 25 1997
KOPPERS INDS., INC.
PORTLAND, OR

GeoEngineers, Inc.
7504 SW Bridgeport Road
Portland, OR 97224
Telephone (503) 624-9274
Fax (503) 620-5940

GeoEngineers

FILE NO. 05823-001-43
INVOICE NO. 007739
DATE 08/14/97

Consulting Engineers and Geoscientists
Offices in Washington, Oregon, and Alaska

Koppers, Inc.
1005 William Pitt Way
Pittsburgh, PA 15328

Attention: Jim Dietz

Geotechnical Engineering Services
Proposed Coal Tar Pitch Storage Tanks
7540 N.W. St. Helens Road
Portland, Oregon

Contract No. 3000-7-9021

SERVICES RENDERED THROUGH 08/08/97

PROFESSIONAL SERVICES

GEI Professional Services	$	5,639.00
GEI Equipment & Outside Services	$	110.51
TOTAL DUE THIS INVOICE	$	5,749.51

Net due upon receipt. 1-1/2% service charge per month will be charged if payment is not received within 30 days.

Project Manager: Boyer, Marcella M.

OK to PAY
9/10/97

GeoEngineers, Inc.
8410 154th Avenue N.E.
Redmond, WA 98052
Telephone (425) 861-6000
Fax (425) 861-6050
www.geoengineers.com

Printed on recycled paper.

GeoEngineers

FILE NO. 05823-001-43
INVOICE NO. 007739
DATE 08/14/97

SUPPORTING INFORMATION

PROFESSIONAL SERVICES

PROFESSIONAL SERVICES

	HOURS	RATE	AMOUNT
Principal	16.50	120.00	1,980.00
Senior Engineer/Scientist	17.50	100.00	1,750.00
Project Engineer/Scientist	.50	84.00	42.00
Engineer/Scientist 3	14.00	74.00	1,036.00
Engineer/Scientist 2	11.00	65.00	715.00
Technician/Word Processor	1.00	46.00	46.00
Project Assistant	1.75	40.00	70.00
	62.25		5,639.00

GEI EQUIPMENT & OUTSIDE SERVICES

	COST/QTY	RATE	AMOUNT
Chemical Testing	90.00	1.1200	100.80
Delivery/Shipping	8.67	1.1200	9.71
			110.51

Total PROFESSIONAL SERVICES 5,749.51

** Total Project 05823-001-43 5,749.51

AIR LIQUIDE™

Memo

TO: Amos Kamerer – Koppers Industries, Inc.

FROM: Lynn Rossi

SUBJECT: Nitrogen Readings Off TeleFlo Unit

DATE: January 31, 2000

Amos:

Kevin Rouser, dispatch in Houston, passed on these readings to me on the nitrogen tank from Monday, 1/24/00 through Sunday, 1/30/00. The high nitrogen usage started on Friday through Sunday when the tank went empty. Hope this information helps in determining the cause of the run out situation.

Level as of each morning:

Monday	74"	
Tuesday	71"	
Wednesday	69"	
Thursday	60"	
Friday	58"	
Saturday	29"	Used almost 30" since Friday morning
Sunday	6"	Out of nitrogen sometime Sunday

Filled sometime Sunday evening.

AIR LIQUIDE AMERICA CORPORATION • Region Office • 10450 SW Tualatin-Sherwood Road, Tualatin, OR 97062-9504
Phone: (503) 454-1200 • Fax: (503) 692-4815

KOPPERS INDUSTRIES

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Telephone: (412) 227-2001

May 17, 1999

PRAXAIR, Inc.
Attention: Lisa

Fax: 800/772-9980

SUBJECT: Liquid Nitrogen Storage and Evaporation System

Koppers Industries, Inc. is making modifications to its facility in Portland, Oregon and in need of the following equipment as described in the attached specification 6526AS04.

It is suggested a site visit be arranged with Koppers Industries, Inc. Plant Manger, Amos Kamerer, 503/286-3681, to enable a complete bid to be prepared.

Schedule requirements are currently dictating a requirement for Nitrogen on October 1, 1999.

Any questions should be directed to me at 412/227-2265, fax 412/227-2395. Your proposal is required by June 15, 1999.

Very truly yours,

Jack L. Stephenson
Manager of Purchasing

JLS/sad

CC: Amos Kamerer, Portland, OR

PRAXAIR

Luis Flores Jr.
Senior Sales
Representative

Praxair, Inc.
2902 20th Street East
Tacoma, WA 98424
Tel (253) 926-7255
Fax (253) 922-3015
Paging 1 (800) 590-5765
email luis_flores@praxair.com

Making Our Planet More Productive

KOPPERS INDUSTRIES

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Telephone: (412) 227-2001

May 17, 1999

Air Liquide America Corp.
Attention: Lynn Rossi
10350 S.W. Tualation Sherwood Road
Tualation OR 97062

Fax: 703/691-7150

SUBJECT: Liquid Nitrogen Storage and Evaporation System

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It is suggested a site visit be arranged with Koppers Industries, Inc. Plant Manger, Amos Kamerer, 503/286-3681, to enable a complete bid to be prepared.

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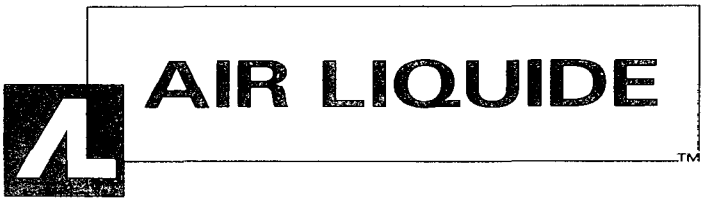
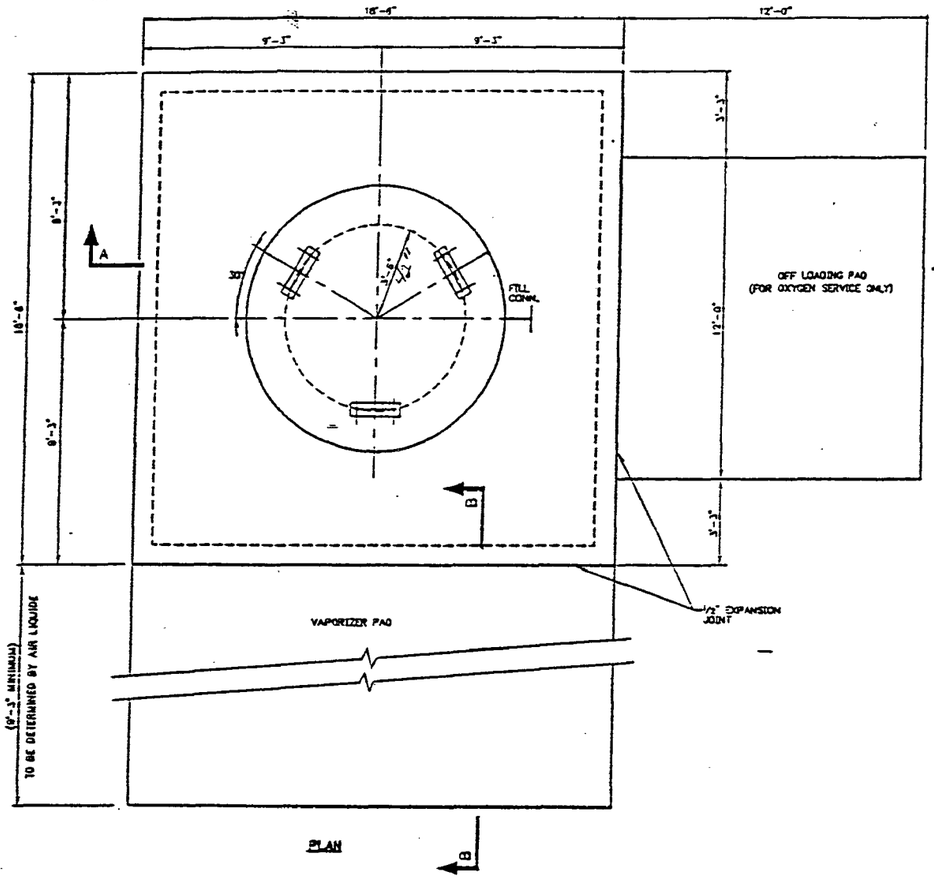
Jack L. Stephenson
Manager of Purchasing

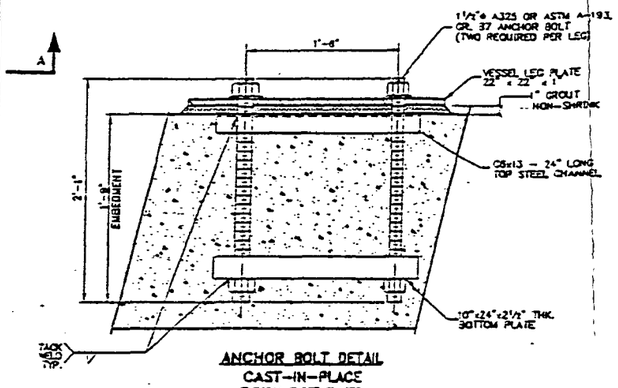
JLS/sad

CC: Amos Kamerer, Portland, OR

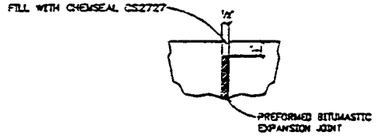

AIR LIQUIDE
TM



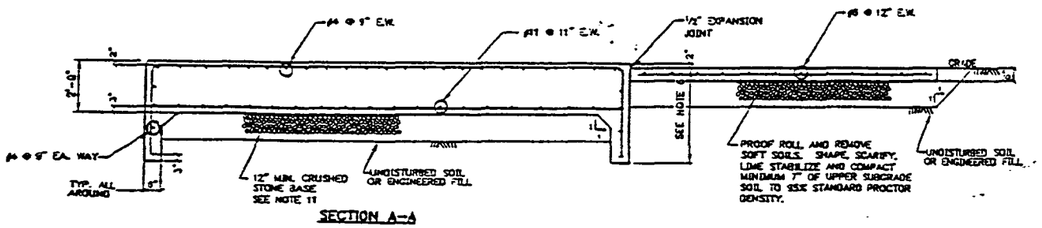
PLAN



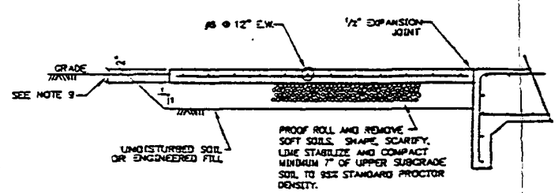
ANCHOR BOLT DETAIL
CAST-IN-PLACE
TYPICAL THREE PLACES
SEE NOTE 13b
NOT TO SCALE



EXPANSION JOINT DETAIL
SEE NOTE 14



SECTION A-A



SECTION B-B

GENERAL NOTES:

1. ALL PERMITS/APPROVALS ARE THE RESPONSIBILITY OF THE CUSTOMER AND SHALL BE OBTAINED PRIOR TO CONSTRUCTION.
2. IT IS THE RESPONSIBILITY OF THE CUSTOMER TO INSURE THAT THIS FOUNDATION IS CONSTRUCTED PER THIS DRAWING. AIR LIQUIDE SPECIFICALLY RECOMMENDS INSPECTION OF ALL EMBEDDED ITEMS PRIOR TO POURING CONCRETE.
3. LOCATION OF OXYGEN SYSTEMS MUST CONFORM TO THE RECOMMENDATIONS OF THE NATIONAL FIRE PROTECTION ASSOCIATION AND THE UNIFORM FIRE CODE, AS WELL ANY LOCAL CODES.
4. THE SITE SHALL BE LOCATED SUCH THAT DRAINAGE AWAY FROM THE FOUNDATION IS ASSURED.
5. SOIL MUST BE CAPABLE OF 3,000 P.S.F. NET ALLOWABLE BEARING CAPACITY AT THE DEPTHS INDICATED. IF THIS CANNOT BE SUSTAINED, CONSULT LOCAL PROFESSIONAL ENGINEER FOR SPECIFIC DESIGN RECOMMENDATIONS.
6. FOUNDATION DEPTH (OR FROST SKIRT) MUST BE BELOW LOCAL FROST LINE, AND MEET LOCAL CODES.
7. FIELD VERIFY THE LOCATION AND DEPTH (OR HEIGHT) OF ALL UTILITIES PRIOR TO BEGINNING CONSTRUCTION IN ORDER TO PROVIDE ADEQUATE CLEARANCES AND TO INSURE NO INTERRUPTION OF SERVICES.
8. STORAGE VESSEL SHALL BE LOCATED IN THE CENTER OF THE STORAGE VESSEL FOUNDATION, AS SHOWN IN THE PLAN. VESSEL CAN BE ROTATED AS REQUIRED TO TO ORIENT FILL CONNECTION.
9. VAPORIZER PAD DEPTH (MIN. 5') AND ANCHORING MUST COMPLY WITH LOCAL BUILDING

CONSTRUCTION NOTES:

10. MATERIAL AND WORKMANSHIP SHALL CONFORM WITH APPLICABLE BUILDING CODES AND BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE FOLLOWING STANDARDS:

    ACI 117 "STANDARD SPECIFICATIONS FOR TOLERANCE FOR CONCRETE CONSTRUCTION AND MATERIALS"
    ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS".
    ACI 318 "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE"
    AWS D1.1 "STRUCTURAL WELDING CODE – STEEL"

11. THE SITE SHALL BE CLEARED OF ALL ORGANIC MATERIAL AND TOP SOIL. PLACE 12" CRUSHED STONE BASE ON UNDISTURBED SOIL OR ENGINEERED FILL. COMPACT TO A MINIMUM OF 95% PROCTOR (ASTM D1557).
12. CONCRETE:
    a. 28 DAY ULTIMATE COMPRESSIVE STRENGTH OF 3,000 PSI.
    b. PORTLAND CEMENT: ASTM C 150, TYPE I.
    c. MAXIMUM WATER-CEMENT RATIO: 0.45.
    d. WATER-REDUCING ADMIXTURES: ASTM C494.
    e. NORMAL WEIGHT AGGREGATES: ASTM C33.
    f. AIR ENTRAIN ALL EXTERIOR CONCRETE (ADMIXTURE: ASTM C260).
    g. DO NOT USE CALCIUM CHLORIDE ADMIXTURES UNDER ANY CIRCUMSTANCES.
    h. REINFORCING BARS: ASTM A 615 SPECIFICATIONS, GRADE 60, DEFORMED. BEND BARS COLD.
    i. LAP ALL BARS AT SPLICES IN ACCORDANCE WITH ACI 318, BUT NOT LESS THAN 40 BAR DIAMETERS NOR LESS THAN 18" UNLESS OTHERWISE NOTED.
    j. ALL BAR STEEL SHALL BE PROPERLY SUPPORTED AND HELD ACCURATELY IN PLACE AS RECOMMENDED BY THE CRSI, EXCEPT THAT MAXIMUM SPACING OF ANY BAR SUPPORT SHALL BE 3 FEET.
    k. ALL EXPOSED EDGES OF CONCRETE SHALL HAVE ¾" 45° CHAMFER.
    l. CONCRETE SURFACE TO BE BROOM FINISHED
13. STEEL:
    a. STRUCTURAL STEEL: ASTM A36, PLATES AND SHAPES.
    b. CAST-IN-PLACE ANCHOR BOLTS:
       - ASTM A325 OR ASTM A-193, GR. 37
       - CONFIRM WITH AIR LIQUIDE REPRESENTATIVE FOR EXACT ANCHOR BOLT ORIENTATION.
       - PROTECT ANCHOR BOLTS FORM CONSTRUCTION ACTIVITY UNTIL THE TANK IS IN PLACE.
    c. WELDING ELECTRODE – E70XX
    d. GROUT PLATES ARE PRE-DRILLED. PAINT ALL EXPOSED PARTS WITH ZINC COATING OR APPROVED EQUIVALENT.
    e. USE OF DRILLED ANCHOR BOLTS IS NOT ALLOWED.
14. EXPANSION JOINTS SHALL BE PLACED AT ALL LOCATIONS NOTED ON THE DRAWING AND AROUND FOUNDATIONS WHICH PROJECT THROUGH CONCRETE SLABS. FOR NITROGEN/ARGON: AND CARBON DIOXIDE FOUNDATIONS A BITUMASTIC PREFORMED EXPANSION JOINT SHALL BE USED. FOR OXYGEN/HYDROGEN FOUNDATIONS THE EXPANSION JOINTS SHALL BE MADE OF CS2727 FLEXIBLE EPOXY JOINT SEALER, MANUFACTURED BY CHEM SEAL DIVISION OF FLAMEMASTER CORP., 11120 SHERMAN WAY, SUNVALLEY, CALIFORNIA 91352, (818)982-1650.
15. SYSTEM TO BE GROUNDED, IF NECESSARY, PER LOCAL CODES.

DESIGN CRITERIA

UBC 1994 NON-ESSENTIAL FACILITY
BOCA 1996 CATEGORY I FACILITY
SBC 1994 CATEGORY I FACILITY
100 MPH BASIC WIND SPEED

SEISMIC ZONE 2B

13,000 GALLON STORAGE TANK
WEIGHT (EMPTY) = 33,300 LBS.
WEIGHT (FULL OF O2) = 175,400 LBS.
HEIGHT = 26'-11"

FOR DESIGN CALCULATIONS, ASSUMPTIONS, AND INTERPRETATIONS SEE LAW ENGINEERING JOB NO. 50140-96-5103

STATE OF TEXAS – 77084 – REGISTERED PROFESSIONAL ENGINEER

7-10-96

CONFIDENTIAL

REV	DATE	DESCRIPTION
1	7-10-96	ISSUED FOR DISTRIBUTION

DRAWN BY: C. WALKER
DATE: 5-4-96
CHECKED BY: CHAD LARUN
COMPUTER FILE: STF1087

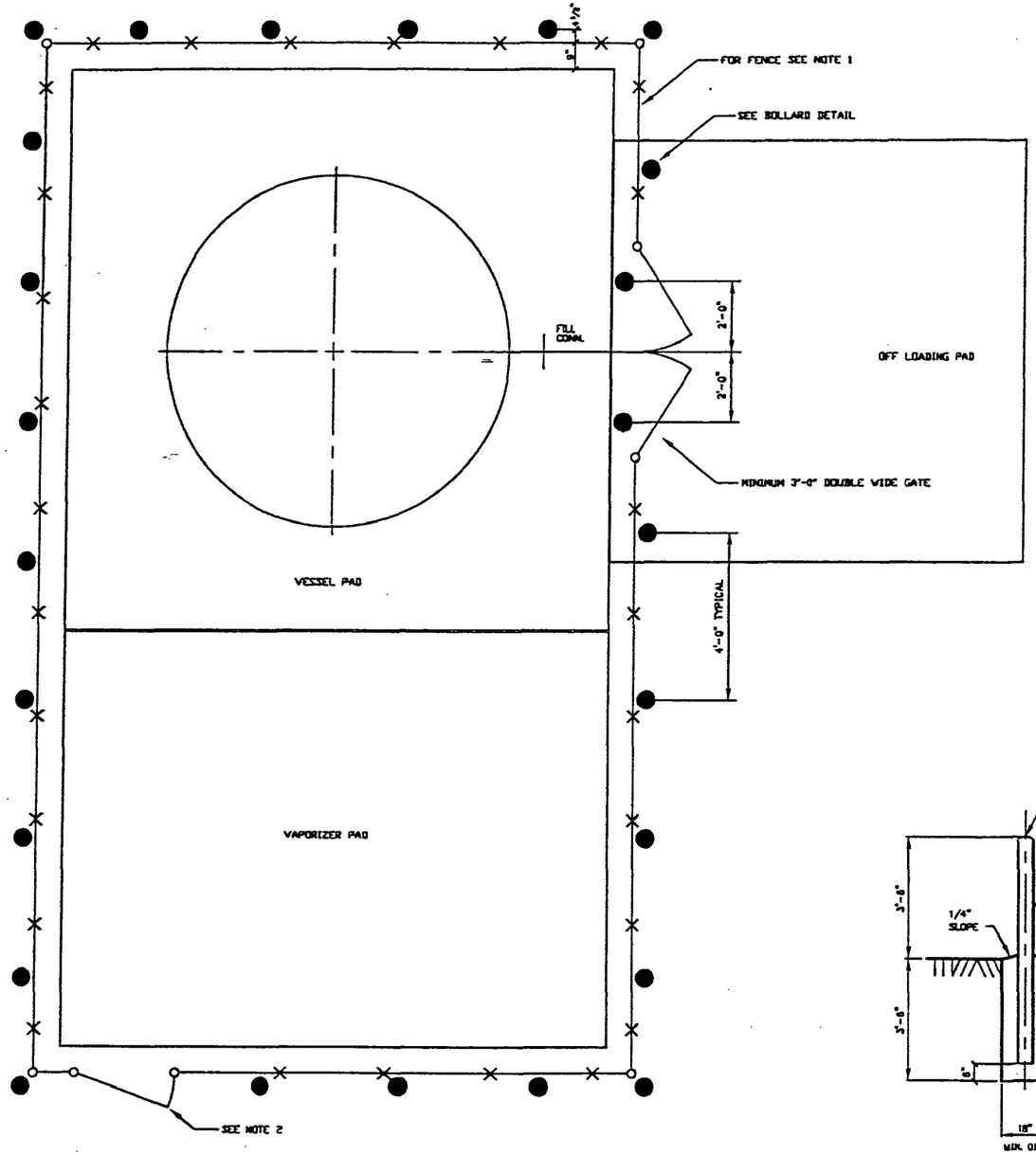
AIR LIQUIDE

AIR LIQUIDE AMERICA CORP.
HOUSTON, TEXAS

VERTICAL STORAGE VESSEL FOUNDATION
SEISMIC ZONES: 3, 4
9000, 11000, 13000 GAL. OXYGEN, NITROGEN SERVICE
9000, 11000 ARGON SERVICE

SCALE: 3/8"=1'-0"
DWG. NO.: STF 1087

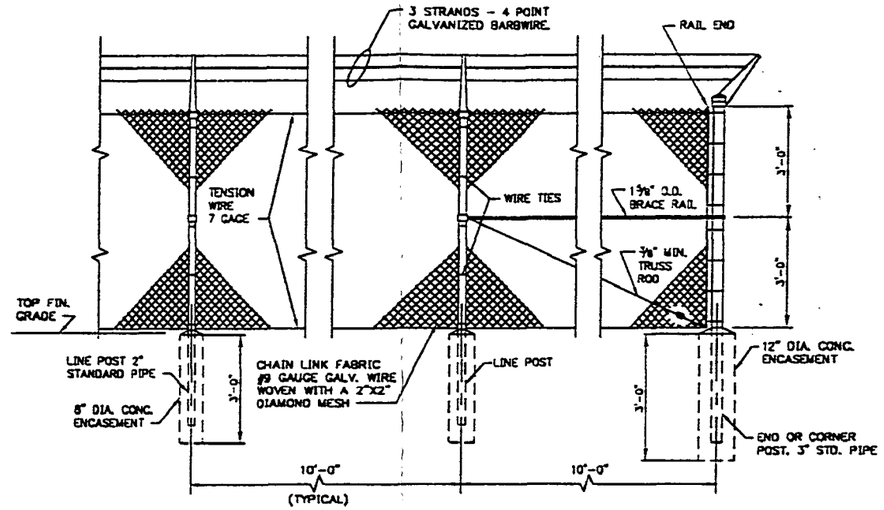
Koppers010404



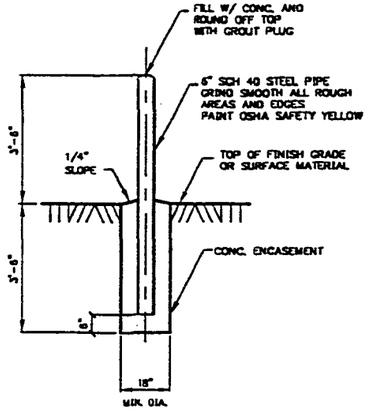
PLAN

GENERAL NOTES

1. THE MINIMUM REQUIREMENT SHALL BE A FENCE OF CHAIN LINK CONSTRUCTION, HAVING A MINIMUM HEIGHT OF SIX FEET AND TOPPED WITH AT LEAST THREE STRANDS OF BARBED WIRE OR ACCORDING TO LOCAL BUILDING STANDARDS.
2. MAN GATE 3'-0" REQUIRED FOR OXYGEN SERVICE ONLY.
3. OFF LOADING PAD REQUIRED FOR OXYGEN SERVICE ONLY.
4. QUANTITY AND LOCATION OF BOLLARDS TO BE DETERMINED BY VEHICULAR TRAFFIC PATTERNS, TYPICALLY ON 4'-0" CENTERS.
5. NEITHER THE FENCE NOR BOLLARDS SHALL BE LOCATED ON THE VESSEL PAD OR VAPORIZER PAD.



FENCE DETAIL
NTS



BOLLARD DETAIL
SCALE 1/2"=1'-0"

CONFIDENTIAL

REV	DATE		REV	DATE		REV	DATE			
								DATE 1-31-97	DRAWN BY C. WALKER	
								JOB No.	CHECKED BY BILL SPITZER	
								COMPUTER FILE STA1023	APPROVED	

AIR LIQUIDE

AIR LIQUIDE AMERICA CORP.
HOUSTON, TEXAS

STANDARD FENCE ARRANGEMENT FOR LIQUID VESSEL INSTALLATIONS

SCALE 1/2"=1'-0" | REV. No.
DWG. No. STA 1023

Koppers010405

AIR LIQUIDE

June 10, 1999

Mr. Jack L. Stephenson
Manager of Purchasing
Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Dear Jack:

Thank you for giving me the opportunity to meet with you and supply this pricing proposal for the planned bulk liquid nitrogen system. Air Liquide American is a full service industrial gas company with the ability to provide your needs out of two plants in the northwest. In the Portland area, our main source for liquid nitrogen would be our air separation plant in McMinnville, OR with backup supply out of our other plant in Kent, WA. We are the only industrial gas company with two full source air separation plants in the northwest. We are also able to provide emergency nitrogen tube trailers out of our fill plant in Tualatin if a need should exist.

We provide 24 hour a day distribution of product and service technicians to handle any concerns that may arise. Our nitrogen system will be equipped with a telemetry monitoring unit to provide our central dispatch with constant updates on the liquid level of the tank for assurance of consistent supply.

Based on the equipment specification and our discussions yesterday in which we estimated your flow patterns, I would like to propose the following pricing:

Monthly lease on the equipment	$700.00
Nitrogen Product Pricing	$0.39/100scf

The system equipment will consist of a 3000 gallon cryogenic tank along with oversized vaporizers to handle your peak flows and initial purging procedures. The vaporizers will be rated to provide 8300scfh for 8 hours at 70 degrees. An additional pressure builder vaporizer will be required to maintain the set pressure in the tank when drawing 3000scfh for a number of hours. The TeleFlo monitoring system will be necessary when drawing at this heavy usage.

This pricing would be based on the signing of a mutually acceptable 7 year product supply agreement. As part of this agreement, Air Liquid would fully deliver, set, anchor, pipe and test the system at no extra charge. We would provide regulators and relief valves for the system in addition to setting the pressure and flow according to your

AIR LIQUIDE AMERICA CORPORATION • Region Office • 10450 SW Tualatin-Sherwood Road, Tualatin, OR 97062-9504
Phone: (503) 692-2716 • Fax: (503) 692-4815

requirements. Wet stamp drawings of the tank pad area will be supplied upon agreement signing. The filing of the tank pressure permit will be the responsibility of Air Liquide.

Koppers would be responsible for providing the concrete pad for the equipment per the specifications provided by Air Liquide along with piping to the pad area from your process use point. Lighting should be available for night deliveries. Koppers will need to contract out for the installation of the fencing and gate on the system since this is normally not provided by Air Liquide service staff. We will supply a standard master lock for the gate in order to have complete access for our distribution and service technicians. A key for this lock will also be provided to Koppers for your access needs. The telemetry monitoring unit will require a voice grade designated phone line with 110 power availability.

I look forward to discussing this proposal more in depth with you and, hopefully, having the opportunity to supply your nitrogen needs. I have included a sample of our standard bulk agreement for your review and comments along with pad specifications for both 3000 and 9000 gallon tanks. Fencing specifications are also enclosed in addition to a standard certificate of insurance.

Sincerely,

M. Lynn Rossi
Account Manager

Cc: Mr. Amos Kamerer
Mr. Bill Meisinger
Mr. Charles Norris
Mr. Cameron McKernan

AIR LIQUIDE AMERICA CORPORATION
BULK PRODUCT AGREEMENT

This is an Agreement, dated, for reference purposes only, June 8, 1999 ,
between the following Parties:

AIR LIQUIDE AMERICA CORPORATION ("Supplier"), with a place of business at

10450 SW Tualatin Sherwood Road, Tualatin, OR 97062

AND **SAMPLE**

Koppers Industries, Inc. ("Customer"),

with a place of business at _____

and having a plant or plants at _____

(the "Facilities").

Supplier and Customer agree as follows:

AIR LIQUIDE™

SALE AND PURCHASE OF PRODUCT

1. EXCLUSIVE SUPPLY AGREEMENT

1.1 Supplier agrees to sell and Customer agrees to purchase, subject to the conditions of this Agreement, Customer's entire requirements of the following products ("Product"), at the following Facilities, at the following prices, charges and fees ("Price"):

FACILITY	PRODUCT	PRICE (S/100 SCF)	CARTAGE CHARGES (S/100 SCF)	MONTHLY FACILITY FEE (S/MONTH)	ESTIMATED MONTHLY VOLUME (SCF/MONTH)
rtland, OR	Nitrogen	$0.42/100	-0-	$625.00	350,000

SAMPLE

"SCF" means Standard Cubic Foot measured at 70 degrees at one atmosphere of pressure.

1.2 The Product shall be for Customer's own use, and not for resale, unless specifically agreed to by a signed resale addendum. At Supplier's option, this Agreement shall also include Customer's entire requirements of the Product at any location to which any significant part of Customer's operations at the Facilities may be relocated.

1.3 In view of Supplier's considerable investment in the Systems (Sec. 4.1 a) and in its related production and transportation systems, Customer agrees not to acquire or use any Product or substitute(s), in liquid or gaseous form, from any other source or supplier, or by any other means, without Supplier's consent. Substitute(s) shall include but not be limited to on-site or off-site generating systems, pipelines, mixtures of products, and cylinder products.

2. TERM

2.1 The Term of this Agreement shall be seven (7) years beginning on Oct 1, 1999 ("Initial Term"). After the Initial Term, the Term shall automatically renew from year-to-year, unless either party gives a termination notice at least 12 months before the expiration of the Initial Term or the year-to-year renewal then in existence.

3. DELIVERIES

3.1 All Product shall be delivered F.O.B. Supplier's delivery vehicle to the storage Systems. Title and risk of loss pass to Customer upon delivery.

3.2 Even if Supplier installs a telemetry system for measuring tank volumes, it is Customer's obligation to monitor the Product inventory levels in its storage system and to provide Supplier with sufficient delivery notice when ordering Product.

3.3 Supplier is not obligated to deliver Product in amounts less than 75% of the capacity of the Systems or more than 110% of Customer's average monthly purchases over the previous 6-month period. When requested, Supplier will make reasonable efforts to supply more, but the Customer will have to pay all additional costs associated with the additional supply.

3.4 If Supplier is unable to supply Products to Customer, Customer may obtain replacement products elsewhere and place them in the Systems for that period of time that Supplier is unable to supply Customer. This right is subject to Supplier's prior consent, which shall not be unreasonably refused. During this period Customer shall make sure that the Systems are not damaged and shall compensate Supplier if any damage occurs.

3.5 Customer will allow Supplier to make deliveries 24 hours a day, 7 days a week.

3.6 a) Deliveries at any time during any labor disturbance affecting Customer shall be at Supplier's sole option.

b) If Supplier does deliver during a labor disturbance affecting Customer, then, despite Section 10.1 of this Agreement, Customer assumes the entire risk and agrees to compensate Supplier for any additional costs and all damages (including but not limited to lawyers' fees) related to the disturbance, and all liabilities and damages attributable to the negligence or willful acts of Supplier or persons for whom Supplier is responsible.

3.7 Deliveries of Product shall be measured by Supplier, using the method regularly used by Supplier for the type of delivery made.

4. OBLIGATIONS RELATING TO STORAGE SYSTEM

4.1 Supplier shall at its expense:

a) install at the Facilities, on Customer's concrete foundations or equivalent acceptable to Supplier, storage system(s) selected by Supplier, complete with safety and control apparatus ("Systems"), and connect the Systems to piping installed by Customer; and

b) maintain the Systems in accordance with good industrial practice.

4.2 Customer shall at its expense:

a) provide and maintain throughout the Term a safe site acceptable to Supplier for the Systems, including:

i) a concrete foundation or equivalent acceptable to Supplier;
ii) a piping system in accordance with the laws and regulations for handling of the Product from the Systems;
iii) fencing and security measures to insure continuous protection of the Systems;
iv) hard-surfaced access and parking for Supplier's vehicles (SURFACE AT UNLOADING AREA MUST BE CONCRETE IF PRODUCT INCLUDES LIQUID OXYGEN OR HYDROGEN);
v) light and power as specified by Supplier and phone lines and phone service for a telemetry system if Supplier installs one; and
vi) continuous access to the Systems for Supplier's representatives and vehicles.

b) maintain adequate fire and extended coverage insurance on the Systems, with loss payable to Supplier. Since the Systems are in Customer's custody, all risks of loss or damage to the Systems, except loss or damage solely caused by Supplier's negligence, are assumed by Customer until return of the Systems to the Supplier. Customer shall pay the full cost of repair, or, if the equipment is not repairable, the full replacement cost.

c) ~~Notify Supplier immediately of any damage, malfunction or change relating to the Systems.~~

d) make sure that the Systems, which shall remain Supplier's property at all times, are kept free of all liens and other claims by third partie

e) ~~allow the Systems to be removed at Customer's expense regardless of when or why they are removed.~~ If the Systems are remove before the end of the Initial Term, Customer shall reimburse Supplier for all unamortized installation and shipping costs, base on an 84 month amortization schedule.

4.3 Customer shall at its expense maintain and keep free from contamination any equipment that is provided by Customer.

5. SUBSTITUTE SYSTEMS

5.1 If Supplier determines, ~~after giving Customer advance notice and opportunity to comment~~ and upon mutual agreement by customer, that the Systems require relocation c modification, Supplier may, ~~at its option~~, carry out the relocation or modification. In that case, the Term of the Agreement will b extended to a period that is the same length as the original Initial Term and begins on the date of the completion of the relocation c modification. The Facility Fee may be adjusted appropriately, and Customer's rights under Section 6 of this Agreement shall not app to the adjustment.

6. REVISIONS OF PRICES

6.1 From time to time Supplier shall have the right to revise the Prices for one or more of the Product(s) by notice to Customer and:

a) Within 15 days after the date of the notice, Customer shall have the right to deliver to Supplier a copy of a current written quote received from a responsible supplier, for the sale of like quantities of the Product(s) concerned on similar terms and at a lowe price or prices.

b) If Customer does not submit a quote within 15 days, the new Prices shall apply.

c) If Customer does submit a quote within 15 days, Supplier shall have 15 days to match the quoted price, or go back to the Pric that preceded the increase, or do neither.

If Supplier matches or goes back, the Term of this Agreement shall be extended to a period that is the same length as the origina Initial Term and begins on the date of Supplier's price increase notice.

d) If Supplier does not match the quoted price or go back to the Price that preceded the increase with regard to a particular Product(s Customer may cancel this Agreement with regard to that Product(s) by giving Supplier written notice. Whether or not Custome cancels, Supplier's new Price shall become effective on the 60th day following the date of Supplier's price increase notice.

Customer's cancellation notice must be given no later than 10 days after the 15 day period allotted to Supplier for matching o going back, and must give a specific cancellation date that is no later than 60 days after the date of Supplier's price increase notice If the cancellation notice does not comply with those requirements, or if Customer takes any deliveries of the cancelled Product(s from Supplier after the given cancellation date, the cancellation will be void and this Agreement will remain in effect for the remainder of the Initial Term and any applicable year-to-year renewal after that.

GENERAL CONDITIONS

7. PAYMENT

7.1 Accounts are payable within 10 days after date of invoice at the address shown on the invoice. All taxes on, or with respect to the sale, delivery, storage or use of, the Product or Systems, are payable by Customer. If Customer does not pay on time, Supplier may place Customer on a pre-pay basis which may also require payment of past due amounts on a schedule determined by Supplier. Supplier may also take any other appropriate legal action.

8. EXCUSE OF PERFORMANCE

8.1 Supplier shall not be liable for failure to perform in the event of circumstances beyond its reasonable control.

8.2 If sufficient Product from Supplier's normal sources of supply becomes unavailable, Supplier will divide available Product among its various customers, and will make every reasonable effort to obtain Product from other sources, provided Customer agrees to pay al additional costs associated with such Product.

9. WARRANTIES

9.1 Supplier warrants that the Product complies with the Compressed Gas Association's standards and Supplier's standard specifications, if any.

9.2 If the Product does not conform to warranty, Customer's sole remedy is to require Supplier to replace the Product at no cost to Customer. In order for Supplier to be able to properly investigate, Customer must notify Supplier of all claims relating to Product within 15 days after delivery. Otherwise, Customer loses its right to make a claim.

SUPPLIER MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

10. INDEMNITY AND LIMITATION OF DAMAGES

10.1 If there is an injury, loss or damage to the person or property of either Party or any third party, the Parties shall share the responsibility for it based on the relative amount of negligence attributable to each Party. For example, if injury to an employee of Customer is causec 65% by Supplier's negligence and 35% by Customer's negligence, 65% of the cost relating to the injury will be paid by Supplier and 35% will be paid by Customer. Neither party shall ever be liable to the other for non-economic, indirect, punitive, or consequential damages or downtime claimed by the other.

11. WARNING CONCERNING HAZARDOUS NATURE OF PRODUCTS. TRAINING PROGRAMS

11.1 Customer recognizes that the Products are hazardous chemicals, classified as such by the U.S. Occupational Safety and Health Administration ("OSHA"), and that there are hazards associated with the possession and use of the Products and the Systems.

11.2 Customer acknowledges that it understands the hazardous nature of the Products and Systems and that it will warn, protect and train, as appropriate, all persons who may be exposed to those hazards. Customer also acknowledges that Supplier has provided it with all relevant Material Safety Data Sheet(s). Supplier will provide additional Material Safety Data Sheets upon request (up to 50 copies free). Customer is aware that OSHA regulations may require Customer to develop and implement a written chemical hazard communications program for Customer's employees with respect to the Products.

11.3 Customer understands that the Products must not be used without first consulting the Material Safety Data Sheet(s). Customer shall make sure that all employees, customers and persons who might become exposed to the Products receive and refer to copies of the Material Safety Data Sheet(s).

12. COMPLIANCE WITH LAWS

12.1 Customer shall conform to all laws, ordinances, rules and regulations now in force or hereafter adopted which relate to and/or have jurisdiction over the purchase, storage or use of the Product, use of the Systems, and all other aspects of Customer's operations. Customer shall obtain all permits, licenses and consents required by such laws, ordinances, rules and regulations, and it is the responsibility of Customer to comply with all relevant reporting obligations under the Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. Sec 11001-11049 [EPCRA, also commonly known as Title III of the Superfund Amendments and Reauthorization Act of 1985 (SARA Title III)] resulting from the presence of the chemicals (the Product) supplied under the Agreement. In that regard, Customer agrees to file annually, pursuant to SARA Title III, Section 312, and EPA regulations promulgated thereunder, the EPA Tier I or II inventory form covering the Product. Further, it is the responsibility of the Customer, as stated above, to warn and protect its employees and others exposed to the hazards posed by Customer's storage and use of the Product.

13. GENERAL PROVISIONS

13.1 **Declaration of Intent.** Supplier has made a special effort to write this Agreement in plain English. When words or expressions of a general nature are used, it is intended that they be comprehensive, unless the context clearly dictates otherwise.

13.2 **Assignment.** This Agreement shall be binding on the Parties, their successors and assigns, including any corporation with which either Party may merge or consolidate or to which either may transfer all or a material amount of its assets at the Facilities. Customer shall obtain a written assumption of this Agreement, in form acceptable to Supplier, from any such transferee of Customer's assets.

13.3 **Controlling Law.** This Agreement shall be controlled by the laws in force in the State of _____. The invalidity or unenforceability of any provision of this Agreement under the laws of any state in which the Agreement is in effect shall not affect the validity or enforceability of any other provision of this Agreement.

13.4 **Equal Opportunity.** Customer's attention is directed to Section 202 of U.S. Executive Order 11246, paragraphs 1-7 "Equal Opportunity Clause", Section 60-741 and Section 60-250.4 "Affirmative Action Clause", incorporated herein by reference.

13.5 **Further Assurances.** Both Parties agree to sign all documents and do all things necessary or appropriate, in a timely manner, to give effect to the intent of this Agreement.

13.6 **Modifications.** This Agreement constitutes the entire agreement between the Parties concerning the subject matter of the Agreement. No provision of any purchase order of Customer shall alter or add to the terms of the Agreement, and any such provisions shall be void. No modification of this Agreement shall be binding unless it is in writing and signed by an authorized representative of each Party.

13.7 **Notices.** Any notices given in connection with this Agreement shall be sent or delivered in writing to the receiving Party at its address above or any substitute address that the Party might provide by giving notice under this Agreement. Notice shall be deemed given on the day on which it is sent by prepaid mail or fax, or hand delivered, to the receiving Party.

13.8 **Waiver.** The waiver by either Party of any of its rights under this Agreement shall not be construed as constituting a precedent.

14. CORPORATE REVIEW.

14.1 Within thirty (30) days after signing and return of this Agreement by representatives of Supplier and Customer, Supplier's corporate headquarters office shall have the right to review and cancel this Agreement.

5. FREEDOM TO CONTRACT

15.1 Customer represents that, throughout the Term, it shall be free to meet all obligations under this Agreement and shall not be bound by a conflicting agreement. Customer shall fully indemnify Supplier against all damages it may suffer if Customer's representation is not correct.

CCEPTED FOR CUSTOMER	ACCEPTED FOR SUPPLIER AIR LIQUIDE AMERICA CORPORATION
Koppers Industries, Inc.	
Y: _____	BY: _____
AME: _____ Print Name	NAME: _____ Print Name
ITLE: _____	TITLE: _____
ATE: _____	DATE: _____

KOPPERS
INDUSTRIES

Koppers Industries, Inc.
7540 N.W. Saint Helens Road
Portland, OR 97210-3663

Telephone: (503) 286-3681
FAX: (503) 285-2831

Amos S. Kamerer
Regional Sales Manager

April 15, 1998

To: All General Use Creosote Customers

This is to advise you that effective December 31, 1998 the Portland, Oregon Terminal will no longer offer General Use Creosote for Sale.

Effective January 1, 1999 Koppers Industries will only offer the sale of General Use Creosote in 5 gallon pails or 55 gallon drums, from our Follensbee, West Virginia plant. Orders may be placed by calling the Pittsburgh, Pennsylvania Sales Office at # 1-800-321-9876, or by sending a facsimile to # 1-412-227-2002

Thank you for your understanding.

Sincerely,

A. S. Kamerer

KOPPERS INDUSTRIES

Koppers Industries, Inc.
7540 N.W. Saint Helens Road
Portland, OR 97210-3663

Amos S. Kamerer
Regional Sales Manager

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Sincerely,

A. S. Kamerer

KOPPERS INDUSTRIES

File

INTEROFFICE CORRESPONDENCE

To: See Below

From: L. F. Flaherty

Location:

Location: K-1750

Subject: Emergency Response - HM-126C

Date: December 28, 1990

To: G. E. Trent
T. A. Golubic
R. J. Morris
K. J. Fitzgerald
J. A. Oxford
A. Kamerer

As a reminder, I have attached Jay Sebbens memo of December 18, 1990 regarding the Hazard Communications Documents that must accompany each shipment after the first of the new year.

Make certain we are in compliance with this new requirement.

L. F. Flaherty

LFF/bjs

Attachment

KOPPERS INDUSTRIES HAZARDOUS MATERIALS NEWSLETTER

See Attached List — Transportation Dept.

Various — K-2050, Pgh, PA

EMERGENCY RESPONSE COMMUNICATION STANDARDS HM-126C — December 18, 1990

The mandatory requirement to provide emergency response information with all hazardous shipments WILL BECOME EFFECTIVE JANUARY 1, 1991 under Docket HM-126C. In prior newsletters, various alternatives were discussed to comply with the new regulations from providing an MSDS to requiring all carriers to acknowledge their possession of the DOT Emergency Response Guidebook. The most economical, efficient and effective means of compliance is providing a one page attachment to our bills of lading that fulfills the DOT requirement and at the same time does not place any undue burden on our shipping locations.

Attached for your use are preprinted Emergency Response Guides that correspond to the proper shipping names for our products. A list of proper shipping names is also attached for your review. Beginning January 1, 1991 a copy of the appropriate ER guide(s) must be attached to the shipping papers for all shipments of hazardous materials or substances. If billing is provided to the carrier via fax, the guide must also be provided in this manner.

Empty tank cars that have not been cleaned and purged of vapors will also be subject to the same requirements. This is important since all wood operations facilities receiving raw materials via tank cars must provide the same guide back to the railroad with the car's empty return instructions.

This new rule will affect all shipments and modes regardless of quantity as long as the material is regulated as a hazardous material or substance. There may be an occasion where an appropriate ER guide is not available for the product. In cases such as this, the applicable guide may be obtained from the DOT Emergency Response Guidebook. Copies are available for purchase from Labelmaster. Further, there are always instances that may not fit our plan for compliance. Included with the attached guides are blank forms without proper shipping names that you may type in the appropriate proper shipping name after consulting the guidebook. Please discuss any unique situation with the undersigned if no ER Guide is available or if procedures prevent providing a guide to a carrier.

Each location is receiving a complete set of guides; many of which you may not need to use.

The guides are not product specific. Rather, you should match the proper shipping name for the product on the bill of lading with the same name on the guide to insure using the appropriate guide. As always, if you have any questions or problems, please contact me if I can provide any assistance.

Thank you!

Jay

J. S. Sebbens

JSS:kas

Attachments

Approvals

Koppers Industries, Inc.
Pittsburgh, PA 15219

62-4
311

Location No. 9270 Date NOV. 21, 1996 No. 233727

Pay $45.00**********
to the order of

DEPT. OF LICENSING/BUS. & PROFESSIONS DIV.

P.O. BOX 9034

OLYMPIA, WA 98507-9034

NOT NEGOTIABLE

Payable through Mellon Bank (DE) N.A., Wilmington, DE 19899
Mellon Bank (East) N.A., Philadelphia, PA 19102

KI 179 3/90 10M

General Ledger	Detail	Sub Detail	Location or Contract	Dept. or Orig. Loc.	Tax Codes	Emp. No.	Purchase Order No. Rec. Id.	Br.	P.O. No.	P.O. Add	P.O. Add or Resource	Quantity			Unit Code	Amount Distributed Dollars	Cents
305	973		9270	910	0362											$45.00	

Vendor No.
9406 080 33

Description
WASHINGTON STATE PESTICIDE RENEWAL OF LICENSE

PLANT COPY

Koppers010418

Approvals

Koppers Industries, Inc.
Pittsburgh, PA 15219

62-4
311

Location No. 9270 Date Nov. 15, 1996 No. 233726

Pay $10.00**********
to the order of

Oregon Dept. of Agriculture
635Capitol St. NE
Salem, OR 97310-0110

NOT NEGOTIABLE

Payable through Mellon Bank (DE) N.A., Wilmington, DE 19899
Mellon Bank (East) N.A., Philadelphia, PA 19102

KI 179 3/90 10M

General Ledger	Detail	Sub Detail	Location or Contract	Dept. or Orig. Loc.	Tax Codes	Emp. No.	Purchase Order No. Rec. Id.	Br.	P.O. No.	P.O. Add.	P.O. Add. or Resource	Quantity	Unit Code	Amount Distributed Dollars	Cents
305	973		9270	910	0362									$10.00	

Vendor No.: 9466 26 013

Description: Renewal of pesticide dealer license

PLANT COPY

Koppers010419

OVERNITE TRANSPORTATION CO.(OVNT)

ORIGINAL FREIGHT BILL

REMIT TO: P.O. BOX 905385 CHARLOTTE, NC 28290-5385

ORIGINAL INVOICE: PAYMENT DUE BY: 10-01-1996

DATE	ORIGIN	OVNT.REV.	ADVANCE REV.	BEYOND REV.	DESTINATION	FREIGHT BILL NO.
9-11-1996	POR	49.49	0.00	0.00	LOS	716675083

CONSIGNEE

VASS INDUSTRIES INC
% POLYCOAT PRODUCTS
14722 SPRING AVE
SANTA FE SPRINGS, CA 90670

P.O. NO. NONE

FOR OFFICE USE ONLY 137100611

B/L NO. 9270002115

200

ROUTE(CARRIERS,F/B NO. AND DATE,JUNCTIONS)

SHIPPER 137100611

KOPPERS INDUSTRIES INC
COMML RFG DEPT
7540 NW ST HELENS RD
PORTLAND, OR 97210-3697

BILL TO 137100611

KOPPERS INDUSTRIES INC
COMML RFG DEPT
7540 NW ST HELENS RD
PORTLAND, OR 97210-3697

NO. PCS.	HM	PKG	DESCRIPTION OF ARTICLES AND SPECIAL MARKINGS	WEIGHT	NMFC	RATE	CHARGES
2	X	PL	SEALER ASPHALT SURFACE PAVEM COAT TAR REFINED OR PETROLEUM BASE OTHER REGULATED SUBSTANCES LIQUID, NOSNA3082,9,PGII,LIQUID NOS, CLASS 55	100	035320-00	MIN	108.35
			55.00% DISCOUNT			55.00%	-59.59
			LTL FUEL ADJUSTMENT			1.00	.73
2			TOTAL	100			
			AMOUNT DUE				49.49 PPD
			EMERGENCY PHONE# 800 424 9300 CHEMTREC OVNT 6180 0003830 *OVNT00560B 01344				

TO INSURE PROPER CREDIT WE MUST HAVE A COPY OF THE INVOICE SUMMARY(REMITTANCE COPY) OR THE CORRECT FREIGHT BILL NUMBER AND AMOUNT OF EACH BILL RETURNED WITH PAYMENT. FED ID: 54-0481236 A VIRGINIA CORP.
OTHER CORRESPONDENCE SHOULD BE ADDRESSED TO P.O. BOX 1216, RICHMOND,VA. 23209-1216, PHONE 800-333-7400, DUNS# 00-599-5071

Our invoicing process is now improved for increased accuracy and speed. Invoices are now easier to read and clearly show the status of your payments. Blue logos differentiate original invoices from copies. This change is part of a new image processing system called NiteVision. This system is another effort by Overnite to give you service beyond other carriers.

KI 37G REV 2 2M 6/90

CIRCLE TERMS ON INVOICE

GIL	DET.	S-DET.	LOC.	DEPT.	TAX	EMP #	MOVE # PO #	AMOUNT
305	816		9270	9110	0362			49.49

INV # 716675083 DATE 9/11/96

A/P DEPARTMENT USE ONLY

VENDOR NUMBER 13405426 0

TERMS CODE 035 DUE DATE 11/14/96

OK TO PAY

IMPORTANT: CIRCLE TERMS ON INVOICE

GROSS AMOUNT 49.49

DISCOUNT 0

NET 0

DIVISION	MONTH	AUDIT NUMBER
483	11	969

DATE ORIG STMT	DATE SHIP	OVERNITE PRO NO	YOUR NUMBER	PAST DUE AMOUNT	RE-MARKS
FIRST NOTICE PAST DUE BILLS:					
09-16	09-11	716675083	9270002115	49.49	

"Your Prompt Attention Will Be Appreciated"

RECEIVED
OCT 28 1996
KOPPERS INDS., INC.
PORTLAND, OR

TOTAL PROS	1	TOTAL PAST DUE	49.49	200 137 000100611 (LEDGER CONTROL) #503-286-3681

OVERNITE TRANSPORTATION CO.

DATE ▶ 10-23-96 PAGE ▶ 1

PAST DUE STATEMENT

If there is any discrepancy concerning the listed past due bills which is causing payment to be withheld, please advise so we can handle accordingly. Otherwise, won't you please issue your check? If payment is in transit, we thank you.

REMIT TO

OVERNITE TRANSPORTATION CO. (OVNT)
P.O. BOX 905385
CHARLOTTE, NC 28290-5385
CORRESPONDENCE ADDRESS: P.O. BOX 1216 RICHMOND, VA. 23209-1216 (DUNS #00-599-5071)
Phone 804-231-8000 Duns #00-599-5071

KOPPERS INDUSTRIES INC
COMML RFG DEPT
7540 NW ST HELENS RD
PORTLAND OR
97210-3697

OVERNITE TRANSPORTATION CO. (OVNT)

3092

FREIGHT BILL COPY

PLEASE REMIT TO P.O. BOX 905385, CHARLOTTE, N.C. 28290-5385

PAST DUE INVOICE

TRAILER NO.	DATE	ORIGIN	OVNT. REV.	ADVANCE REV.	BEYOND REV.	DESTINATION	FREIGHT BILL NO.
	9/11/96	POR/137	4949			LOS/105	716 675 083 SYS

CONSIGNEE

VASS INDUSTRIES INC
% POLYCOAT PRODUCTS
14722 SPRING AVE
SANTA FE SPRINGS CA 90670

REFER TO THIS NUMBER ON REMITTANCE

P.O. NO. NONE

FOR OFFICE USE 137-100611 200

B/L NO 9270002115

FREIGHT BILL NO. 716 675 083

ROUTE (CARRIERS, F/B NO. and DATE, JUNCTIONS)

SHIPPER
KOPPERS INDUSTRIES INC S100611
COMML RFG DEPT
7540 NW ST HELENS RD
PORTLAND OR 972103697

BILL TO
KOPPERS INDUSTRIES INC
COMML RFG DEPT
7540 NW ST HELENS RD
PORTLAND OR 972103697

NO. PCS.	H M	DESCRIPTION OF ARTICLES AND SPECIAL MARKINGS	WEIGHT	RATE	CHARGES
2	X	PL SEALER ASPHALT SURFACE PAVEM			
		COAT TAR REFINED OR PETROLEUM			
		BASE OTHER REGULATED SUBSTANCES			
		LIQUID, NOSNA3082,9,PGII,LIQUID			
		NOS			
		*NMFC 035320-00 55	100	M	108.35
		55.00% DISCOUNT			59.59
		000150 LTL FUEL ADJUSTMENT		1.0000	.73
2		TOTAL	100		49.49 PPD
		800 424 9300 EMERGENCY PHONE#			
		CHEMTREC			

PAST DUE

CONTINUED

CERTIFIED EXACT COPY OF ORIGINAL FREIGHT BILL — PLEASE REMIT TO P.O. BOX 905385, CHARLOTTE, N.C. 28290-5385

TO INSURE PROPER CREDIT WE MUST HAVE A COPY OF PAST DUE STATEMENT, OR COPY OF EACH BILL, OR THE CORRECT FREIGHT BILL NUMBER AND AMOUNT PAID ON EACH BILL RETURNED WITH PAYMENT. CORRESPONDENCE ADDRESS: P.O. BOX 1216 RICHMOND, VA. 23209-1216 (DUNS #00-599-5071)

6

Koppers010422

OVERNITE TRANSPORTATION CO. (OVNT)

PLEASE REMIT TO P.O. BOX 905385, CHARLOTTE, N.C. 28290-5385

FREIGHT BILL COPY
PAST DUE INVOICE

TRAILER NO.	DATE	ORIGIN	OVNT. REV.	ADVANCE REV.	BEYOND REV.	DESTINATION	FREIGHT BILL NO.
CONTINUATION BILL		PAGE	2				716 675 083

CONSIGNEE

P.O. NO.

FOR OFFICE USE

REFER TO THIS NUMBER ON REMITTANCE

B/L NO.

FREIGHT BILL NO.

ROUTE (CARRIERS, F/B NO. and DATE, JUNCTIONS)

SHIPPER

BILL TO

NO. PCS.	H M	DESCRIPTION OF ARTICLES AND SPECIAL MARKINGS	WEIGHT	RATE	CHARGES
		OVNT 6180 0003830 *OVNT00560B 01344 HU0002 PU0271500-OVNZ-091196-1			

PAST DUE

CERTIFIED EXACT COPY OF ORIGINAL FREIGHT BILL — PLEASE REMIT TO P.O. BOX 905385, CHARLOTTE, N.C. 28290-5385

TO INSURE PROPER CREDIT WE MUST HAVE A COPY OF PAST DUE STATEMENT, OR COPY OF EACH BILL, OR THE CORRECT FREIGHT BILL NUMBER AND AMOUNT PAID ON EACH BILL RETURNED WITH PAYMENT. CORRESPONDENCE ADDRESS: P.O. BOX 1216 RICHMOND, VA. 23209-1216 (DUNS #00-599-5071)

6

Koppers010423

OVERNITE

FED ID: 54-0481236

A VIRGINIA CORPORATION

STATEMENT NUMBER
137100611-960916-0

REMITTANCE COPY

ACCOUNT AGING

0-29	30-59	60-89	OVER 90
49	0	0	0

TOTAL
49

DATE: 9-16-1996

RETURN THIS COPY WITH YOUR PAYMENT

KOPPERS INDUSTRIES INC
COMML RFG DEPT
7540 NW ST HELENS RD
PORTLAND, OR 97210-3697

REMIT TO:

OVERNITE TRANSPORTATION CO. (OVNT)
P.O. BOX 905385
CHARLOTTE, NC 28290-5385

PAYMENT OF CHARGES DUE BY:

10-01-1996

OTHER CORRESPONDENCE SHOULD BE ADDRESSED TO: P.O.BOX 1216, RICHMOND VA 23209-1216, PHONE 800-333-7400, DUNS#00-599-5071

OVNT PRO#	SHIP DATE	CUSTOMER REF	P/C	AMOUNT	REMARKS
716675083	09-11-1996	9270002115	P	49.49	
TOTAL PROS: 1		**TOTAL DUE:**		**49.49**	

2 29.789

Koppers010424

OVERNITE

RECEIVED
SEP 18 1996
KOPPERS INDS., INC.
PORTLAND, OR

FED ID: 54-0481236
A VIRGINIA CORPORATION

STATEMENT NUMBER
137100611-960916-0

INVOICE SUMMARY

ACCOUNT AGING

0-29	30-59	60-89	OVER 90
49	0	0	0

TOTAL
49

DATE: 9-16-1996

THIS COPY IS FOR YOUR RECORDS

REMIT TO:

OVERNITE TRANSPORTATION CO. (OVNT)
P.O. BOX 905385
CHARLOTTE, NC 28290-5385

KOPPERS INDUSTRIES INC
COMML RFG DEPT
7540 NW ST HELENS RD
PORTLAND, OR 97210-3697

PAYMENT OF CHARGES DUE BY:

10-01-1996

OTHER CORRESPONDENCE SHOULD BE ADDRESSED TO: P.O.BOX 1216, RICHMOND VA 23209-1216, PHONE 800-333-7400, DUNS#00-599-5071

OVNT PRO#	SHIP DATE	CUSTOMER REF	P/C	AMOUNT	REMARKS
716675083	09-11-1996	9270002115	P	49.49	
TOTAL PROS: 1		**TOTAL DUE:**		**49.49**	

PAGE 1 OF 1

1 29,788

Koppers010425

FORM 1014 REV. 5/93
OREGON DEPARTMENT OF AGRICULTURE
635 CAPITOL STREET NE
SALEM OR 97310-0110
(503) 378-3776
(503) 986-4550

POST THIS LICENSE IN A CONSPICUOUS PLACE

LICENSEE	KOPPERS INDUSTRIES INC AMOS S KAMERER 7540 NW ST HELENS RD PORTLAND, OR 97210	FIRM NO.	077467 077467
		BUSINESS LOCATION	7540 NW ST HELENS RD PORTLAND, OR 97210

LICENSE TYPE	LICENSE NUMBER	DATE ISSUED	DATE EXPIRES	
65	81780	12/06/1995	12/31/1996	10.00

Pesticide Dealer License

RECEIVED
DEC 8 1995
KOPPERS INDS., INC.
PORTLAND, OR

Koppers010426

USPCI
A LAIDLAW COMPANY

Service provided by:
SOLVENT SERVICE CO., INC.

ORIGINAL INVOICE
Please pay from this invoice
No statement will be rendered

Service For:
KOPPERS INDUSTRUIAL INC

7540 NW ST HELENS ROAD
PORTLAND, OR 97210

Bill To:
KOPPERS INDUSTRIES, INC.

7540 N.W. SAINT HELENS ROAD
PORTLAND, OR 97210 -3663

Customer No.	Invoice Date	Invoice No.
001034643	02/01/96	SSI368815

Bill To No.
000026907

Accounting Information
M CO 0311 0000

Terms
NET 30

ITEM #	QUANTITY	DESCRIPTION	PRICE	PER	NET AMT

PO: VERBAL REF: 950062414 FAC NO: 02100
MAN #: 95382444
ORDER: 960005172
WASTE STREAM: SJ95-2034 WASTE NAME: CREOSOTE CONTAMIN RAGS AND ABS
MAN DOC #: 82444

TRANS	3.00	TRANSPORTATION	75.000	DR	225.00

RECEIVED
FEB - 5 1996
KOPPERS INDS., INC.
PORTLAND, OR

Ni Tu 408 453 8167

Remit to Address: P.O. BOX 13618
NEWARK, NJ 07188-0618

THANK YOU DAVE ASPITARTE

Please pay this amount:
FOR PROPER CREDIT, PLEASE INCLUDE INVOICE NUMBER ON REMITTANCE 225.00

KL37G REV 2 2M 6/90

CIRCLE TERMS ON INVOICE

GIL	DET	S DET	LOC	DEPT	TAX	EMP #	MOVE # PO #	AMOUNT
305	807		9270	910	0362			225 —

INV # 368815 DATE 2/1/96

A/P DEPARTMENT USE ONLY

VENDOR NUMBER 006347002

TERMS CODE 845 DUE DATE / /

OK TO PAY

GROSS AMOUNT 225 —
DISCOUNT
NET

DIVISION 483 MONTH 02 AUDIT NUMBER 9270087

IMPORTANT: CIRCLE TERMS ON INVOICE

Koppers010427

Environmental Protection Agency
Form OMB No. 2050-0039 (Expires 9-30-96)
Please print or type. Form designed for use on elite (12-pitch) typewriter.

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

95382444

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA, CALL 1-800-852-7550

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. ORD012719343 — Manifest Document No. 81214 14 — 2. Page 1 of 1 — Information in the shaded areas is not required by Federal law.

GENERATOR

3. Generator's Name and Mailing Address: KOPPERS INDUSTRIES INC.. 7540 NW ST. HELENS ROAD PORTLAND, OREGON 97210

4. Generator's Phone (503) 286-3081

A. State Manifest Document Number: 95382444

B. State Generator's ID: EXEMPT

5. Transporter 1 Company Name: KVS Transportation — 6. US EPA ID Number: CAD981214951608

C. State Transporter's ID: 615611-43823

D. Transporter's Phone: 805-589-5220

7. Transporter 2 Company Name — 8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address: SOLVENT SERVICE CO. 1021 BERRYESSA RD. SAN JOSE, CA. 95133 — 10. US EPA ID Number: CAD059494311 0

G. State Facility's ID: CAD059494311 0

H. Facility's Phone: 408-451-5000

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. RQ, HAZARDOUS WASTE SOLID, NOS (CREOSOTE) (CLASS) 9 NA3077 III	093	DM	00830	P	State 352 / EPA/Other U051
b.					State / EPA/Other
c.					State / EPA/Other
d.					State / EPA/Other

J. Additional Descriptions for Materials Listed Above: a) ST95-2034

K. Handling Codes for Wastes Listed Above: a. 14 b. c. d.

15. Special Handling Instructions and Additional Information

A) 14/07

EMERGENCY # 1-800-424-9300 CHEM-CHECK

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
LINDA M. ROBINSON	Linda M. Robinson	09	26	95

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
JOHN RUCKER	John Rucker	09	26	95

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19. 2400

Printed/Typed Name	Signature	Month	Day	Year
BETTE SWEENEY	Bette Sweeney	09	28	95

DO NOT WRITE BELOW THIS LINE.

White: TSDF SENDS THIS COPY TO DTSC WITHIN 30 DAYS.
To: P.O. Box 3000, Sacramento, CA 95812

DTSC 8022A (9/94)
EPA 8700—22

Koppers010428

WEST COAST MARINE CLEANING, INC.

455 "C" Street
Washougal, WA 98671
(503)285-2485 (24 Hrs)
(360)835-3780
FAX(360)835-7534

RECEIVED
MAR 7 1996
KOPPERS INDS., INC.
PORTLAND, OR

SOLD TO: Koppers Industries
7540 NW St. Helens
Portland, OR 97210-3663

DATE: 3/5/96

INVOICE #: ORV-1567

JOB NAME: "Coal Tar"

Purchase Order #	WORK ORDER NO	CONTRACT NO	JOB LOCATION	DATE STARTED	DATE COMPLETED
Verbal-Amos	ORV-1567		Portland, OR	2/29/96	3/4/96

DESCRIPTION OF SERVICES			RATE PER HOUR	EXTENDED PRICE
Provide guzzler dry vacuums and operators to vacuum Coal Tar from railcars and dump on site.				
2/29/96 0600 to 1730 Thursday				
2 Operators	21.00 Hrs R/T	@	32.00	672.00
2 Operators	5.00 Hrs R/T over time	@	16.00	80.00
2 Guzzler Dry Vacuums	19.00 Hrs	@	89.50	1700.50
3/1/96 0600 to 1800 Friday				
2 Operators	24.00 Hrs R/T	@	32.00	768.00
2 Operators	8.00 Hrs P/T "	@	16.00	128.00
2 Guzzler Dry Vacuums	22.00 Hrs	@	89.50	1969.00
3/2/96 0600 to 1500 Saturday				
2 Operators	18.00 Hrs R/T	@	32.00	576.00
2 Operators	18.00 Hrs P/T "	@	16.00	288.00
2 Guzzler Dry Vacuums	16.00 Hrs	@	89.50	1432.00
3/4/96 0600 to 1200 Monday				
1 Operator	6.00 Hrs R/T	@	32.00	192.00
1 Laborer	6.00 Hrs R/T	@	30.00	180.00
1 Guzzler Dry Vacuum	5.00 Hrs	@	89.50	447.50
6" ADS Hose	250 Feet	@	1.25	312.50
			TOTAL PRICE:	**$8,745.50**

Terms: Due upon completion with submitted invoice.

KI 37G REV 2 2M 6/90

GIL	DET.	S-DET.	LOC.	DEPT.	TAX	EMP #	MOVE # PO #	AMOUNT
5050	0003		9270	925	0362			2915 —
5050	0004		9270	925	0362			2916 —
5050	0005		9270	925	0362			2915 —

OK TO PAY

IMPORTANT: CIRCLE TERMS ON INVOICE

GROSS AMOUNT 8745 50

DISCOUNT $

NET 6

CIRCLE TERMS ON INVOICE

INV # 1567 DATE 3/5/96

A/P DEPARTMENT USE ONLY

VENDOR NUMBER 0 0 3 4 8 1 0 0 1

TERMS CODE 045 DUE DATE / /

DIVISION	MONTH	AUDIT NUMBER
48 3	03	92700254

West Coast Marine Cleaning, Inc.

455 "C" Street • Washougal, WA 98671 • (503) 285-2485 • (360) 835-3780 • FAX (360) 835-7534 • 24 Hour Service

DAILY WORK SHEET

Our Job # ORU-1567

Job Complete Yes ____ No ____

P.O. # _____ R # _____

Customer Koppers

Job Location Koppers Tarm.

Job Description _____

Customer Rep _____

Company Rep _____

Vehicle # # 119

Trailer # _____

Mileage Meter - Out _____

Mileage Meter - In _____

Total Miles _____

Operator _____

DATE	EMPLOYEE	START JOB	LUNCH	FINISH JOB	JOB TIME	EMPL. S/S No.
2/19	Mike Murphy	0600	1	1730	10.5	

MATERIALS USED _____

MATERIALS PURCHASED _____

OFFICE USE ONLY: T&M _____ CONTRACT _____

SUPERVISION _____

SAFETY EQUIPMENT _____

PER DIEM _____ STAND BY _____

FUEL SURCHARGE _____ OTHER _____

TIME	WORK DESCRIPTION	TIME	
2400		1200	
0030		1230	
0100		1300	
0130		1330	
0200		1400	
0230		1430	
0300		1500	
0330		1530	
0400		1600	
0430		1630	5 loads
0500		1700	
0530		1730	
0600		1800	
0630		1830	9.5 hrs Truck Time
0700		1900	
0730		1930	
0800		2000	
0830		2030	
0900		2100	
0930		2130	
1000		2200	
1030		2230	
1100		2300	
1130		2330	

INSTRUCTIONS: ONE WORK SHEET PER PIECE OF EQUIPMENT PER SHIFT

West Coast Marine Cleaning, Inc.

455 "C" Street • Washougal, WA 98671 • (503) 285-2485 • (360) 835-3780 • FAX (360) 835-7534 • 24 Hour Service

DAILY WORK SHEET

Our Job # ORV-1567 Job Complete Yes ____ No ____

P.O. # _____ R # _____ Vehicle # # 122

Customer Koppers Trailer # _____

Job Location Koppers Term. Mileage Meter - Out _____

Job Description _____ Mileage Meter - In _____

Customer Rep J. T. Total Miles _____

Company Rep _____ Operator _____

DATE	EMPLOYEE	START JOB	LUNCH	FINISH JOB	JOB TIME	EMPL. S/S No.
2/25	Les Murphy	0600	1	1730	10.5	

MATERIALS USED 100' ADS hose

MATERIALS PURCHASED _____

OFFICE USE ONLY: T&M _____ CONTRACT _____

SUPERVISION _____

SAFETY EQUIPMENT _____

PER DIEM _____ STAND BY _____

FUEL SURCHARGE _____ OTHER _____

TIME	WORK DESCRIPTION	TIME	
2400		1200	
0030		1230	
0100		1300	
0130		1330	
0200		1400	
0230		1430	LEAVE Koppers
0300		1500	
0330		1530	ARRIVE SHOP
0400		1600	
0430		1630	
0500		1700	
0530		1730	
0600	LEAVE SHOP	1800	5 LOAD
0630		1830	
0700	Arrive Koppers	1900	
0730		1930	
0800		2000	9.5 hrs Truck Time
0830		2030	
0900		2100	
0930		2130	
1000		2200	
1030		2230	
1100		2300	
1130		2330	

INSTRUCTIONS: ONE WORK SHEET PER PIECE OF EQUIPMENT PER SHIFT

West Coast Marine Cleaning, Inc.

455 "C" Street • Washougal, WA 98671 • (503) 285-2485 • (360) 835-3780 • FAX (360) 835-7534 • 24 Hour Service

DAILY WORK SHEET

Our Job # ORU-1567 Job Complete Yes ____ No ____

P.O. # _____ R # _____ Vehicle # # 119

Customer Koppers Trailer # _____

Job Location Koppers Tarm. Mileage Meter - Out _____

Job Description _____ Mileage Meter - In _____

Customer Rep T. J. Total Miles _____

Company Rep _____ Operator _____

DATE	EMPLOYEE	START JOB	LUNCH	FINISH JOB	JOB TIME	EMPL. S/S No.
3-1	Mike Murphy	0600	Ø	10:00	4	
3-1	RANDY LeFever	0930		6 PM	8	

MATERIALS USED _____

MATERIALS PURCHASED _____

OFFICE USE ONLY: T&M _____ CONTRACT _____

SUPERVISION _____

SAFETY EQUIPMENT _____

PER DIEM _____ STAND BY _____

FUEL SURCHARGE _____ OTHER _____

TIME	WORK DESCRIPTION	TIME	
2400		1200	4th Load
0030		1230	
0100		1300	
0130		1330	5th LOAD
0200		1400	
0230		1430	
0300		1500	6th LOADS
0330		1530	
0400		1600	
0430		1630	
0500		1700	
0530		1730	NOT Truck Time!
0600	LEAVE SHOP	1800	
0630		1830	
0700	ARIVE KOPPERS	1900	
0730		1930	
0800	1 LOAD	2000	
0830		2030	
0900	2.	2100	
0930		2130	
1000		2200	
1030	3	2230	
1100	3 L	2300	
1130		2330	

INSTRUCTIONS: ONE WORK SHEET PER PIECE OF EQUIPMENT PER SHIFT

West Coast Marine Cleaning, Inc.

455 "C" Street • Washougal, WA 98671 • (503) 285-2485 • (360) 835-3780 • FAX (360) 835-7534 • 24 Hour Service

DAILY WORK SHEET

Our Job # ORU-1567 Job Complete Yes ____ No ____

P.O. # _____ R # _____ Vehicle # # 122

Customer Koppers Trailer # _____

Job Location Koppers Terra Mileage Meter - Out _____

Job Description _____ Mileage Meter - In _____

Customer Rep _____ Total Miles _____

Company Rep _____ Operator _____

DATE	EMPLOYEE	START JOB	LUNCH	FINISH JOB	JOB TIME	EMPL. S/S No.
3-1	Les Murphy	0600	-0-	6pm	12	

MATERIALS USED _____

MATERIALS PURCHASED _____

OFFICE USE ONLY: T&M _____ CONTRACT _____

SUPERVISION _____

SAFETY EQUIPMENT _____

PER DIEM _____ STAND BY _____

FUEL SURCHARGE _____ OTHER _____

TIME	WORK DESCRIPTION	TIME	
2400		1200	
0030		1230	4th LOAD
0100		1300	
0130		1330	5TH LOAD
0200		1400	
0230		1430	
0300		1500	6th LOADS
0330		1530	
0400		1600	
0430		1630	
0500		1700	11 hrs Truck Time
0530		1730	
0600	LEAVE SHOP	1800	
0630		1830	
0700	ARRIVE KOPPERS	1900	
0730		1930	
0800		2000	
0830	1 LOAD	2030	
0900		2100	
0930	2 LOADS	2130	
1000		2200	
1030	~~3~~	2230	
1100	3 LOADS	2300	
1130		2330	

INSTRUCTIONS: ONE WORK SHEET PER PIECE OF EQUIPMENT PER SHIFT

West Coast Marine Cleaning, Inc.

455 "C" Street • Washougal, WA 98671 • (503) 285-2485 • (360) 835-3780 • FAX (360) 835-7534 • 24 Hour Service

DAILY WORK SHEET

Our Job # ORV-1567

Job Complete Yes ____ No ____

P.O. # _____ R # _____

Customer Koppers

Job Location Koppers Texas

Job Description _____

Customer Rep JIT

Company Rep _____

Vehicle # # 122

Trailer # _____

Mileage Meter - Out _____

Mileage Meter - In _____

Total Miles _____

Operator _____

DATE	EMPLOYEE	START JOB	LUNCH	FINISH JOB	JOB TIME	EMPL. S/S No.
3-2	LES Murphy					

MATERIALS USED _____

MATERIALS PURCHASED _____

OFFICE USE ONLY: T&M _____ CONTRACT _____

SUPERVISION _____

SAFETY EQUIPMENT _____

PER DIEM _____ STAND BY _____

FUEL SURCHARGE _____ OTHER _____

TIME	WORK DESCRIPTION	TIME	
2400		1200	5 Loads
0030		1230	
0100		1300	
0130		1330	
0200		1400	6 LOADS
0230		1430	
0300		1500	7 — LEAVE Koppers
0330		1530	
0400		1600	Arive Shop
0430		1630	
0500		1700	
0530		1730	
0600	LEAVE SHOP	1800	
0630		1830	
0700	Arive Koppers	1900	
0730	1 LOAD	1930	
0800		2000	
0830		2030	
0900	2 Load #119	2100	
0930		2130	
1000		2200	
1030	3 LOADS	2230	
1100		2300	
1130	4 —	2330	

INSTRUCTIONS: ONE WORK SHEET PER PIECE OF EQUIPMENT PER SHIFT

West Coast Marine Cleaning, Inc.

455 "C" Street • Washougal, WA 98671 • (503) 285-2485 • (360) 835-3780 • FAX (360) 835-7534 • 24 Hour Service

DAILY WORK SHEET

Our Job # ORV-1567 Job Complete Yes ____ No ____

P.O. # _____ R # _____
Customer Koppers
Job Location Koppers Texas
Job Description _____
Customer Rep _____
Company Rep _____

Vehicle # #119
Trailer # _____
Mileage Meter - Out _____
Mileage Meter - In _____
Total Miles _____
Operator _____

DATE	EMPLOYEE	START JOB	LUNCH	FINISH JOB	JOB TIME	EMPL. S/S No.
3-2	Mike Rice					

MATERIALS USED _____
MATERIALS PURCHASED _____

OFFICE USE ONLY: T&M _____ CONTRACT _____
SUPERVISION _____
SAFETY EQUIPMENT _____
PER DIEM _____ STAND BY _____
FUEL SURCHARGE _____ OTHER _____

TIME	WORK DESCRIPTION	TIME	
2400		1200	5 Loads
0030		1230	
0100		1300	
0130		1330	
0200		1400	6 LOADS
0230		1430	
0300		1500	7 ——— LEAVE KOPPERS
0330		1530	
0400		1600	ARIVE SHOP
0430		1630	
0500		1700	
0530		1730	
0600	Leave Shop	1800	
0630		1830	
0700	Arrive at Koppers	1900	
0730		1930	
0800		2000	
0830	1 LOAD	2030	
0900	2 Load TK 122	2100	
0930		2130	
1000		2200	
1030	3 LOADS	2230	
1100		2300	
1130	4 ———	2330	

INSTRUCTIONS: ONE WORK SHEET PER PIECE OF EQUIPMENT PER SHIFT

West Coast Marine Cleaning, Inc.

455 "C" Street • Washougal, WA 98671 • (503) 285-2485 • (360) 835-3780 • FAX (360) 835-7534 • 24 Hour Service

DAILY WORK SHEET

Our Job # ORV 1567 Job Complete Yes ____ No ____

P.O. # _____ R # _____
Customer Koppers
Job Location Koppers Tarn
Job Description _____
Customer Rep TS
Company Rep _____

Vehicle # 119
Trailer # _____
Mileage Meter - Out _____
Mileage Meter - In _____
Total Miles _____
Operator _____

DATE	EMPLOYEE	START JOB	LUNCH	FINISH JOB	JOB TIME	EMPL. S/S No.
3/4	LES MURPHY	06:00	Ø	12:00		
3/4	Philip Tucker					

MATERIALS USED _____
MATERIALS PURCHASED _____

OFFICE USE ONLY: T&M _____ CONTRACT _____
SUPERVISION _____
SAFETY EQUIPMENT _____
PER DIEM _____ STAND BY _____
FUEL SURCHARGE _____ OTHER _____

TIME	WORK DESCRIPTION	TIME	
2400		1200	Leave Koppers
0030		1230	
0100		1300	Arive Shop
0130		1330	
0200		1400	
0230		1430	
0300		1500	
0330		1530	
0400		1600	
0430		1630	
0500		1700	
0530		1730	
0600		1800	
0630		1830	
0700	Arived Koppers	1900	
0730		1930	
0800		2000	
0830		2030	
0900		2100	
0930		2130	
1000	STOP VACUM. WASH TRUCK	2200	
1030		2230	
1100		2300	
1130		2330	

INSTRUCTIONS: ONE WORK SHEET PER PIECE OF EQUIPMENT PER SHIFT

STATE OF WASHINGTON

MASTER LICENSE SERVICE

REGISTRATIONS AND LICENSES

UNIFIED BUSINESS ID #: 601 139 216
BUSINESS ID #: 001
LOCATION: 0003
EXPIRES : 12-31-1996

ORGANIZATION TYPE
FOREIGN PROFIT CORPORATION

KOPPERS INDUSTRIES, INC.
7540 NW SAINT HELENS RD
PORTLAND OR 97210

TAX REGISTRATION

PESTICIDE DEALER

The above entity has been issued the business registrations or licenses listed
DEPARTMENT OF LICENSING, BUSINESS & PROFESSIONS DIVISION,
P.O. BOX 9034 OLYMPIA, WA 98507-9034 (360) 753-4401

Director, Department of Licensing

0005673 ZN

IMPORTANT!

PLEASE READ THE FOLLOWING INFORMATION CAREFULLY BEFORE POSTING THIS DOCUMENT.

General Information

- ❑ Post this document in a visible place.
- ❑ This document *may* have been issued as a result of changes to your account. If you were issued a Registrations and Licenses document before, **destroy the old one and post this one in its place.**
- ❑ If you were issued renewable licenses, the expiration date appears in the upper right-hand corner on the reverse side of this document. Business and Professions Division will mail a renewal notice to you four to six weeks before that date.
- ❑ Registrations remain in effect as long as you continue required reporting (see Registrations).
- ❑ Please contact Business and Professions Division if you change your business name, location, mailing address, telephone number, or business ownership.

Registrations

If you applied for registrations with Department of Revenue, Department of Labor & Industries, or Employment Security Department, these registrations will appear on your Registrations and Licenses document. However, **your registration with these agencies is not complete until they have established an account for your business.**

Each registering agency requires you to submit periodic reports. Each agency will send you the necessary reporting forms and instructions.

Corporations

Submitting an MBA does **not** authorize you to legally operate as a corporation if you have not filed with the Corporations Division of the Secretary of State. If you have any questions, call (360) 753-7115.

Rev. 6/95

The Department of Licensing has a policy of providing equal access to its services. If you need special accomodation, please call (360) 753-4401 or TDD (360) 586-2788.

Approvals

Koppers Industries, Inc.
Pittsburgh, PA 15219

62-4
311

Location No. 9270 Date NOV. 21, 1996 No. 233727

Pay to the order of --KOPPERS-- INDUSTRIES, INC 45and00cts $45.00**********
Not valid over $3500.00

DEPT. OF LICENSING/BUS. & PROFESSIONS DIV.

P.O. BOX 9034

OLYMPIA, WA 98507-9034

Linda Lehmann

Payable through Mellon Bank (DE) N.A., Wilmington, DE 19899
Mellon Bank (East) N.A., Philadelphia, PA 19102

KI 179 3/90 10M ⑈233727⑈ ⑆031600047⑆ 2⑈9216⑈

General Ledger	Detail	Sub Detail	Location or Contract	Dept. or Orig. Loc.	Tax Codes	Emp. No.	Purchase Order No. Rec. Id.	Br.	or P.O. No.	P.O. Add	P.O. Add or Resource	Quantity			Unit Code	Amount Distributed Dollars	Cents
305	973		9270	910	0362											$45.00	

Vendor No.	Description
9406 080 33	WASHINGTON STATE PESTICIDE RENEWAL OF LICENSE

UBI: 601 139 216 001 0003

YOUR NEW EXPIRATION DATE WILL BE: 12-31-1997

I certify under penalty of perjury under the laws of the State of Washington that I have read and understand the conditions and requirements described, and that the matters and things set forth on this renewal application, including any accompanying information, are true and correct.

X A.S. Kamerer, Plant Manager
Signature of Sole Proprietor, Partner, Officer of the Corporation, or LLC Member or Manager

11/21/96 Portland (multnomah), Oregon (503)286-3681
Date and Place (City & County) Where Signed Business Telephone Number

Check if one of the following occurred:
Change of ownership ☐
Change in partnership ☐

Please return the renewal application and payment to:

DEPARTMENT OF LICENSING
BUSINESS AND PROFESSIONS DIVISION
PO BOX 9034
OLYMPIA, WASHINGTON 98507-9034

(360) 586-5368

0003086 AB

STATE OF WASHINGTON
DEPARTMENT OF LICENSING
BUSINESS AND PROFESSIONS DIVISION

EXPIRATION DATE: 12-31-1996
To avoid penalties, payment must be made on or before this date.

MASTER LICENSE RENEWAL APPLICATION

Please make any corrections to business name, mailing address or business location address below.

UNIFIED BUSINESS ID#: 601 139 216 001 0003

BUSINESS LOCATION ADDRESS:

KOPPERS INDUSTRIES, INC.
7540 NW SAINT HELENS RD
PORTLAND OR 97210

OFFICE USE ONLY 9645-W 01P-400-731-0003

BUSINESS MAILING ADDRESS:

7540 NW SAINT HELENS RD
PORTLAND OR 97210-3663

IF LIQUOR, LOTTERY, MINORS OR PESTICIDE APPEAR BELOW, PLEASE COMPLETE THE BACK.	AMOUNT DUE	LATE CHARGE
PESTICIDE DEALER	$ 30.00	$ 0.00
PESTICIDE DEALER SURCHARGE	6.00	0.00
RENEWAL APPLICATION FEE	9.00	0.00
	$ 45.00	$ 0.00

THE MASTER LICENSE WILL BE INVALID AND LATE CHARGES WILL BE DUE IF PAYMENT IS NOT RECEIVED BY THE EXPIRATION DATE.

Total Due: $ 45.00

Payment Requested by: 12-16-1996

UBI: 601 139 216 001 0003

YOUR NEW EXPIRATION DATE WILL BE: 12-31-1997

I certify under penalty of perjury under the laws of the State of Washington that I have read and understand the conditions and requirements described, and that the matters and things set forth on this renewal application, including any accompanying information, are true and correct.

X A.S. Kamerer, Plant Manager

Signature of Sole Proprietor, Partner, Officer of the Corporation, or LLC Member or Manager

11/21/96 Portland (Multnomah), Oregon (503) 286-3691

Date and Place (City & County) Where Signed — Business Telephone Number

Check if one of the following occurred:
Change of ownership ☐
Change in partnership ☐

Please return the renewal application and payment to:

DEPARTMENT OF LICENSING
BUSINESS AND PROFESSIONS DIVISION
PO BOX 9034
OLYMPIA, WASHINGTON 98507-9034

(360) 586-5368

COMPLETE ANY SECTIONS BELOW WHICH APPLY TO YOUR BUSINESS. Attach additional sheets if necessary.

MINOR WORK PERMITS: COMPLETE THIS SECTION TO RENEW, ADD, OR CANCEL A PERMIT TO EMPLOY MINORS.

If you wish to cancel your Minor Work Permit, please mark this box ☐

Estimate how many minors (under age 18) you plan to employ during the next 12 months? _____

Are any of these minors under the age of 16? ☐YES ☐NO If yes, how many? _____

Are you employing these minors in an agricultural business? ..... ☐YES ☐NO

List below the specific duties performed by minors at this location. Duties must be listed each year.

NOTE: Industrial Insurance is required before minors can be hired.

NURSERY LICENSES: COMPLETE THIS SECTION IF THE TYPE OR VOLUME OF NURSERY SALES HAS CHANGED.

Select ONE license type, wholesale or retail, based on the MAJORITY of your sales. Determine your fees based on your gross annual nursery sales for the preceding year. Write the new fee on the front of this renewal. If the total due has changed, remit the new total. The fees listed below include a 20 percent surcharge.

NURSERY RETAILERS		NURSERY WHOLESALERS	
Gross Annual Sales	Pay this Amount	Gross Annual Sales	Pay this Amount
Under $100	no license required/issued	Under $15,000	$90.00
$100-$2,500	$42.00	Over $15,000	$180.00
$2,501-$15,000	$90.00		
Over $15,000	$180.00		

PESTICIDE DEALER: COMPLETE THIS SECTION EACH YEAR.

Designated Dealer-Manager Amos S. Kamerer WA License No. 601 139 216

Alternate Dealer-Manager _____ WA License No. _____

The Pesticide Dealer license cannot be renewed unless this information is provided. Non-home and garden pesticides may not be legally distributed without a Washington licensed dealer-manager on site. In addition, pesticide law requires that you promptly notify the Department of Agriculture of any changes to the dealer-manager designation.

LIQUOR, LOTTERY, OR TELEPHONE SOLICITOR LICENSES:

Name and address of landlord:

Is this business owned by, controlled by, or affiliated with any other business entities? ..... ☐YES ☐NO
If yes, list entities:

Is anyone other than the licensee to share in the profits or losses? ..... ☐YES ☐NO
If yes, list names and addresses: (Do not list shareholders of a corporation)

Does anyone other than the proprietor, partners, corporate officers or stockholders have a financial interest in this business? ..... ☐YES ☐NO
If yes, list names and addresses:

Have there been any unreported changes in the following?
☐ Stock ownership ☐ Corporate Officers ☐ Corporate Name ☐ Registered agent's name or office address ☐ Marital Status
☐ Criminal or legal status of an owner, spouse, corporate officer.

LIQUOR LICENSES ONLY:

If you are a Washington State business, do you keep invoices of all liquor purchases for at least two years and are they available for inspection? ..... ☐YES ☐NO

CLASS H LIQUOR LICENSES ONLY:

Are sales slips/cash register tapes for the last two years readily available for inspection? ..... ☐YES ☐NO

The Department of Licensing has a policy of providing equal access to its services. If you need special accommodation, please call (360) 753-4401 or TDD (360) 586-2788.

Koppers010442

General Ledger	Detail	Sub Detail	Location or Contract	Dept. or Orig. Loc.	Tax Codes	Emp. No.	Purchase Order No. Rec. Id.	Br.	P.O. No.	P.O. Add.	P.O. Add or Resource	Quantity	Unit Code	Amount Distributed Dollars	Cents
305	973		9270	910	0362									$45	.00

Vendor No.	Description
9406 080 33	WASHINGTON STATE PESTICIDE RENEWAL OF LICENSE

Koppers010443

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2100 Second Street, S.W.
Washington, DC 20593-0001
Staff Symbol: G-MPS-1
Phone: (202) 267-4150
Fax: (202) 267-4867

16600
APR 1 1 2005

Koppers Inc.
Carbon Materials & Chemicals
Attn: Mr. T. J. Turner
7540 NW Saint Helens Road
Portland, OR 97210-3363

Dear Sir:

We reviewed your submission, dated February 16, 2005, wherein you requested a waiver from all of the requirements of Part 105 of Title 33 of the Code of Federal Regulations (33 CFR Part 105) for your facility located at 7540 NW St. Helens Road, Portland, Oregon. We are pleased to inform you that we are approving your waiver request.

After considering the nature of the operations conducted by your facility, receiving only domestic barges not otherwise subject to 33 CFR Part 104 and handling only carbon pitch, or other commodities not regulated by 33 CFR Part 105, it has been determined that this facility poses a lower level of risk for being involved in a Transportation Security Incident. Therefore the requirements of 33 CFR Part 105 are waived. If in the future this facility changes either of the above stated conditions, it will be required to meet 33 CFR Part 105.

Your facility is still subject to 33 CFR Parts 101 and 103. Please work with your local Captain of the Port (COTP) to ensure the physical security at your facility is adequate and notify your COTP with changes to your operations.

Please contact LT Fasceski at (202) 366-9750 if you have any further questions regarding this decision.

Sincerely,

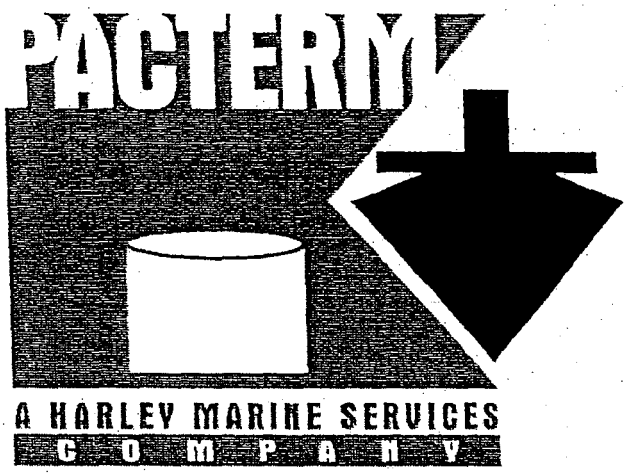
C. L. STOWE
Commander, U. S. Coast Guard
Chief, Vessel & Facility Security
By direction

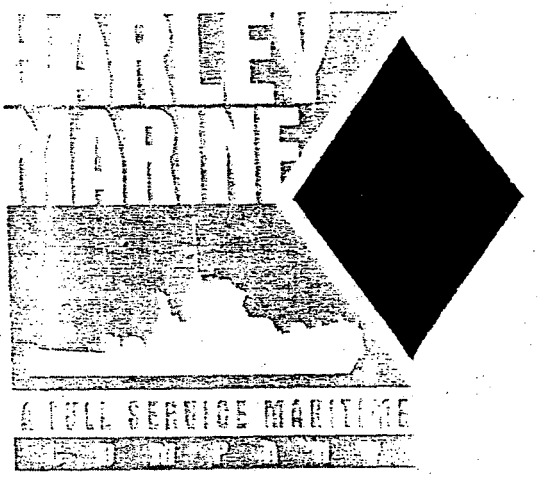
Copy: Commander, Coast Guard Pacific Area (Pmr)
Commander, Coast Guard Thirteenth District (m)
Commander, Coast Guard Marine Safety Office Portland
Black and Veatch

cc: J. Marcinkowski
T. Self
J. Dietz
4/26/05

Harley Marine Services, Inc.
Pacific Terminal Services, Inc.

July 24th, 2003
Spill Response Exercise





PARTICIPANT and OBSERVER GUIDE

List of Acronyms used in this guide and in the Exercise

OR	Oregon State
MSRC	Marine Spill Response Corporation
NWFF	NWFF Environmental Company
ICS	Incident Command System
NPREP	National Preparedness for Response Exercise Program
SMT	Spill Management Team
OR DEQ	Oregon Department of Environmental Quality
ODF&W	Oregon Department of Fish & Wildlife
USCG	United States Coast Guard
MSO	USCG Marine Safety Office Portland
MAREX	Marine Exchange of Portland
NRC	National Response Center (federal reporting)
OERS	OR Emergency Response System (state reporting)
ICP	Incident Command Post
IC	Incident Commander
FOSC	Federal On Scene Coordinator
SOSC	State On Scene Coordinator
LOSC	Local On Scene Coordinator
UCS	Unified Command System of Incident Command
COTP	USCG Captain of the Port for Portland
OCMI	USCG Officer in Charge of Marine Inspections
NOP	Next Operational Period
NOAA	National Atmospheric and Oceanic Administration
SSC	Scientific Support Coordinator
ICS	Incident Command System
FOG	USCG ICS Field Operations Guide for Oil Spill (2001 version)
NIIMS	National Interagency Incident Management System (the national standard for ICS adopted by the USCG in the FOG)
OPA 90	Oil Pollution) Act of 1990 (federal legislation governing oil spill response
RP	Responsible Party (entity responsible for spilled oil under OPA 90)
RRT	Regional Response Team (regional agency oil spill panel)
Area Plan	NW Regional State/federal Oil Spill Contingency Plan
SCAT	Shoreline Cleanup and Assessment Team
NRDA	Natural Resource Damage Assessment
IWRC	International Wildlife Recovery Center
CRC	Clean Rivers Cooperative

Koppers010446

1. Summary

Harley Marine Services and Pacific Terminal Services are conducting a Table Top Training Exercise on 24 July August 9, 2003 in Portland, OR. The Exercise will be a Table Top Exercise of the PTSI Spill Management Team (SMT), with an emphasis on protocols for resource management contained in the National Interagency Incident Management System (NIIMS)-based Incident Command System (ICS) as they apply to the HMS Vessel Response Plan and the PTSI Oil Spill Contingency Plan. This exercise will be a Table Top exercise, with limited deployment of field resources. The Exercise will follow a pre-scripted scenario and include prepared inputs throughout the duration of the Exercise, under the direction of the Exercise Director.

This document contains information for persons who will participate in or observe the exercise. An additional exercise plan has been prepared for the Exercise Staff which contains the details of the exercise scenario. A listing of all scheduled exercise participants, staff and invited observers is included in Section 14 of this document. ***If you are an exercise Participant or Observer, please read this entire document carefully before you arrive at the exercise.***

HMS is a Vessel Response Plan holder for federal and state laws in both Oregon and Washington. PTSI is an Oil Spill Contingency Plan holder for purposes of meeting applicable Oregon laws. This Exercise has been planned and designed following the NPREP guidelines developed by the United States Coast Guard (USCG), and has included both Oregon Department of Environmental Quality (OR DEQ) and USCG Marine Safety Office (MSO) Portland in the development of this Exercise.

The Exercise is an announced exercise. **Sign in will be open at 6:45 AM, and the exercise commences at 7:00 AM. Exercise activities will conclude** by **2:00 PM on the day of the exercise.** There will be up to 60 people at the facility the morning of the exercise, so it will take a while to check everyone in. To avoid the crowds at the check in, please plan to arrive in plenty of time to get checked in.

Oregon (OR DEQ and ODF&W), Washington (DOE), and federal (USCG) agency personnel have been invited to participate in the Exercise at the PTSI ICP, in a Unified Command structure.

The Exercise will be managed and administered by Harley Marine Services, Inc. An Exercise Evaluation Report will be produced for HMS and PTSI following the Exercise.

From The South

I-5 North

Take I-405 NORTH RAMP towards CITY CENTER/BEAVERTON(U.S. 26 W).
Merge onto I-405 NORTH RAMP.
Merge onto I-405 N.
Take the US-30 WEST exit, exit number 3, on the left towards ST. HELENS.
Merge onto US-30.
US-30 becomes NW YEON AVE.
NW YEON AVE becomes NW ST HELENS RD/US-30.

From Downtown Portland:

Start out going West on NW COUCH ST towards NW 5TH AVE by turning left.
Turn LEFT onto NW BROADWAY.
Turn RIGHT onto W BURNSIDE ST.
Take the I-405 NORTH ramp towards US 30 WEST.
Take the I-405 NORTH ramp.
Merge onto I-405 N.
Take the US-30 WEST exit, exit number 3, on the left towards ST. HELENS.
Merge onto US-30.
US-30 becomes NW YEON AVE.
NW YEON AVE becomes NW ST HELENS RD/US-30.

If you need further instructions or help finding the facility on the day of the Exercise, or need to make actual emergency contact with participants during the day of the Exercise, please call :

(503) 240-3452

2.1 Persons with special needs

The PTSI facility has handicap access for wheelchairs. If you have additional special needs, please contact Tina Garrett at (503) 240-3452 to make arrangements as required prior to the day of the exercise.

3. Actions to be taken upon arriving

Upon arrival at the exercise location, all exercise staff, participants and observers must:

1. Check in with the Check In recorder at the main street level entrance to the facility.

2. Put on your exercise identification badge. The exercise identification badge **MUST** be worn in plain view at all times while on the premises of the exercise facility. If you cannot find a badge with your name on it, additional blank badges will be available. Please fill one out and wear it .

3. Make your luncheon choice with the Check In recorder, you will not get lunch if you don't !

4. Review the Participant Handouts provided by the Check In recorder (These will include a chronology of scenario events and a diagram of the facility layout with telephone numbers)

Exercise Play Concludes

1100 Actions to respond to the scenario by exercise participants concludes.

Individual sections meet for a self-critique of the exercise. (Issues to be written on a flip chart or overhead transparencies. Discussion lead by Section Chiefs and Coaches or Evaluators) Each section develops five (5) Lessons Learned.

Group review of Lessons Learned.

Exercise critique ends. Closing statements.

Conclusion of day's activities

5. Scope of the Exercise

Consistent with the USCG NPREP guidelines and the Oregon Department of Environmental Quality's June 1998 Guidance Document of Conducting Oil Spill Drills, this exercise will be a "focused" exercise which targets a limited portion of the response organization which could be required for the chosen scenario.

The HMS Vessel Response Plan and the PTSI Oil Spill Response Contingency Plan as well as the NIIMS-based ICS methods and procedures detailed in the Plans and in the NW Area Plan will be utilized throughout the exercise.

The Exercise is specifically focused on ICS organizational skill development, ICS process management, integration and coordination of vessel issues into a pollution response organization and resource tracking.

The Exercise will use a pre-scripted scenario. "Real time" inputs will be provided by the Exercise Controllers to exercise specific SMT skills. Any requirements from Exercise Participants to verify on scene conditions of the spill (sometimes referred to on exercises as "Truth") will come from the Exercise Control group. Phone numbers, ground rules and procedures for contacting Exercise Control will be provided at the Check In recorder station on the day of the exercise. ***Activities of all participants and observers will be under the control of the Exercise Staff. All participants and observers must follow instructions or directions from the Exercise Staff as a condition of participation.***

7. Exercise Objectives

Primary Exercise Focus:

⇒ Development of Incident Objectives to address both pollution response and vessel casualty response in a Unified Command Structure as envisioned in the USCG FOG;

⇒ Resource Tracking of the resources required to respond to a major marine oil spill:

Primary Objectives:

1. Develop an appropriate Day 1 Incident Action Plan for ongoing operations.
2. Coordinate vessel issues (salvage, repair, voyage plan, cargo transfers) with the barge companies within the ICS/UCS organization
3. Coordinate Unified Command activities during the initial incident response.

Sub Objectives:

1. Demonstrate resource tracking capability and process by completing the 215 process in a Tac Ops meeting, and supporting current resource summary for the ICS 201.
2. Demonstrate the ability to develop and document an Operations Section following the NIIMS ICS guidelines and associate resources with those operational units.
3. Demonstrate a full scale Situation Display Unit which is well controlled and uses appropriate visuals to show current incident status in an appropriate location in the ICP.
4. Exercise the use of the PTSI building to accommodate the ICP needs.
5. Produce timely and accurate cost accounting of resources deployed and projection of anticipated costs for incoming member.
6. Become more familiar with logistical and communications issues in the Portland area.

3.2.2 PLANNING: Demonstrate the ability to consolidate the various concerns of the members of the Unified Command into joint planning recommendations and specific long range strategic plans. Demonstrate the ability to develop short range tactical plans for the Operations Section.

3.2.3 LOGISTICS: Demonstrate the ability to provide the necessary support of both the short term and long term action plans.

3.2.6 SAFETY AFFAIRS (SAFETY OFFICER): Demonstrate the ability to monitor all field operations and insure compliance with safety standards.

5. ASSESSMENT. Demonstrate the ability of the spill response organization to provide an initial assessment of the discharge and provide continuing assessments of the effectiveness of the tactical operations.

6. CONTAINMENT. Demonstrate the ability of the spill response organization to contain the discharge at the source or in various locations for recovery operations.

8. PROTECTION: Demonstrate the ability of PTSI to develop plans to protect the environmentally and economically sensitive areas identified in the Area Contingency Plan and the PTSI Contingency Plan.

8.1 PROTECTIVE BOOMING: Demonstrate the ability to assemble and deploy sufficient resources to implement the protection strategies contained in the Area Contingency Plan and the Facility Response Plan.

9. DISPOSAL: Demonstrate the ability of the spill response organization to dispose of the recovered material and contaminated debris.

10. COMMUNICATIONS: Demonstrate the ability to establish an effective communications system for the spill response organization.

10.1 INTERNAL COMMUNICATIONS: Demonstrate the ability to establish an intra-organization communications system. This encompasses communications both within the administrative elements and the field units.

10.2 EXTERNAL COMMUNICATIONS: Demonstrate the ability to establish communications with external and advisory and support elements.

8. Actions to be taken by participants

1. Conduct an Initial Incident Briefing
2. Establish ICP at PTSI: initiate ICS and UCS process and organizations
3. Establish a plan for time management of SMT activities
4. Schedule and conduct meetings using ICS principles and procedures
5. Effectively assign incoming personnel into the Unified SMT
6. Establish (simulate) Staging Area(s) with Staging Area Manager(s) and real time communications from ICP to Staging Areas
7. Simulate resource mobilization to Staging Area(s), capture in documentation
8. Identify and develop strategies to protect resources at risk and public health and safety
9. Simulate assignment / deployment of resources from Staging Area(s)
10. Document communication systems to be used for field operations
11. Develop written salvage / lightering / vessel management plan within the UCS SMT organizational format and process and integrate that planning into the overall incident action plan
12. Document key decisions

10. ICS Positions activated

Following the "focused" approach of this exercise tied to the exercise objectives, only the following ICS positions will be activated in the exercise;

- Command Section- IC, Safety Officer (SO), FOSC & SOSC
- Operations Section- OSC, Staging Area Manager(s), On Water Recovery and Beach Cleanup.
- Planning Section- PSC, Situation Unit, Resource Unit, Documentation Unit,
- Logistics- LSC, Branch Directors
- Finance Section- Section Chief, Cost Unit

12. Exercise Guidelines

This exercise is designed to exercise selected portions of the PTSI Spill Management Team, as set out in the Objectives listed in this document. In order for the exercise to be effective, each team member will need to contribute as though they were responding to an actual incident.

The exercise will proceed according to a real time schedule. No artificial time compression will be used.

The exercise scenario has been pre-scripted to make a plausible backdrop for the situational challenges which will come from the Exercise Controllers. However, both the exercise scenario and the exercise events are designed to maximize the use of ICS skills, and do not include or address many issues which may be encountered in an actual oil spill. Oil spill responses can raise a multitude of controversial regulatory, political, tactical, equipment, economic, business and ethical issues. This exercise is not designed to address all of those potential issues. It is focused on exercising a specific set of ICS organizational skills and processes. In the event that participants stray from the stated objectives, the Exercise Staff will ask participants to drop those discussions and move back on task.

The simulation itself will be driven by the Exercise Control which will present problem situations and/or update information about the incident, people involved, and activities taking place. The spill location and trajectories as well as vessel conditions will be simulated and updated on a regular basis by the Control Group, providing what is often referred to as "Truth" in exercise situations. Exercise Control will be located in another building from the exercise facility, so contact with Exercise Control will require either telephone contact or a physical visit to the Exercise Control facility which is located a short (walking) distance from exercise facility. Participants who want to simulate a visit to or overflight of the incident site during the exercise will have to actually go to the Exercise Control facility. Specific information on how to contact or visit Exercise Control will be provided the day of the exercise in handouts to the participants.

Exercise Control may issue written "Exercise Directives" to participants to prompt participants to take certain actions. There will be written instruction on each exercise directive as to what the participants is required to do with the directive.

Locating, securing and/or ordering equipment, manpower or supplies for the purposes of the exercise should, insofar as possible, reflect realistic delivery times. Telephone calls may be made to anyone necessary outside the ICP. The Exercise Control Room will simulate role play of some key contacts. The

telephone numbers are listed on the Telephone Directory placed at each ICP telephone.

i. Limitations in Control Room staff prevents the physical simulation of each contact by a single individual. That is to say that one role player may play several roles, although each role under most circumstances will be played by the same controller. The role players will indicate what telephone number they may be reached at if a response is necessary.

j. At the end of the exercise, the team will be allowed a self-evaluation. This process is often insightful and provides more valuable inter-team feedback than outside evaluations.

Exercise Staff

Name	Agency/ Affiliation	Position on Exercise
Dennis O'Meara	FAMM	Controller
Barry Keavan	MSRC	Controller

Exercise Participants

Name	Affiliation	Exercise Status
	OR DEQ	SOSC
	OR DEQ	Participant
Troy Goodman	PTSI	Participant
George Clark	HMS	Participant
Chris Swan	OTB	Participant
Jennifer Masar	HMS	Participant
Amber Anderson	HMS	Participant
Bob Robertson	PTSI	Participant
Alan Sullivan	FAMM	Participant
Kevin Buffum	PTSI	Participant
Dave Gore	HMS	Participant
Rick Harshfield	MSRC	Participant
Nicole Kangas	PTSI	Participant
Brent Way	CRC	Participant
Tina Garrett	PTSI	Participant
Don Meberg	HMS	Participant
Todd Prophet	HMS	Participant
Gregg Nelsen	HMS	Participant
Harley Franco	HMS	Participant
Kelly Dawson	CRC	Participant
	USCG	Participant
	USCG	Participant
	CRC	Participant
		Participant
		Participant
		Participant

HMS/PTSI 2003 Table Top Exercise Critique Form (use more than one if needed)

UNIT OR SECTION BEING EVALUATED: _____

NPREP OBJECTIVE EVALUATION RELATES TO (Number): _____

OBSERVATION: _____

_____

_____

_____

_____

_____

_____

RECOMMENDATION: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

EVALUATOR'S NAME: _____ (Optional)

Please return by August 15, 2003 to:
HMS, George Clark, P.O. Box 24005, Seattle, WA 98124
Fax : (206) 447-3055 e-mail : gclark@harleymarine.com

Marcinowski John

From: Marcinowski John
Sent: Monday, April 30, 2001 5:01 PM
To: Kamerer Amos
Cc: Dietz Jim
Subject: Functional Drill

Amos,

Your plant has been very proactive in conducting precrisis management exercises -the last exercise was a tabletop exercise in '98. I would like to move on to the "walk phase" of precrisis management and conduct a functional drill this year in the form of a high-angle or confined space rescue. If a functional drill is not possible it would still be beneficial to do a tabletop exercise.

Our agenda for previous drills takes a half-day which includes the rescue exercise; critique; a plant tour, to familiarize the firemen with plant operations/equipment and fire fighting/rescue capabilities; and then lunch/dinner, depending on time of day, and ball caps to show our appreciation.

Please contact me at your convenience to discuss the preferred rescue exercise/location and contacting the local fire department to see if/when it is doable.

Thanks,

John M.

5/1/01
Jim Dietz said to hold off until decision is made on continued plant operations.

KOPPERS INDUSTRIES **INTEROFFICE CORRESPONDENCE**

To:	K. Fitzgerald	**From:**	John E. Marcinowski
Location:	K-1600	**Location:**	K-1800
Subject:	NORTHWEST TERMNAL TABLETOP EXERCISE	**Date:**	April 15, 1998

PARTICIPANTS: T.J. Turner, R. Collins, D. Evans, E. Pollot, D. Burt, E. Woodward, C. Jobe, J. Summerfield, D. Stewart, S. Harwood, and R. Eaton (See attached attendance sheet.)

EVALUATORS: A. Kamerer & J. Marcinowski

The objectives of the TABLETOP EXERCISE at the NW Terminal on April 14th were to:

1. Promote preparedness.

2. Test/evaluate/exercise the plant SPCC plan by allowing employees the opportunity to mitigate an incident/scenario, which may cause personal injury, property damage or environmental contamination, by following expected behaviors as listed in various sections of the "plan."

3. Train personnel in emergency management duties.

4. Make revisions in the "plan" if necessary based on weaknesses discovered during the TABLETOP EXERCISE.

5. Review the KII Crisis Response Program and the role it plays in crisis management.

6. Ensure all required equipment in "plan" is available, operational, exercised and inspected if required.

7. Determine if existing staff/manpower is capable/adequate to mitigate any incidents in plant during absence of plant manger.

The TABLETOP EXERCISE, which lasted 3.5 hours, was conducted in the Best Western Hotel, in a non-threatening format, under minimum stress and without any time constraints.

Nine out of 13 scenarios, developed by Amos and me, were addressed during the EXERCISE. (You will find copies of the scenarios attached.) All participants demonstrated sound judgment, knowledge of the plant emergency equipment, knowledge of product physical hazards at elevated temperatures and emergency procedures necessary to deal

with each scenario in the absence of plant manager. The scenarios addressed were mitigated effectively and timely. Mitigating the scenarios proved to be a valuable training exercise for Erin and Eric.

Some of the issues/procedures covered during the scenarios are attached.

Areas that need further review as a result of this EXERCISE are as follows:

1. Fire extinguisher training for Erin Pollot.
2. Installation of new wind sock.
3. Propositioning clay mats near drain adjacent to #2 hot oil main circulating pump drain.
4. Meeting with mutual aid organizations prior to installing new dock; i.e., MFSA, GRP & CRC.
5. Prepositioning dirt along ditch at plant entrance in event a spill occurs in this area.
6. Determine if/what emergency training is provided to P&W Railroad employees.
7. Reporting Matlack truck drivers exhibiting questionable skills/performance to management.
8. Removal of old ADT Fire Alarm Box directly behind office on telephone pole – alarm is inoperative.
9. Providing copies of SPCC plan in shop and employee service room.
10. Developing a Marine Terminal Response Plant for proposed dock.
11. Determine access to boat and booms owned by Northwest Natural Gas for spill containment at dock.
12. Determine status of revised draft SPCC plan.
13. Accessibility to fire blanket in lab-presently located in sealed box in cabinet.
14. Reviewing new media policy with all employees.

15. Reviewing "Working With the Media" section of the Title III Workbook and "Guidance For Effective Communication..." manual with all employees.

By copy of this correspondence to Amos, I want to thank him and his employees for their time, hospitality, participation, recommendations and valuable input that made this TABLETOP EXERCISE especially productive/educational for the newer employees.

All participants enjoyed lunch after the exercise and an overview of KII that was provided by Randy.

Subsequent to the exercise, I reviewed all the emergency equipment mentioned in the exercise; e.g., ADT fire alarm box, fire extinguishers, spill kits, fire blanket, first aid kits and boat at the proposed new dock unloading station. All equipment was found to be serviceable and currently inspected.

I look forward to working with Amos and T.J. in the future on a FUNCTIONAL DRILL involving the Portland Fire Bureau.

John E. Marcinowski

Attachments

cc:

R. Collins	K-1700
A. Kamerer	NW Terminal
M. Juba	K-1800
S. Smith	K-1800

SIGN-IN SHEET
NORTHWEST TERMINAL
TABLETOP EXERCISE
APRIL 14, 1998

NAME	TITLE	ORGANIZATION	ADDRESS
A. KAMERER	Plant mgr.	Koppers	Portland
T.J. Turner	Gen Foreman		Brush Prairie
R D Collins	Pgl	Koppers	Pgl PA
Don Evans	Pgl	Koppers	Pgl PA
Erin Pollot	office manager		PDX
Anne Burt	worker		PDX
ERIC WOODWARD	WORKER	Koppers IND.	PDX
Chris Jobe	Worker	Koppers IND.	PDX
JOHN SUMMERFIELD	WORKER	KOPPERS IND	PDX
Dennis Paul Stewart	utility man	Koppers IND	PDX
Steven B. Harwood	utility operator	KOPPERS	PDX
Ron Eaton	Utility man	Koppers Ind.	PDX

NORTHWEST TERMINAL

SCENARIO NO. 1

You have been loading a Kaiser pitch car for 30 minutes when an earthquake occurs (6.0 on the Richter scale). The car loading personnel failed to properly set the brakes or to place the checks on the car. The car now starts rolling to the east, breaking and tearing off the loading arm. Liquid pitch is flowing everywhere and the car is heading towards the closed railroad gate.

SCENARIO NO. 2

The #2 hot oil main circulation pump was recently replaced with a rebuilt unit. At 6:00 p.m. on Sunday, the hot oil reached the desired temperature of 490 F. You start to make your rounds to take your readings and the casting, at the suction flange of this pump, breaks. Hot oil is pumping out of the breach, and the alarm is sounding at the main computer board. You are all alone!

SCENARIO NO. 3

A dean-stack test is being run to do a water analysis on a pitch sample. The flask that is holding the toluene breaks and a fire stars when the toluene and sample spill onto the electric heater.

SCENARIO NO. 4

During the unloading of a pencil pitch ship, the loader driver is backing up in the storage building. He turns the wheels too far to the right, trying to avoid one of the building's support columns, causing the center of gravity to shift and the loader rolls over onto its side. The driver is knocked unconscious and is trapped inside the loader. The loader door is facing the ground.

SCENARIO NO. 5

It's 2:00 am, you are at the dock monitoring the unloading of liquid pitch off of a vessel to the storage tanks and suddenly the 10" diameter flex line from the vessel to the dock break's. Liquid pitch (450 F) is spewing onto the dock and into the river.

SCENARIO NO. 6

A truckload of creosote is departing the plant when a BN Railroad switch engine hits it. The truck is knocked onto its side and pushed down the tracks. Creosote is all over the place.

SCENARIO NO. 7

(ODOR COMPLAINT)

The office receives a call from Wacker Siltronic's complaining about odors and black dust coming from the KII plant. Some Wacker employees are complaining about headaches, nausea and eye irritation as a result of the odor. And, others are complaining about black dust on their automobiles.

SCENARIO NO. 8
(PITCH SAMPLE FIRE)

While collecting a routine sample from a pitch storage tank, the employee heats the sample valve with a propane torch. The valve starts leaking, the pitch catches fire, the employee is burned and the fire is spreading.

SCENARIO NO. 9

At 9:00 A.M. on a Sunday, you receive a call from the Northwest Natural Gas Co.security guard. The guard explains that while making his rounds he heard a noise coming from the KII plant and upon investigation, discovered black material spewing from a huge gash on the side of a storage tank.

SCENARIO NO. 10
(CHEST PAINS)

You are performing repairs on the 40 HP drive belt motor, for the upper incline conveyor, when your coworker begins having chest pains.

SCENARIO NO. 11
(TANK TRUCK SPILL)

On your way to work, you witness a tank truck hit by another vehicle as the tanker turns right onto St. Helens Road after departing the KII plant. All traffic has stopped. When you get out of your vehicle you see the tanker is leaking and you smell the familiar odor of creosote.

SCENRIO NO. 12
(EXPLOSION)

You are in the office and hear an explosion. You run out the door and see a huge fireball over the Northwest Natural Gas Co. plant.

SCENARIO NO. 13

You are in the process of pumping pitch from the melter tank to the shipping tank when a Wacker Siltronics employee comes into the office an informs you have a spill.

TABLETOP EXERCISE
(ISSUES/ PROCEDURES COVERED)

ACTIVATING FIRE ALARM
SEARCHING FOR INJURED
FIRST AID/BLOODBORN PATHOGENS
ROLE OF KII FIRE BRIGADE
RESPONDING TO FIRE ALARM
FIRE DEPARTMENT TOURS
CONTACTING KEY PERSONNEL
ELIMINATING SOURCE OF IGNITION
LOCATION OF EMERGENCY SHUTOFF
LOCATION OF MSDSs
RESPONDING TO THE MEDIA
TRAFFIC CONTROL
PLANT MGR BRIEF TO FIRE CHIEF
ENVIRONMENTAL CONTAMINATION
REPORTING SPILL TO REGULATORS
FOSS INVOLVEMENT
FLAME IMPINGEMENT ON OTHER TANKS
BLEVEs
USE OF CELLULAR RADIO BY PLT. MGR.
PLANT MEDIA SPOKES PERSON
NEW MEDIA POLICY
LOCATION OF SPILL CONTROL PILLOW
WHO RESPONDS TO CREO SPILL OFF SITE
EMERGENCY SHUTDOWN PROCEDURES
FIRST AID/CPR PROCEDURES
BACK INJURY VS POTENTIAL FIRE
ACCESS ROUTES INTO PLANT
NOTIFY PITTSBURGH
SPILL CONTAINMENT ON LAND
MINIMIZING ENVIRO. SOIL CONTAINMENT
USE OF 911
CONTACTING LOCAL FIRE DEPT.
CONTACTING LOCAL AMBULANCE
LOCATION OF ADDITIONAL EMERGENCY EQUIPMENT
FIRST AID TRAINED EMPLOYEES
DIRECTING AMBULANCE TO EMERGENCY
HAZARDS OF HOT OIK AND WATER
PLANT EVACUATION PROCEDURES
"PIGS" NOT HEAT RESISTANT
#2 HOT OIL PUMP SHUT DOWN PROCEDURES
SEMIANNUAL FIRE DEPT. TOURS
NEW MICROWAVE LEVEL CONTROLS
SPILL CONTAINMENT IN PLANT DITCH
POST SPILL REPORTING
CALL FOR ASSISTANCE ON SHIFTS
AVAILABILITY OF CONSULTANTS
KII CRT ACTIONS FOLLOWING NOTIFICATION
RESPONSIBILITY FOR CREO SPILL OFF PROPERTY
DIKING FOR SPILL CONTAINMENT
FIRE FIGHTING TECHNIQUES
INCIPIENT FIRE FIGHTING
EC RESPONSIBILITIES
PLANT POST SPILL CLEAN-UP
PREVENTING SPILLS FROM LEAVING KII
RESPONDING TO ODOR COMPLAINT
INPLANT FIRE NOTIFICATION PROCEDURE
EC's AWARENESS OF SPCC
HEAVY EQUIP OPERATOR 2ND & 3RD SHIFT
HANDLING CREO SPILL CLOSE TO PLANT
RQs & WHERE TO LOCATE THEM
SIMULATED 911 CALL
IMP. OF IMMED. SPILL CLEAN UP AFTER CONTAINMENT
LOCATION OF HYDRANTS
VISIT ODOR COMPLAINANT PERSONALLY
WHO LIVES CLOSEST TO PLANT
OFFICE RESPONSIBILITIES
DIRECTING AMBULANCE AT NIGHT
WIND DIRECTION IN ODOR COMPLAINT
EXCURSIONS IN PLANT CAUSING ODOR
INVITE ODOR COMPLAINANT TO PLANT
OTHER ODOR SOURCES IN COMMUNITY
LOCAL CONTACTS FOR HELP
FIRST AID TRAINED ON SHIFTS
EMERGENCY RESPONSE MATERIAL FOR FIRE DEPT.
"WORKING WITH THE MEDIA/TITLE III"
WHAT ARE EC POST EMERGENCY RESPONSIBILITIES
ROADWAY TO PLANT BLOCKED
LOCATION OF CRT MANUAL
CRT PROGRAM

KOPPERS
INDUSTRIES

INTEROFFICE CORRESPONDENCE

To:	L. F. Flaherty	**From:**	John E. Marcinowski
Location:	K-1750	**Location:**	K-1801
Subject:	NORTHWEST TERMINAL TABLETOP EXERCISE	**Date:**	Feb. 23, 1994

PARTICIPANTS: T. Hare, M. Bailey, E. Farlow, R. Beehler, T. Turner, C. Jobe, L. Mathews, C. Turner, & R. Hutsell
(See attached attendance sheet.)

EVALUATORS: A. Kamerer, J. Batchelder & J. Marcinowski

The purpose of the TABLETOP EXERCISE at the Northwest Terminal (NWT) on February 17th was to:

1. Exercise the NWT SPCC Plan by allowing the plant foreman and employees the opportunity to mitigate an incident/scenario which may cause personal injury, property damage or damage to the environment, following procedures addressed in the "plan"; and,
2. Make revisions in the "plan" if necessary based on weaknesses discovered during the TABLETOP EXERCISE.

The TABLETOP EXERCISE was conducted in an Oxford Suites conference room, in a non-threatening format, under minimum stress and without any time constraints.

Nine scenarios, developed by A. Kamerer, T. Turner and me, were addressed during the EXERCISE. You will find copies of the scenarios attached. During each scenario the participants demonstrated a high level of professionalism, sound judgment, and a thorough knowledge of the required procedures necessary to deal with the spill scenario. The employees also responded well to the non-spill scenarios in the absence of a formal plan.

Some of the issues/procedures covered during the scenarios included:

Emergency shutdown procedures	**Directing ambulance to emergency area**
If in doubt "REPORT"	**First aid/CPR procedures**
In-plant fire notification procedures	**Responding to media questions**
Responding to fire alarm	**Incipient fire fighting**
Access routes into plant	**Contacting key personnel**
Post earthquake problems	**Calls to 911 dispatcher**
Head count following earthquake	**Utility shutdown following earthquake**
Location of MSDSs/SPCC plan	**Spill containment SW end of plant**
Excursions in plant causing odor	**Contacting local ambulance**

Fire department tours
BLEVEs
First aid trained on shift
Other odor sources in community
Preventing spill from leaving plant
Minimizing soil contamination
Eliminating sources of ignition
Location of first aid kit
First aid trained employees
Portable medical alert button
Briefing to fire dept
Good samaritan liability
Spill containment on land
RQ of a hazardous waste
Location of RQs
Post spill reporting
Spill cleanup procedures
Call for assistance on shifts
Availability of oil spill booms
Location of fire extinguishers
Company ID to access plant
Wind direction in odor complaint
Location of safety shower
Who lives closest to plant
Important role of office manager in emergency
Importance of EC's knowing SPCC plan
Contacting local fire dept
Responding to creosote spill off property
Flame impingement on other tanks
Plant spokesperson
In-plant fire notification procedures
Combustibility of Caloria HT 43
Call fire department immediately
Fire Brigade vs incipient fire fighter
Responding to odor complaint
Diking procedures for containment
Importance of training hourly employees
Reporting spills to regulatory agencies
Location of spill containment material
Minimizing environmental contamination
Police roadblocks and access to plant
Koppers responsibilities in a transportation related spill
Use/availability of a consulting toxicologist and communications expert
Actions taken by the KII Pittsburgh office following receipt of an emergency call
The responsibilities and resources available to the EC; e.g., OH Materials, Riedel Services
Incidents at the plant, if handled incorrectly, can lead to environmental contamination, loss of property, loss of jobs, injuries, and most importantly loss of life.

The video of the April 1986 Koppers Co. Youngstown Plant fire was shown during the EXERCISE to reinforce the following:

1. The need to respond to fires immediately by calling the appropriate agencies;
2. The need to prepare for the media who will be attracted to these events.

Areas which need further **review** as a result of this EXERCISE are as follows:

1. Availability of First Aid Kits.
2. Contract with Riedel Services, Inc.
3. Availability of MSDSs after normal working hours-control room.
4. Fire extinguisher training.
5. Prepositioning sand along ditch (off site) to use as diking material to prevent spills entering Willamette River.
6. Location of spill kits in SPCC plan.

7. An alert device for operators working alone in the plant. (Note: An ADT system consisting of a personal button and transmitter is available. When the button is activated, the transmitter sends a signal to a dispatcher who calls the plant. If no one answers, the local police are called to investigate.)
8. Acquisition of "soft-landing lanyard" for aerial work.
9. First Aid/CPR trained employees on all shifts.
10. "Working With the Media" section of the Title III Workbook by EC's.
11. "Guidance For Effective Communication..." manual by EC's.
12. Koppers ID for access to plant during roadblock

By copy of this correspondence to Amos, I want to thank him and his employees for their time, hospitality, participation, recommendations and valuable input which made this TABLETOP EXERCISE especially productive.

I also want to thank Jim Batchelder for his support by attending this exercise and actively participating in the mitigation of the scenarios. His presence and input added to the success of the exercise.

I look forward to working with the NWT personnel in the future on an EXPANDED TABLETOP EXERCISE involving the local fire departments and police.

John E. Marcinowski

Attachments

cc:

J. Batchelder	K-1701
R. Collins	K-1701
A. Kamerer	Northwest Terminal
W. Swearingen	K-1800

SIGN-IN SHEET
NORTHWEST TERMINAL PLANT
TABLETOP EXERCISE
FEBRUARY 17, 1994

NAME	TITLE	ORGANIZATION	ADDRESS
Glen Farber	DRIVER?	Koppers	
Mickey Bailey	Driver	Koppers	
Chris Jake	Operator	Koppers	
Luke Mathews	LABOR	Koppers	
Cheryl Turner	Off. Mgr	Koppers	
T. G. Turner	Gen Foreman	Koppers	
Jed Hare	Lab Tech.	Koppers	
Randy Beckley	Maint.	KOPPERS	
Robert Whitsell	Production	Koppers	
Amos Cameron	Plant Manager	"	

NORTHWEST TERMINAL PLANT - TABLETOP EXERCISES
SCENARIO NO. 1 (PITCH CAR LOADING ACCIDENT)

You have been loading a pitch car for Intalco for about 30 minutes when an earthquake occurs (5.5 on the Richter scale). The car loading personnel failed to properly set the brakes or to place the wheel checks on the car. The car now starts rolling to the east, breaking and tearing off the loading arm. Liquid pitch is flowing everywhere and the car is heading towards the closed railroad gate.

SCENARIO NO. 2 (MELTER HOT OIL SPILL)

The #2 hot oil main circulation pump was recently replaced with a rebuilt unit. At 6:00 PM on Sunday evening, the hot oil reached the desired temperature of 490°F. You start to make your rounds to take your readings and the casting, at the suction flange of this pump, breaks. Hot oil is pumping out of the breach, and the alarm is sounding at the main computer board. You are all alone!

SCENARIO NO. 3 (LABORATORY FIRE)

A dean-stack test is being run to do a water analysis on a pitch sample. The flask that is holding the toluene breaks and a fire starts when the toluene and sample spill onto the electric heater. The flames spread to the surrounding area and catch your shirt on fire.

SCENARIO NO. 4 (CREOSOTE TRUCK AND RAILROAD TRAIN ACCIDENT)

At 9:30 AM, a truck load of creosote for Taylor Lumber heads for the weigh scales prior to leaving the plant. At the intersection of the railroad tracks, just outside the plant gate, the truck collides with the BN Railroad switch engine. The truck is hit on the left side, flips over onto its right side and is pushed down the track. The truck finally stops directly behind Northwest Natural Gas Company's odorizer plant. Creosote is leaking from the trailer onto the ground and into the creek outfall which flows into the Willamette River.

SCENARIO NO. 5 (FRONT-END LOADER ACCIDENT)

During the unloading of a pencil pitch ship, the loader driver is backing up in the storage building. He turns the wheel too far to the right, trying to avoid one of the building's support columns, causing the center of gravity to shift and the loader rolls over onto its side. The driver is knocked unconscious and is trapped inside the loader. The loader door is facing the ground.

SCENARIO NO. 6 (PITCH CONVEYOR REPAIR)

While loading pencil pitch into the melter, the drive belts break on the 40HP motor on the upper incline conveyor. An employee installed the replacement belts and only needs to attach the safety cover over the belts. The employee is working off a ladder and is using a harness and safety rope. The employee slips and falls over the back side of the conveyor, and is now hanging 25' above the ground.

SCENARIO NO. 8 (CREOSOTE INFORMATION PHONE CALL)

The office receives a phone call from the Salem fire chief asking for information on creosote. There was an accident on Route 5 north of Salem involving a tank truck carrying creosote.

SCENARIO NO. 9 (ODOR COMPLAINT)

The office receives a call from the manager of the Northwest Natural Gas Company. Several of his employees are sick. He claims it is caused by an odor coming from the KII plant.

SCENARIO NO. 10 (FIRE NEAR MELTER OPERATION)

It is 9:00 PM and you receive a phone call from the Northwest Natural Gas Company security guard. He informs you that smoke and fire is coming from an area in the plant near the melter operation. He has already called the fire department.

Air/Compliance Consultants, Inc.

RECEIVED
OCT 29 1998

October 28, 1998

Project Number AC098

Ms. Traci Self
Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219-1800

RE: Permit Application Air Emissions Inventory Summary and Backup

Dear Ms. Self:

Air/Compliance Consultants, Inc. (ACCI) has conducted an analysis to determine the actual and potential emissions from the Portland facility. The actual emission calculations were based on the present operations, existing equipment, some residual creosote transfers and a rate of 70,000 tons per year of Pitch production. The existing potential emissions were based on the same existing operations, but at a production rate of 150,000 tons per year of Pitch. The additional market-based Phases of construction and revisions were as follows:

Phase I Revisions:

- A new tank, T-200, is vented to Fume Recovery System. The effect on emission is negligible.
- A new Hot Oil Heater rated at 10 MMBTU/hr is added. The old heater remains as a backup.
- Unit can burn oil and natural gas.

Phase II Revisions:

- A new tank, T-210, is vented to Fume recovery. The effect on emissions is negligible.
- The Fume Recovery System is replaced with a fume combustor. Pitch fumes are controlled at 98% based on an inlet loading which is assumed saturated at 400°F.

The following are attachments to this letter:

1. Emissions Summary Forms
2. Backup Calculations for Actual Emissions
3. Backup Calculations for Potential Emissions
4. ChemCAD Analysis of Fume Recovery System Maximum Hourly Emissions Rate
5. ChemCAD Analysis of Fume Recovery System Emissions, 1 Month Basis
6. Design Basis of Scrubber

1050 William Pitt Way
Pittsburgh, PA 15238
412-826-3636
412-826-3640 fax

The bases for the analyses are summarized on the first page of Attachments 2 and 3.

Please do not hesitate to call us at (412) 826-3636 if you have any questions.

Sincerely,

AIR/COMPLIANCE CONSULTANTS, INC.

Jill W. Merrill
Principal Engineer/President

JWM:jch

Attachments

cc: J. Dietz
A. Kamerer

ATTACHMENT 1

EMISSIONS SUMMARY FORMS

Actual Emissions from Existing Units
Koppers Industries, Inc., Portland Terminal

Unit	Comments	Commodity	NOx (lb/hr)	NOx Tons/Yr	VOC (lb/hr)	VOC Tons/Yr	CO (lb/hr)	CO Tons/Yr	SO2 (lb/hr)	SO2 Tons/Yr	PM-10 (lb/hr)	PM-10 Tons/Yr
Atlas Boiler		Gas	2.82	2.04	0.06	0.04	0.70	0.51	0.08	0.06	0.12	0.09
Hot Oil Heater		Gas	0.81	0.59	0.04	0.08	0.17	0.12	0.03	0.02	0.04	0.03
Fume Recovery System [1,2]		NA			12.47	15.45						
Tank 33		Heavy Oil			0.12	0.003						
Tank 67		P1/P13 Distillate			1.71	0.035						
Loading Tank 67 to Rail		P1/P13 Distillate			2.46	0.005						
Fugitives		NA			0.98	0.266						
Plant Total			3.63	2.63	17.84	15.88	0.88	0.63	0.11	0.08	0.16	0.12

NOTES
[1] The fume recovery system receives emissions from the following units: T-68, T-65, railcar loading and tank car loading.
[2] Hourly and annual VOC emissions from the fume recovery system were calculated using ChemCAD. Annual VOC was adjusted by 1997 actual operating hours over 8,760 hours.

Koppers010476

Maximum Potential Emissions from Existing Units
Koppers Industries, Inc., Portland Terminal

Unit	Comments	Commodity	NOx (lb/hr)	NOx Tons/Yr	VOC (lb/hr)	VOC Tons/Yr	CO (lb/hr)	CO Tons/Yr	SO2 (lb/hr)	SO2 Tons/Yr	PM-10 (lb/hr)	PM-10 Tons/Yr
Atlas Boiler		Gas	2.82	12.33	0.06	0.25	0.70	3.08	0.08	0.33	0.12	0.55
		Oil	3.00	13.14	0.03	0.13	0.75	3.29	10.65	46.65	0.30	1.31
		MAX	3.00	13.14	0.06	0.25	0.75	3.29	10.65	46.65	0.30	1.31
Hot Oil Heater		Gas	0.81	3.57	0.04	0.19	0.17	0.75	0.03	0.14	0.04	0.16
		Oil	1.22	5.32	0.01	0.05	0.31	1.33	4.33	18.88	0.12	0.53
		MAX	1.22	5.32	0.04	0.19	0.31	1.33	4.33	18.88	0.12	0.53
Fume Recovery System [1,2]		NA			12.47	21.51						
Tank 33		Heavy Oil			0.12	0.005						
Tank 67		P1/P13 Distillate			0.85	0.035						
Loading Tank 67 to Rail		P1/P13 Distillate			2.46	0.004						
Fugitives		NA			0.98	0.568						
Plant Total			4.22	18.46	16.98	22.56	1.06	4.61	14.98	65.53	0.42	1.85

NOTES
[1] The fume recovery system receives emissions from the following units: T-68, T-65, railcar loading and tank car loading.
[2] Hourly and annual VOC emissions from the fume recovery system were calculated using ChemCAD.

Koppers010477

Maximum Potential Emissions, Phase I
Koppers Industries, Inc., Portland Terminal

Unit	Comments	Commodity	NOx (lb/hr)	NOx Tons/Yr	VOC (lb/hr)	VOC Tons/Yr	CO (lb/hr)	CO Tons/Yr	SO2 (lb/hr)	SO2 Tons/Yr	PM-10 (lb/hr)	PM-10 Tons/Yr
Atlas Boiler		Gas	2.82	12.33	0.06	0.25	0.70	3.08	0.08	0.33	0.12	0.55
		Oil	3.00	13.14	0.03	0.13	0.75	3.29	10.65	46.65	0.30	1.31
		MAX	3.00	13.14	0.06	0.25	0.75	3.29	10.65	46.65	0.30	1.31
Hot Oil Heater(backup unit)		Gas	0.81	3.57	0.04	0.19	0.17	0.75	0.03	0.14	0.04	0.16
		Oil	1.22	5.32	0.01	0.05	0.31	1.33	4.33	18.88	0.12	0.53
		MAX	1.22	5.32	0.04	0.19	0.31	1.33	4.33	18.88	0.12	0.53
Fume Recovery System [1,2]		NA			12.47	21.51						
Tank 33		Heavy Oil			0.12	0.005						
Tank 67		Heavy Oil			0.04	0.002						
Fugitives		NA			0.98	0.568						
New Hot Oil Heater		Gas	1.34	5.87	0.03	0.12	0.34	1.47	0.04	0.16	0.06	0.26
		Oil	1.42	6.26	0.01	0.06	0.36	1.56	5.04	22.21	0.14	0.63
		MAX	1.42	6.26	0.03	0.12	0.36	1.56	5.04	22.21	0.14	0.63
T-200		Liquid Pitch				Note 3						
Plant Total			**5.64**	**24.72**	**13.74**	**22.64**	**1.41**	**6.18**	**20.02**	**87.74**	**0.56**	**2.47**

NOTES

[1] The fume recovery system receives emissions from the following units: T-68, T-65, T-200, railcar loading arfd tank car loading.

[2] Hourly and annual VOC emissions from the fume recovery system were calculated using ChemCAD.

[3] Emissions from T-200 are included in the fume recovery system's emissions.

Koppers010478

Maximum Potential Emissions, Phase II
Koppers Industries, Inc., Portland Terminal

Unit	Comments	Commodity	NOx (lb/hr)	NOx Tons/Yr	VOC (lb/hr)	VOC Tons/Yr	CO (lb/hr)	CO Tons/Yr	SO2 (lb/hr)	SO2 Tons/Yr	PM-10 (lb/hr)	PM-10 Tons/Yr
Atlas Boiler		Gas	2.82	12.33	0.06	0.25	0.70	3.08	0.08	0.33	0.12	0.55
		Oil	3.00	13.14	0.03	0.13	0.75	3.29	10.65	46.65	0.30	1.31
		MAX	3.00	13.14	0.06	0.25	0.75	3.29	10.65	46.65	0.30	1.31
Hot Oil Heater(backup unit)		Gas	0.81	3.57	0.04	0.19	0.17	0.75	0.03	0.14	0.04	0.16
		Oil	1.22	5.32	0.01	0.05	0.31	1.33	4.33	18.88	0.12	0.53
		MAX	1.22	5.32	0.04	0.19	0.31	1.33	4.33	18.88	0.12	0.53
Fume Combustion System[1,2]		NA			0.49	2.16						
Tank 33		Heavy Oil			0.12	0.005						
Tank 67		Heavy Oil			0.04	0.002						
Fugitives		NA			0.98	0.568						
New Hot Oil Heater		Gas	1.34	5.87	0.03	0.12	0.34	1.47	0.04	0.16	0.06	0.26
		Oil	1.42	6.26	0.01	0.06	0.36	1.56	5.04	22.21	0.14	0.63
		MAX	1.42	6.26	0.03	0.12	0.36	1.56	5.04	22.21	0.14	0.63
T-200		Liquid Pitch				Note 3						
T-210		Liquid Pitch				Note 3						
Plant Total	**Maximum**		**5.64**	**24.72**	**1.76**	**3.29**	**1.41**	**6.18**	**20.02**	**87.74**	**0.56**	**2.47**

NOTES

[1] The fume combustion system recieves emissions from the following units: T-68, T-65, T-200, T-210, railcar loading and tank car loading, and an additional loading rack.

[2] Hourly emissions from the fume combustion system were calculated assuming an uncontrolled emission rate of 24.7 and a destruction efficiency of 98%. Annual emissions assumes 8,760 hours of operation.

[3] Emissions from T-200 and T-210 are included in the fume combustion system's emissions.

Koppers010479

ATTACHMENT 2

BACKUP CALCULATIONS FOR ACTUAL EMISSIONS

Basis: Actual Emissions case

Year	Pitch Total (tons)	Pitch Total (gallons)	Pitch Solid (tons)	Pitch Solid (gallons)	Pitch Liquid (tons)	Pitch Liquid (gallons)	Additive Heavy Oil (gallons)	Fume Recovery Heavy Oil (gallons)
Maximum	70,000	12,727,273	0	0	70,000	12,727,273	84,000	36,000

Gallons = tons * 2,000 lb/ton / (11 lb/gal)

* Heavy Oil Throughput (Tank 33) assumed to be equal to 1.2 gallons per ton of Total Pitch Throughput
* New Tank(s) throughput assumed to be equal to total liquid pitch Shipments
* Rail Car througput assumed equal to 60% of total pitch shipments
* Truck througput assumed equal to 40% of total pitch shipments
* Tank 68 assumed equal to Rail Car Shipments
* Tank 65 throughput assumed equal to total solid pitch deliveries
* Uncontrolled tank breathing losses are based on +/- 10 F temperature variations.
* Fume recovery system solution usage was calculated by assuming 3,000 gallons per month for every 70,000 tons of Pitch processed per year
* Tank 67 throughput assumed equal to fume recovery system throughput
* Fume Recovery system operates whenever transfers occur.
* Inlet pitch concentration to fume recovery system was assumed saturated pitch at 400F (Actual pitch concentration is expected to be lower)
* Fume recovery system emissions were calculated by ChemCad.

Scrubber Operating Hours- Actual case
Koppers Industries, Inc., Portland Tar Plant, Portland, Oregon

Assumptions:

All Pitch comes in as solid pitch		
Total Annual Pitch Production:	70,000	tons/yr
Pitch Charging into T-65	58	tons/hr, based on 1,200 tons per each change of 20.6 hrs
% Pitch loaded into trucks from T-68:	60	% of total pitch production
Pitch loading pumping rate into trucks fr	55.5	tons/hr, based on 37 tons loaded per 40 minutes
% Pitch loaded into railcar from T-65:	40	% of total pitch production
Pitch loading pumping rate into railcars f	58.0	tons/hr, based on 87 tons loaded per 90 minutes
% Pitch transferred from T-65 to T-68	60.0	% of total pitch production
Pitch transfer pumping rate from T-65 to	70.0	tons/hr
Heavy oil pumping rate:	23	tons/hr, based on 1,200 gal/15min, and a density of 9.6 lbs/gal
Heavy Oil Annual Usage:	375	tons/yr, based on 1997 actual heavy oil usage of 42,421 gal times the ratio of potential pitch production (70,000 tons) over 1997 actual pitch production (38,000 tons)

Calculations:

Transfer Description	Amount per Charge (tons)	Pumping Rate (ton/hr)	Annual Amount Transferred (tons/yr)	Annual Transfer Time (hours)	Annual Number of Transfers	T-65 fume hours	T-68 fume hours	Total hours
Dry Pitch Charging	1200	58	70,000	1,207	58	1,323		1,323
From T-68 to trucks	37	55.5	42,000	757	1,135		3,027	3,027
From T-65 to rail	87	58.0	28,000	483	322	1,127		1,127
From T-65 to T-68	1200	70.0	42,000	600	35		670	670
Heavy Oil transfer	5.76	23	375	16	65	73	73	146
TOTALS:				**3,063**	**1,615**	**2,523**	**3,770**	**6,293**

[1] Solid pitch loading hours were adjusted by 1/3 times max hours to reflect llower flow rates
The flow rate is acually lower by about 1/3, so adjusting hours will have same effect .

Assume all transfers (except Solid Pitch) are done independently and that the scrubbers are at high capacity (1,050 scfm). Assume it takes one hour before and after each transfer to turn the fime system off and on.

Annual Operating Time: 71.84% annual operating time

Maximum annual emissions = 12 * monthly emissions (lbs) 100% operating at full capacity

Monthly emissisons = 3,585 lbs (reference: Chem Cad result)

Maximum annual emissions = 43,020 lbs 100% operating at full capacity
21.51 tons 100% operating at full capacity

Actual annual emissions = 43,020 * % of annual operation hours

Actual annual emissions = 30,905 lbs/yr
15.45 tpy

Koppers010482

Actual Emissions from Natural Gas Combustion, Koppers Industries, Inc., Portland Tar Plant

Unit ID	Heat Input (MM BTU/Hr)	Fuel Used	Max Fuel Use (mmcf/hr)	Actual 1997 Fuel Use (mmcf/yr)	NOx (lb/mmcf)	NOx (lb/hr)	NOx (tpy)	VOC (lb/mmcf)	VOC (lb/hr)	VOC (tpy)	CO (lb/mmcf)	CO (lb/hr)	CO (tpy)	SO2 (lb/mmcf)	SO2 (lb/hr)	SO2 (tpy)	PM-10 (lb/mmcf)	PM-10 (lb/hr)	PM-10 (tpy)
Atlas Boiler	21	Gas	0.02	29.19	140.000	2.816	2.043	2.784	0.056	0.041	35.000	0.704	0.511	3.800	0.076	0.055	6.200	0.125	0.090
Hot Oil Heater	8.5	Gas	0.01	11.81	100.000	0.814	0.591	5.280	0.043	0.077	21.000	0.171	0.124	3.800	0.031	0.022	4.500	0.037	0.027
Total				**41.00**		**3.630**	**2.634**		**0.099**	**0.118**		**0.875**	**0.635**		**0.107**	**0.078**		**0.161**	**0.117**

Actual annual throughput based Therm output from 1997: 428,977 Therms.
Actual hourly fuel usage based on heat input and 1,044 BTU/cf
100,000 BTU = 1 Therm
Natural Gas = 1044 BTU/cuft
Emission Factors taken from the AP-42, sections 1.4 - EPA/Jan, 1995
Calculation for criteria pollutants = (Criteria emission factor) X (Actual Fuel Use) / (2000 lbs/ton)

Koppers010483

Actual Fugitive Equipment Leak Emissions, Koppers Industries, Inc., Portland Terminal

Reference: Protocol for Equipment Leak Estimates EPA-453/R-95-017, Average Emission Factors, Table 2--1

Distillate Fugitive Equipment Leaks
Tanks 67

Process Description	Number In service	Emission Factor (lb/hr/source)	Hours (year)	Emission (lb/hr)	Emission (lb/yr)
Pump seals	3	0.01899	8	0.06	0.43
Valves (in line)	23	0.00051	8	0.01	0.09
Pressure relief valves	0	0.22907	8	0.00	0.00
Open ended valves	1	0.00374	8	0.00	0.03
Flanges	57	0.00403	8	0.23	1.72
		Total emissions		0.30	2.27

Assume pumping rate 200 gpm
Hours = 2 * gals throughput/gpm pump rate/60= $\frac{45{,}000}{200}$ *2 /60 = 7.5

Heavy Oil: Storage Fugitive Equipment Leak
Tank 33

Process Description	Number In service	Emissions (lb/hr/source)	Hours year	Emission (lb/hr)	Emission (lb/yr)
Pump seals	1	0.01899	35	0.02	0.66
Valves (in line)	7	0.00051	35	0.00	0.12
Pressure relief valves	0	0.22907	35	0.00	0.00
Open ended valves	0	0.00374	35	0.00	0.00
Flanges	18	0.00403	35	0.07	2.54
		Total emissions		0.10	3.33

Assume pumping rate 80 gpm
Hours = 2 * gals throughput/gpm pump rate/60= $\frac{84.000}{80}$ /60 * 2= 35.0

Pitch: Storage Fugitive Equipment Leak

Process Description	Number In service	Emissions (lb/hr/source)	Hours year	Emission (lbs/hr)	Emission (lb/yr)
Pump seals	5	0.01899	1,061	0.09	100.69
Valves (in line)	31	0.00051	1,061	0.02	16.66
Pressure relief valves	0	0.22907	1,061	0.00	0.00
Open ended valves	5	0.00374	1,061	0.02	19.86
Flanges	68	0.00403	1,061	0.27	290.65
		Total emissions		0.40	427.85

Assume pumping rate 400 gpm
Hours = 2 * gals throughput/gpm pump rate/60= $\frac{12.727.273}{400}$ /60 *2= 1,060.6

Pitch: Loading Fugitive Equipment Leak

Process Description	Number In service	Emissions (lb/hr/source)	Hours year	Emissions (lb/hr)	Emission (lb/yr)
Pump seals	2	0.01899	530	0.04	20.14
Valves (in line)	11	0.00051	530	0.01	2.96
Pressure relief valves	0	0.22907	530	0.00	0.00
Open ended valves	2	0.00374	530	0.01	3.97
Flanges	33	0.00403	530	0.13	70.53
		Total emissions		0.18	97.59

Assume pumping rate 400 gpm
Hours = * gals throughput/gpm pump rate/60= $\frac{12.727.273}{400}$ /60 = 530.3

Total VOCs **531.03 lb/yr**
0.98 lb/hr

Koppers010484

Actual Emissions from Uncontrolled Loading, Koppers Industries, Inc., Portland Terminal

Reference: AP-42, 1995, Section 5.2, "Transporation and Marketing of Petroleum Liquids"

Process Description	Label	Temp. (°F)	Vapor MW (lb/lb-mole)	V_p (psia)	Saturation Factor	Throughput (Mgal/min)	Throughput (Mgal/yr)	L_L (lb/Mgal)	L_L (lb/yr)	L_L (lb/hr)
Tank 67 to Rail	P1/P13 Distillate	170	121.77	0.0587	1.45	0.20	45	0.2051	9	2.46

Throughput given by Koppers 10/2698 ROTC

Emissions Factor, AP-42, splash fill loading.

Koppers010485

Actual Hourly VOC Loading Emissions from Uncontrolled Tanks, Koppers Industries, Inc., Portland Terminal

Tank	Commodity	Vapor MW	Temp deg F	Temp deg R	PVA psia	Pump Rate Gal/min	VOC Emissions (lb/hr)
33	Heavy Oil	174.60	250	710.0	0.0079	80.00	0.12
67	P1/P13 Distillate	121.77	170	630.0	0.0587	200.00	1.71

Pound per hour (lb/hr) tank emissions were calculated as follows

$$\frac{\text{gal}}{\text{min}} \left| \frac{60\ \text{min}}{\text{hr}} \right| \frac{\text{cf}}{7.48\ \text{gal}} \left| \frac{\text{lb-mol}}{385\ \text{cf}} \right| \frac{\text{MW lb}}{\text{lb-mol}} \left| \frac{\text{PVA}}{14.7\ \text{psia}} \right| \frac{530\ \text{R}}{\text{TB deg R}} = \text{lbs/hr}$$

Koppers010486

Emissions from T-67, Koppers Industries, Inc., Portland Terminal

Reference: AP-42, Jan. 1995, Liquid Organic Storage Tanks

Tank ID	T-67	Description	P1/P13 Distillate
City	Portland	State	OR
Company	Koppers Industries, Inc.		

Tank Information		
Diameter (D)	*24.25*	ft
Shell Height (H_s)	*28.5*	ft
Liquid Height (H_L)	*14.3*	ft
Tank Volume	90,000	gal
Annual Throughput- basis, empty existing material	*45,000*	gal
Number of Turnovers	0.5	turnovers
Is Tank Heated (Y/N)?	Y	
Breather Vent Pressure Range (ΔP_B)	*0.00*	psia
Paint solar absorbance (primer, good) (α)	*0.89*	
Solar Insolation (I) for Portland, OR	*1,067*	Btu/ft^2-day

Content Information		
Vapor Molecular Weight (M_v)	*121.77*	lb/lb-mole
Vapor Pressure @ Average Daily Temp (P_{VA})	*0.0587*	psia @ 170 F
Daily Average Ambient Temp (T_{AA})	538	°R
Daily Max Ambient Temp (T_{AX})	548	°R
Daily Min Ambient Temp (T_{AN})	528	°R
Daily Ambient Temp Range (ΔT_A)	20	°R
Daily Average Liquid Surface Temperature	630	°R
Maximum Liquid Surface Temperature	640	°R
Minimum Liquid SurfaceTemperature	620	°R
Bulk Liquid Temperature Range	20	°R
Maximum Liquid Surface Temp (T_{LX})	640.00	°R
Minimum Liquid Surface Temp (T_{LN})	620.00	°R
Average Liquid Surface Temp (T_{LA})	630.00	°R
Vapor Pressure @ Max Liq. Surface Temp(P_{LX})	*0.0752*	psia
Vapor Pressure @ Min Liq. Surface Temp (P_{LN})	*0.0456*	psia
Vapor Pressure Range (ΔP_V)	0.02966	psia

~~BREATHING LOSSES~~

Vv =	6,698 ft^3		
$H_{VO} = (H_S - H_L + H_{RO})$		=	14.50
$T_{LA} = (0.44T_{AA}) + (0.56T_B) + (0.0079\alpha I)$		=	629.44 °R
$T_B = T_{AA} + (6\alpha) - 1$		=	629 °R
Wv =	0.0011 lb/ft^3		
$\mathbf{K_E}$ =	0.025		
$\Delta T_v = (0.72*\Delta T_A) + 0.028\alpha I$		=	14.4 °R
$\mathbf{K_S}$ =	0.957		
L_S (2/96) =		61.7 lb/yr	

WORKING LOSSES

$L_W = 0.0010\ M_V P_{VA} Q K_N K_P$ = 7.7 lb/yr

TOTAL LOSSES

$L_S + L_W$ = 69.4 lb/yr

/ac092/permit/Actualex,T-67-Dis 10/28/98

Emissions from ' ', Koppers Industries, Inc., Portland Termina

Reference: AP-42, Jan. 1995, Liquid Organic Storage Tanks

Tank ID	T-33	Description	Heavy Oil
City	Portland	State	Oregon
Company	Koppers Industries, Inc.		

Tank Information		
Diameter (D)	*18.0*	ft
Shell Height (H_s)	*24.0*	ft
Liquid Height (H_L)	*12*	ft
Liquid Temperature (F)	*250*	deg F
Tank Volume	45,000	gal
Annual Throughput	*84,000*	gal
Number of Turnovers	1.9	turnovers
Is Tank Heated (Y/N)?	Y	
Breather Vent Pressure Range (ΔP_B)	*0.00*	psia
Paint solar absorbance (primer, good) (α)	*0.89*	
Solar Insolation (I) for Portland, Oregon	*1,067*	Btu/ft^2-day

Content Information		
Vapor Molecular Weight (M_v)	*174.60*	lb/lb-mole
Vapor Pressure @ Average Daily Temp (P_{VA})	*0.0079*	psia
Daily Average Ambient Temp (T_{AA})	538	°R
Daily Max Ambient Temp (T_{AX})	548	°R
Daily Min Ambient Temp (T_{AN})	528	°R
Daily Ambient Temp Range (ΔT_A)	20	°R
Daily Average Liquid Surface Temperature	710	°R
Maximum Liquid Surface Temperature	720	°R
Minimum Liquid SurfaceTemperature	700	°R
Bulk Liquid Temperature Range	20	°R
Maximum Liquid Surface Temp (T_{LX})	720.00	°R
Minimum Liquid Surface Temp (T_{LN})	700.00	°R
Average Liquid Surface Temp (T_{LA})	710.00	°R
Vapor Pressure @ Max Liq. Surface Temp(P_{LX})	*0.0102*	psia
Vapor Pressure @ Min Liq. Surface Temp (P_{LN})	*0.0061*	psia
Vapor Pressure Range (ΔP_V)	0.00416	psia

BREATHING LOSSES

Vv =	3,101 ft^3		
$H_{VO} = (H_S - H_L + H_{RO})$		=	12.19
$T_{LA} = (0.44T_{AA}) + (0.56T_B) + (0.0079\alpha I)$		=	709.44 °R
$T_B = T_{AA} + (6\alpha) - 1$		=	709 °R
Wv =	0.0002 lb/ft^3		
$\mathbf{K_E}$ =	0.021		
$\Delta T_v = (0.72*\Delta T_A) + 0.028\alpha I$		=	14.4 °R
$\mathbf{K_S}$ =	0.995		

L_S(2/96) = 4.2 lb/yr

WORKING LOSSES

$L_W = 0.0010\ M_v P_{VA} Q K_N K_P$ = 2.8 lb/yr

TOTAL LOSSES

$L_S + L_W$ = 7.0 lb/yr

/ac092/permit/Actualex,T33 10/28/98

Heavy Oil Lookup Table				% wt in Vapor									
Temp (°F)	Temp (°R)	Vapor MW	VP	Anthracene	Dibenzofuran	PACs	Acenaphthene	Flourene	Phenanthrene	Carbazole	Flouranthene	Pyrene	Balance HO
70	530	166.40	0.0000	10.26	4.01	0.00	14.36	67.40	0.18	1.40	0.00	0.16	2.23
80	540	166.60	0.0000	11.46	4.27	0.00	15.26	64.34	0.21	1.56	0.01	0.19	2.70
90	550	166.83	0.0001	12.69	4.52	0.00	16.11	61.24	0.25	1.72	0.01	0.23	3.23
100	560	167.09	0.0001	13.93	4.76	0.00	16.90	58.13	0.29	1.88	0.02	0.28	3.82
110	570	167.39	0.0001	15.18	4.97	0.00	17.62	55.03	0.34	2.03	0.03	0.32	4.47
120	580	167.72	0.0002	16.42	5.17	0.00	18.26	51.97	0.39	2.19	0.04	0.37	5.19
130	590	168.08	0.0002	17.64	5.34	0.00	18.82	48.97	0.44	2.34	0.06	0.43	5.96
140	600	168.48	0.0003	18.82	5.49	0.00	19.30	46.03	0.50	2.49	0.09	0.49	6.79
150	610	168.91	0.0005	19.96	5.61	0.00	19.70	43.19	0.55	2.63	0.13	0.55	7.67
160	620	169.36	0.0006	21.05	5.72	0.00	20.01	40.45	0.62	2.76	0.19	0.62	8.59
170	630	169.85	0.0008	22.08	5.79	0.00	20.24	37.82	0.68	2.88	0.26	0.69	9.56
180	640	170.36	0.0011	23.04	5.85	0.00	20.39	35.30	0.74	2.99	0.36	0.76	10.56
190	650	170.89	0.0015	23.92	5.88	0.00	20.47	32.91	0.81	3.09	0.49	0.84	11.59
200	660	171.45	0.0020	24.72	5.89	0.00	20.47	30.63	0.87	3.19	0.67	0.91	12.64
210	670	172.03	0.0027	25.44	5.89	0.00	20.41	28.48	0.93	3.27	0.89	0.99	13.71
220	680	172.64	0.0035	26.07	5.86	0.01	20.27	26.45	1.00	3.34	1.16	1.07	14.77
230	690	173.27	0.0047	26.61	5.81	0.01	20.08	24.54	1.06	3.39	1.51	1.14	15.84
240	700	173.92	0.0061	27.05	5.75	0.02	19.83	22.73	1.12	3.44	1.94	1.22	16.89
250	710	174.60	0.0079	27.40	5.67	0.03	19.52	21.04	1.18	3.47	2.47	1.29	17.92
260	720	175.31	0.0102	27.65	5.58	0.05	19.16	19.44	1.24	3.49	3.11	1.37	18.92
270	730	176.05	0.0132	27.79	5.46	0.07	18.75	17.95	1.29	3.50	3.88	1.43	19.87
280	740	176.81	0.0170	27.83	5.34	0.11	18.29	16.54	1.34	3.49	4.80	1.50	20.76
290	750	177.62	0.0218	27.76	5.20	0.16	17.79	15.22	1.38	3.47	5.87	1.56	21.59
300	760	178.47	0.0278	27.58	5.05	0.24	17.24	13.97	1.42	3.44	7.11	1.61	22.33
310	770	179.36	0.0355	27.28	4.88	0.36	16.65	12.80	1.45	3.40	8.54	1.66	22.98
320	780	180.30	0.0452	26.87	4.70	0.52	16.02	11.70	1.47	3.34	10.15	1.70	23.52
330	790	181.31	0.0574	26.35	4.51	0.74	15.35	10.67	1.49	3.26	11.96	1.73	23.94

Koppers010489

GAS USAGE (THERMS)
PORTLAND TERMINAL

	1997
JANUARY	43,267
FEBUARY	32,884
MARCH	36,210
APRIL	36,457
MAY	31,674
JUNE	33,845
JULY	35,644
AUGUST	25,900
SEPTEMBER	38,152
OCTOBER	35,925
NOVEMBER	35,265
DECEMBER	42,854
TOTAL	430,074

ATTACHMENT 3

BACKUP CALCULATIONS FOR POTENTIAL EMISSIONS

Basis: **Potential Emissions**

Year	Pitch Total (tons)	Pitch Total (gallons)	Pitch Solid (tons)	Pitch Solid (gallons)	Pitch Liquid (tons)	Pitch Liquid (gallons)	Additive Heavy Oil (gallons)	Fume Recovery Heavy Oil (gallons)
Maximum	150,000	27,272,727	0	0	150,000	27,272,727	180,000	77,143

Gallons = tons * 2,000 lb/ton / (11 lb/gal)

* Heavy Oil Throughput (Tank 33) assumed to be equal to 1.2 gallons per ton of Total Pitch Throughput
* New Tank(s) throughput assumed to be equal to total liquid pitch Shipments
* Rail Car througput assumed equal to 60% of total pitch shipments
* Truck througput assumed equal to 40% of total pitch shipments
* Tank 68 assumed equal to Rail Car Shipments
* Tank 65 throughput assumed equal to total solid pitch deliveries
* Uncontrolled tank breathing losses are based on +/- 10 F temperature variations.
* Fume recovery system solution usage was calculated by assuming 3,000 gallons per month for every 70,000 tons of Pitch processed per year.
* Tank 67 throughput assumed equal to fume recovery system throughput
* Inlet pitch concentration to fume recovery system was assumed saturated pitch at 400F (Actual pitch concentration is expected to be lower)
* Fume recovery system emissions were calculated by ChemCad.

Phase 1 Revisions

* A new tank, T-200, is vented to Fume Recovery System . The effect on emissions is negligible.
* A new Hot oil Heater rated at 10 MMBTU/hr is added. The old heater remains as a backup . Unit can burn oil and natural gas.

Phase 2 Revisions

* A new tank, T-210, is vented to Fume recovery. The effect on emissions is negligible.
* The Fume Recovery System is replaced with a fume combustor. Pitch fumes are controlled at 98% based on an inlet loading which is assumed saturated at 400F.

Koppers010492

Fume recovery Operating Hours- Maximum Case
Koppers Industries, Inc., Portland Tar Plant, Portland, Oregon

Assumptions:

All Pitch comes in as solid pitch		
Total Annual Pitch Production:	150,000	tons/yr
Pitch laoding from barges	1,100	gallons/min
% Pitch loaded into trucks from T-68:	60	% of total pitch production
Pitch loading pumping rate into trucks from T-68:	55.5	tons/hr, based on 37 tons loaded per 40 minutes
% Pitch loaded into railcar from T-65:	40	% of total pitch production
Pitch loading pumping rate into railcars from T-65:	58.0	tons/hr, based on 87 tons loaded per 90 minutes **Phase I**
Loading rate for 2 racks	116.0	tons/hr **Phase II** added a rack
% Pitch transferred from T-65 to T-68	60.0	% of total pitch production
Pitch transfer pumping rate from T-65 to T-68	70.0	tons/hr
Heavy oil pumping rate:	23	tons/hr, based on 1,200 gal/15min, and a density of 9.6 lbs/gal
Heavy Oil Annual Usage:	375	tons/yr, based on 1997 actual heavy oil usage of 42,421 gal times the ratio of potential pitch production (70,000 tons) over 1997 actual pitch production (38,000 tons)

Calculations:

Transfer Description	Amount per Charge (tons)	Pumping Rate (ton/hr)	Annual Amount Transferred (tons/yr)	Annual Transfer Time (hours)	Annual Number of Transfers	T-65 fume hours	T-68 fume hours	Total hours
Pitch loading from Docks	NA	297	150,000	505	NA	621		621
From T-68 to trucks	37	55.5	90,000	1,622	2,432		6486	6,486
From T-65 to rail	87	116.0	60,000	517	690	1,897		1,897
From T-65 to T-68	1200	70.0	90,000	1,286	75		1436	1,436
Heavy Oil transfer	5.76	23	375	16	65	73	73	146
TOTALS:				**3,946**	**3,262**	**2,591**	**7,995**	**10,586**

Assume all transfers are done independently and that the fume recoverys are at high capacity (1,050 scfm). Assume one hour before and after each transfer, 2 start/stop sequences. Therefore, the total fume recovery operating hours can be calculated as follows:

Actual case: fume recovery will run almost all of the time, many transfers will be done together.

Annual Operating Time: 100 % annual operating time

Maximum Potential Emissions from Fuel Oil Combustion, Koppers Industries, Inc., Portland Tar Plant

Unit ID	Heat Input (MM BTU/Hr)	Fuel Used	Hourly Potential Fuel Use (Mgal/hr)	Annual Potential* Fuel Use (Mgal/yr)	*Emission Factor NOx (lb/Mgal)*	NOx (lb/hr)	NOx (tpy)	*Emission Factor VOC (lb/Mgal)*	VOC (lb/hr)	VOC (tpy)	*Emission Factor CO (lb/Mgal)*	CO (lb/hr)	CO (tpy)	*Emission Factor SO2 (lb/Mgal)*	SO2 (lb/hr)	SO2 (tpy)	*Emission Factor PM-10 (lb/Mgal)*	PM-10 (lb/hr)	PM-10 (tpy)
Atlas Boiler	21	Oil	0.15	1314.00	*20.00*	3.00	13.14	*0.20*	0.03	0.13	*5.00*	0.75	3.29	*71.00*	10.65	46.65	*2.00*	0.30	1.31
Hot Oil Heater	8.5	Oil	0.061	531.86	*20.00*	1.22	5.32	*0.20*	0.01	0.05	*5.00*	0.31	1.33	*71.00*	4.33	18.88	*2.00*	0.12	0.53
New Hot Oil Heater	10	Oil	0.071	625.71	*20.00*	1.42	6.26	*0.20*	0.01	0.06	*5.00*	0.36	1.56	*71.00*	5.04	22.21	*2.00*	0.14	0.63
Total				**2,472**			**24.716**			**0.247**			**6.179**			**87.741**			**2.472**

* Based on 8760 hrs/yr of operation
Assumed higher heating value of #2 Fuel Oil = 140,000 BTU/gal
Emission Factors are taken from the AP-42, Section 1.3, Jan., 1995
SO2 Emission Factor calculated by assuming 0.5% S in Oil
Calculation for criteria pollutants = (max input in mm BTU/hr) X (Criteria emission factor) X (8760 hr/yr) / (2000 lbs/ton * 140,000 BTU/Gal)
Assumed PM = PM-10

Koppers010494

Maximum Potential Emissions from Natural Gas Combustion, Koppers Industries, Inc., Portland Tar Plant

Unit ID	Heat Input (MM BTU/Hr)	Fuel Used	Hourly Potential Fuel Use (mmcf/hr)	Annual Potential* Fuel Use (mmcf/yr)	*Emission Factor NOx (lb/mmcf)*	NOx (lb/hr)	NOx (tpy)	*Emission Factor VOC (lb/mmcf)*	VOC (lb/hr)	VOC (tpy)	*Emission Factor CO (lb/mmcf)*	CO (lb/hr)	CO (tpy)	*Emission Factor SO2 (lb/mmcf)*	SO2 (lb/hr)	SO2 (tpy)	*Emission Factor PM-10 (lb/mmcf)*	PM-10 (lb/hr)	PM-10 (tpy)
Atlas Boiler	21	Gas	0.02	176.21	*140.00*	2.82	12.33	*2.78*	0.06	0.25	*35.00*	0.70	3.08	*3.80*	0.08	0.33	*6.20*	0.12	0.55
Hot Oil Heater	8.5	Gas	0.01	71.32	*100.00*	0.81	3.57	*5.28*	0.04	0.19	*21.00*	0.17	0.75	*3.80*	0.03	0.14	*4.50*	0.04	0.16
New Hot Oil Heater	10	Gas	0.01	83.91	*140.00*	1.34	5.87	*2.78*	0.03	0.12	*35.00*	0.34	1.47	*3.80*	0.04	0.16	*6.20*	0.06	0.26
Total				**331.437**			**21.774**			**0.550**			**5.301**			**0.630**			**0.967**

* Based on 8760 hrs/yr of operation
Higher Heating Value Natural Gas = 1044 BTU/cuft
Emission Factors are taken from the AP-42, Section 1.4, Jan., 1995
Assumed PM = PM-10
Calculation for criteria pollutants = (max input in mm BTU/hr) X (Criteria emission factor) X (8760 hr/yr) / (2000 lbs/ton * 1044 BTU/SCF)

Koppers010495

Maximum Fugitive Equipment Leak Emissions, Koppers Industries, Inc., Portland Terminal

Reference: Protocol for Equipment Leak Estimates EPA-453/R-95-017, Average Emission Factors, Table 2--1

Heavy Oil Fugitive Equipment Leaks
Tanks 67

Process Description	Number In service	Emission Factor (lb/hr/source)	Hours (year)	Emission (lb/hr)	Emission (lb/yr)
Pump seals	3	0.01899	13	0.06	0.73
Valves (in line)	23	0.00051	13	0.01	0.15
Pressure relief valves	0	0.22907	13	0.00	0.00
Open ended valves	1	0.00374	13	0.00	0.05
Flanges	57	0.00403	13	0.23	2.95
		Total emissions		0.30	3.88

Assume pumping rate 200 gpm
Hours = 2 * gals throughput/gpm pump rate/60= 77,143 / 200 *2 /60 = 12.9

Heavy Oil: Storage Fugitive Equipment Leak
Tank 33

Process Description	Number In service	Emissions (lb/hr/source)	Hours year	Emission (lb/hr)	Emission (lb/yr)
Pump seals	1	0.01899	75	0.02	1.42
Valves (in line)	7	0.00051	75	0.00	0.27
Pressure relief valves	0	0.22907	75	0.00	0.00
Open ended valves	0	0.00374	75	0.00	0.00
Flanges	18	0.00403	75	0.07	5.44
		Total emissions		0.10	7.13

Assume pumping rate 80 gpm
Hours = 2 * gals throughput/gpm pump rate/60= 180,000 / 80 /60 * 2= 75.0

Pitch: Storage Fugitive Equipment Leak

Process Description	Number In service	Emissions (lb/hr/source)	Hours year	Emission (lbs/hr)	Emission (lb/yr)
Pump seals	5	0.01899	2,273	0.09	215.76
Valves (in line)	31	0.00051	2,273	0.02	35.69
Pressure relief valves	0	0.22907	2,273	0.00	0.00
Open ended valves	5	0.00374	2,273	0.02	42.55
Flanges	68	0.00403	2,273	0.27	622.82
		Total emissions		0.40	916.82

Assume pumping rate 400 gpm
Hours = 2 * gals throughput/gpm pump rate/60= 27,272,727 / 400 /60 *2= 2,272.7

Pitch: Loading Fugitive Equipment Leak

Process Description	Number In service	Emissions (lb/hr/source)	Hours year	Emissions (lb/hr)	Emission (lb/yr)
Pump seals	2	0.01899	1,136	0.04	43.15
Valves (in line)	11	0.00051	1,136	0.01	6.33
Pressure relief valves	0	0.22907	1,136	0.00	0.00
Open ended valves	2	0.00374	1,136	0.01	8.51
Flanges	33	0.00403	1,136	0.13	151.13
		Total emissions		0.18	209.12

Assume pumping rate 400 gpm
Hours = * gals throughput/gpm pump rate/60= 27,272,727 / 400 /60 = 1,136.4

Distillate Fugitive Equipment Leaks
Tanks 67 (Existing Case Only)

Process Description	Number In service	Emission Factor (lb/hr/source)	Hours (year)	Emission (lb/hr)	Emission (lb/yr)
Pump seals	3	0.01899	8	0.06	0.43
Valves (in line)	23	0.00051	8	0.01	0.09
Pressure relief valves	0	0.22907	8	0.00	0.00
Open ended valves	1	0.00374	8	0.00	0.03
Flanges	57	0.00403	8	0.23	1.72
		Total emissions		0.30	2.27

Assume pumping rate 200 gpm
Hours = 2 * gals throughput/gpm pump rate/60= 45,000 / 200 *2 /60 = 7.5

TOTALS FOR EXISTING CASE ONLY - i.e T67 containing Distillate
0.98 lb/hr
1135.34 lb/yr

TOTAL FOR OTHER CASES - I.e. T67 containinf Heavy Oil
0.98 lb/hr
1136.96 lb/yr

Koppers010496

Maximum Potential Emissions from Uncontrolled Loading, Koppers Industries, Inc., Portland Terminal

Existing Case Only

Reference: AP-42, 1995, Section 5.2, "Transporation and Marketing of Petroleum Liquids"

Process Description	Label	Temp. (°F)	Vapor MW (lb/lb-mole)	V_p (psia)	Saturation Factor	Throughput (Mgal/min)	Throughput (Mgal/yr)	L_L (lb/Mgal)	L_L (lb/yr)	L_L (lb/hr)
Tank 67 to Rail	P1/P13 Distillate	170	121.77	0.0587	1.45	0.20	36	0.2051	7	2.46

Throughput given by Amos 10/2698 ROTC

Koppers010497

Maximum Hourly VOC Loading Emissions from Uncontrolled Tanks, Koppers Industries, Inc., Portland Terminal

Tank	Commodity	Vapor MW	Temp deg F	Temp deg R	PVA psia	Pump Rate Gal/min	VOC Emissions (lb/hr)	
67	Heavy Oil	171.45	200	660.0	0.0020	100.00	0.04	
33	Heavy Oil	174.60	250	710.0	0.0079	80.00	0.12	
67	P1/P13 Distillate	121.77	170	630.0	0.0587	100.00	0.85	Existing Case Only

Pound per hour (lb/hr) tank emissions were calculated as follows

$$\frac{\text{gal}}{\text{min}} \left| \frac{60\ \text{min}}{\text{hr}} \right| \frac{\text{cf}}{7.48\ \text{gal}} \left| \frac{\text{lb-mol}}{385\ \text{cf}} \right| \frac{\text{MW lb}}{\text{lb-mol}} \left| \frac{\text{PVA}}{14.7\ \text{psia}} \right| \frac{530\ \text{R}}{\text{TB deg R}} = \text{lbs/hr}$$

Koppers010498

Emissions from T-6. , .oppers Industries, Inc., Portland Terminal
Existing Case Only

Reference: AP-42, Jan. 1995, Liquid Organic Storage Tanks

Tank ID	T-67	Description	P1/P13 Distillate
City	Portland	State	OR
Company	Koppers Industries, Inc.		

Tank Information		
Diameter (D)	*24.25*	ft
Shell Height (H_s)	*28.5*	ft
Liquid Height (H_L)	*14.3*	ft
Tank Volume	90,000	gal
Annual Throughput (assumed = remaining material)	*45,000*	gal
Number of Turnovers	0.5	turnovers
Is Tank Heated (Y/N)?	Y	
Breather Vent Pressure Range (ΔP_B)	*0.00*	psia
Paint solar absorbance (primer, good) (α)	*0.89*	
Solar Insolation (I) for Portland, OR	*1,067*	Btu/f^2-day

Content Information		
Vapor Molecular Weight (M_v)	*121.77*	lb/lb-mole
Vapor Pressure @ Average Daily Temp (P_{VA})	*0.0587*	psia @ 170 F
Daily Average Ambient Temp (T_{AA})	538	°R
Daily Max Ambient Temp (T_{AX})	548	°R
Daily Min Ambient Temp (T_{AN})	528	°R
Daily Ambient Temp Range (ΔT_A)	20	°R
Daily Average Liquid Surface Temperature	630	°R
Maximum Liquid Surface Temperature	640	°R
Minimum Liquid SurfaceTemperature	620	°R
Bulk Liquid Temperature Range	20	°R
Maximum Liquid Surface Temp (T_{LX})	640.00	°R
Minimum Liquid Surface Temp (T_{LN})	620.00	°R
Average Liquid Surface Temp (T_{LA})	630.00	°R
Vapor Pressure @ Max Liq. Surface Temp(P_{LX})	*0.0752*	psia
Vapor Pressure @ Min Liq. Surface Temp (P_{LN})	*0.0456*	psia
Vapor Pressure Range (ΔP_V)	0.02966	psia

~~BREATHING LOSSES~~

Vv =	6,698 ft^3		
$H_{VO} = (H_S - H_L + H_{RO})$		=	14.50
$T_{LA} = (0.44T_{AA}) + (0.56T_B) + (0.0079\alpha I)$		=	629.44 °R
$T_B = T_{AA} + (6\alpha) - 1$		=	629 °R
Wv =	0.0011 lb/ft^3		
K_E =	0.025		
$\Delta T_v = (0.72*\Delta T_A) + 0.028\alpha I$		=	14.4 °R
K_S =	0.957		

L_S (2/96) = 61.7 lb/yr

WORKING LOSSES

$L_W = 0.0010 M_v P_{VA} Q K_N K_P$ = 7.7 lb/yr

TOTAL LOSSES

$L_S + L_W$ = 69.4 lb/yr

Emission m T-67, Koppers Industries, Inc., Portland T inal

Reference: AP-42, Jan. 1995, Liquid Organic Storage Tanks

Tank ID	T-67	Description	Heavy Oil
City	Portland	State	OR
Company	Koppers Industries, Inc.		

Tank Information		
Diameter (D)	*24.25*	ft
Shell Height (H_s)	*28.5*	ft
Liquid Height (H_L)	*14.3*	ft
Liquid Temperature (F)	*200*	deg F
Tank Volume	90,000	gal
Annual Throughput	*77,143*	gal
Number of Turnovers	0.9	turnovers
Is Tank Heated (Y/N)?	Y	
Breather Vent Pressure Range (ΔP_B)	*0.00*	psia
Paint solar absorbance (primer, good) (α)	*0.89*	
Solar Insolation (I) for Portland, OR	*1,067*	Btu/f^2-day

Content Information		
Vapor Molecular Weight (M_v)	*171.45*	lb/lb-mole
Vapor Pressure @ Average Daily Temp (P_{VA})	*0.0020*	psia
Daily Average Ambient Temp (T_{AA})	538	°R
Daily Max Ambient Temp (T_{AX})	548	°R
Daily Min Ambient Temp (T_{AN})	528	°R
Daily Ambient Temp Range (ΔT_A)	20	°R
Daily Average Liquid Surface Temperature	660	°R
Maximum Liquid Surface Temperature	670	°R
Minimum Liquid SurfaceTemperature	650	°R
Bulk Liquid Temperature Range	20	°R
Maximum Liquid Surface Temp (T_{LX})	670.00	°R
Minimum Liquid Surface Temp (T_{LN})	650.00	°R
Average Liquid Surface Temp (T_{LA})	660.00	°R
Vapor Pressure @ Max Liq. Surface Temp(P_{LX})	*0.0027*	psia
Vapor Pressure @ Min Liq. Surface Temp (P_{LN})	*0.0015*	psia
Vapor Pressure Range (ΔP_V)	0.00117	psia

BREATHING LOSSES

Vv =	6,698	ft^3	
$H_{VO} = (H_S - H_L + H_{RO})$	=	14.50	
$T_{LA} = (0.44T_{AA}) + (0.56T_B) + (0.0079\alpha I)$	=	659.44	°R
$T_B = T_{AA} + (6\alpha) - 1$	=	659	°R
Wv =	0.0000	lb/ft^3	
K_E =	0.022		
$\Delta T_v = (0.72*\Delta T_A) + 0.028\alpha I$	=	14.4	°R
K_S =	0.998		

L_S(2/96) = 2.6 lb/yr

WORKING LOSSES

$L_W = 0.0010\ M_V P_{VA} QK_N K_P$ = 0.6 lb/yr

TOTAL LOSSES

$L_S + L_W$ = 3.3 lb/yr

/ac092/permit/Rcasemax,T67-HO 10/28/98

Emissions from T[illegible], Koppers Industries, Inc., Portland Termina'

Reference: AP-42, Jan. 1995, Liquid Organic Storage Tanks

Tank ID	T-33	Description	Heavy Oil
City	Portland	State	Oregon
Company	Koppers Industries, Inc.		

Tank Information		
Diameter (D)	*18.0*	ft
Shell Height (H_s)	*24.0*	ft
Liquid Height (H_L)	*12*	ft
Liquid Temperature (F)	*250*	deg F
Tank Volume	45,000	gal
Annual Throughput	*180,000*	gal
Number of Turnovers	4.0	turnovers
Is Tank Heated (Y/N)?	Y	
Breather Vent Pressure Range (ΔP_B)	*0.00*	psia
Paint solar absorbance (primer, good) (α)	*0.89*	
Solar Insolation (I) for Portland, Oregon	*1,067*	Btu/ft^2-day

Content Information		
Vapor Molecular Weight (M_v)	*174.60*	lb/lb-mole
Vapor Pressure @ Average Daily Temp (P_{VA})	*0.0079*	psia
Daily Average Ambient Temp (T_{AA})	538	°R
Daily Max Ambient Temp (T_{AX})	548	°R
Daily Min Ambient Temp (T_{AN})	528	°R
Daily Ambient Temp Range (ΔT_A)	20	°R
Daily Average Liquid Surface Temperature	710	°R
Maximum Liquid Surface Temperature	720	°R
Minimum Liquid SurfaceTemperature	700	°R
Bulk Liquid Temperature Range	20	°R
Maximum Liquid Surface Temp (T_{LX})	720.00	°R
Minimum Liquid Surface Temp (T_{LN})	700.00	°R
Average Liquid Surface Temp (T_{LA})	710.00	°R
Vapor Pressure @ Max Liq. Surface Temp(P_{LX})	*0.0102*	psia
Vapor Pressure @ Min Liq. Surface Temp (P_{LN})	*0.0061*	psia
Vapor Pressure Range (ΔP_V)	0.00416	psia

BREATHING LOSSES

Vv =	3,101	ft^3	
$H_{VO} = (H_S - H_L + H_{RO})$	=		12.19
$T_{LA} = (0.44T_{AA}) + (0.56T_B) + (0.0079\alpha I)$	=		709.44 °R
$T_B = T_{AA} + (6\alpha) - 1$	=		709 °R
Wv =	0.0002	lb/ft^3	
K_E =	0.021		
$\Delta T_v = (0.72*\Delta T_A) + 0.028\alpha I$	=		14.4 °R
K_S =	0.995		

L_S (2/96) = 4.2 lb/yr

WORKING LOSSES

$L_W = 0.0010 M_v P_{VA} Q K_N K_P$ = 5.9 lb/yr

TOTAL LOSSES

$L_S + L_W$ = 10.1 lb/yr

/ac092/permit/Rcasemax,T33 10/28/98

Koppers010501

Heavy Oil Lookup Table				% wt in Vapor									
Temp (°F)	Temp (°R)	Vapor MW	VP	Anthracene	Dibenzofuran	PACs	Acenaphthene	Flourene	Phenanthrene	Carbazole	Flouranthene	Pyrene	Balance HO
70	530	166.40	0.0000	10.26	4.01	0.00	14.36	67.40	0.18	1.40	0.00	0.16	2.23
80	540	166.60	0.0000	11.46	4.27	0.00	15.26	64.34	0.21	1.56	0.01	0.19	2.70
90	550	166.83	0.0001	12.69	4.52	0.00	16.11	61.24	0.25	1.72	0.01	0.23	3.23
100	560	167.09	0.0001	13.93	4.76	0.00	16.90	58.13	0.29	1.88	0.02	0.28	3.82
110	570	167.39	0.0001	15.18	4.97	0.00	17.62	55.03	0.34	2.03	0.03	0.32	4.47
120	580	167.72	0.0002	16.42	5.17	0.00	18.26	51.97	0.39	2.19	0.04	0.37	5.19
130	590	168.08	0.0002	17.64	5.34	0.00	18.82	48.97	0.44	2.34	0.06	0.43	5.96
140	600	168.48	0.0003	18.82	5.49	0.00	19.30	46.03	0.50	2.49	0.09	0.49	6.79
150	610	168.91	0.0005	19.96	5.61	0.00	19.70	43.19	0.55	2.63	0.13	0.55	7.67
160	620	169.36	0.0006	21.05	5.72	0.00	20.01	40.45	0.62	2.76	0.19	0.62	8.59
170	630	169.85	0.0008	22.08	5.79	0.00	20.24	37.82	0.68	2.88	0.26	0.69	9.56
180	640	170.36	0.0011	23.04	5.85	0.00	20.39	35.30	0.74	2.99	0.36	0.76	10.56
190	650	170.89	0.0015	23.92	5.88	0.00	20.47	32.91	0.81	3.09	0.49	0.84	11.59
200	660	171.45	0.0020	24.72	5.89	0.00	20.47	30.63	0.87	3.19	0.67	0.91	12.64
210	670	172.03	0.0027	25.44	5.89	0.00	20.41	28.48	0.93	3.27	0.89	0.99	13.71
220	680	172.64	0.0035	26.07	5.86	0.01	20.27	26.45	1.00	3.34	1.16	1.07	14.77
230	690	173.27	0.0047	26.61	5.81	0.01	20.08	24.54	1.06	3.39	1.51	1.14	15.84
240	700	173.92	0.0061	27.05	5.75	0.02	19.83	22.73	1.12	3.44	1.94	1.22	16.89
250	710	174.60	0.0079	27.40	5.67	0.03	19.52	21.04	1.18	3.47	2.47	1.29	17.92
260	720	175.31	0.0102	27.65	5.58	0.05	19.16	19.44	1.24	3.49	3.11	1.37	18.92
270	730	176.05	0.0132	27.79	5.46	0.07	18.75	17.95	1.29	3.50	3.88	1.43	19.87
280	740	176.81	0.0170	27.83	5.34	0.11	18.29	16.54	1.34	3.49	4.80	1.50	20.76
290	750	177.62	0.0218	27.76	5.20	0.16	17.79	15.22	1.38	3.47	5.87	1.56	21.59
300	760	178.47	0.0278	27.58	5.05	0.24	17.24	13.97	1.42	3.44	7.11	1.61	22.33
310	770	179.36	0.0355	27.28	4.88	0.36	16.65	12.80	1.45	3.40	8.54	1.66	22.98
320	780	180.30	0.0452	26.87	4.70	0.52	16.02	11.70	1.47	3.34	10.15	1.70	23.52
330	790	181.31	0.0574	26.35	4.51	0.74	15.35	10.67	1.49	3.26	11.96	1.73	23.94

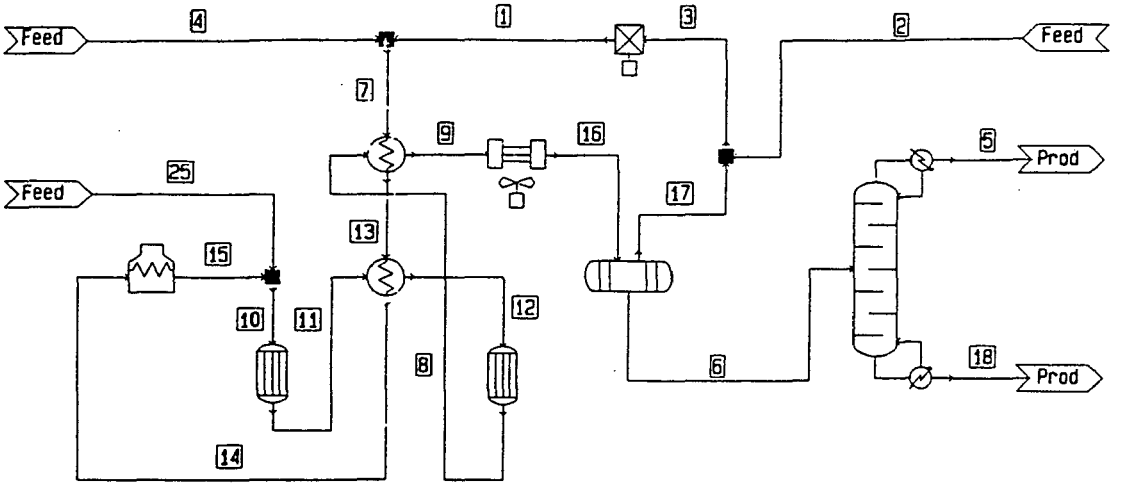
Koppers010502

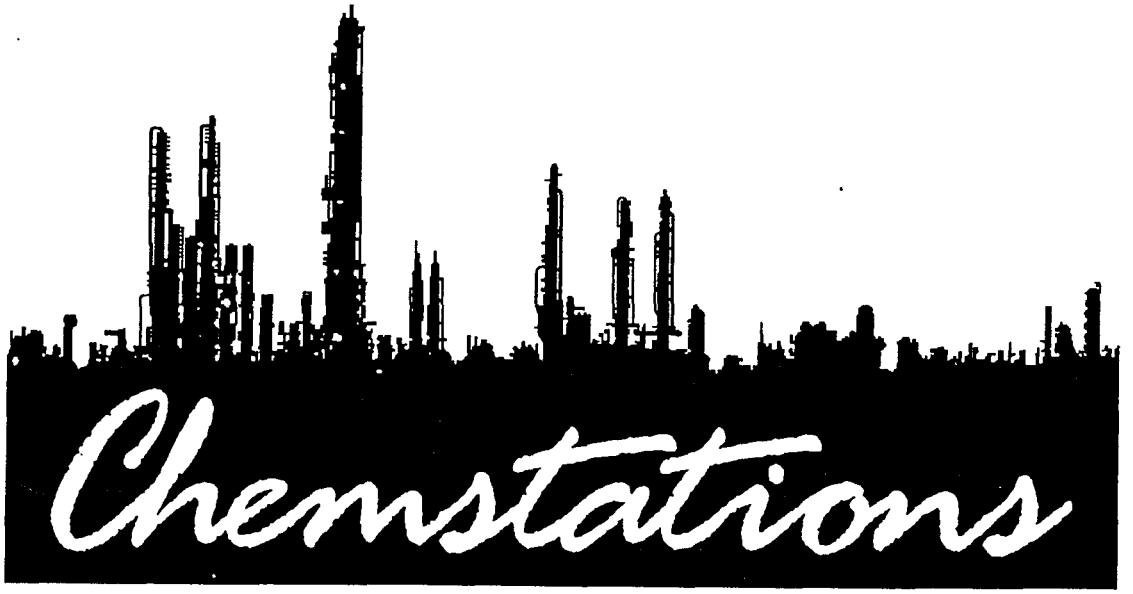
ATTACHMENT 4

CHEMCAD ANALYSIS OF FUME RECOVERY SYSTEM
MAXIMUM HOURLY EMISSIONS RATE

CHEMCAD III

Process Flowsheet Simulator





INTUITIVE CHEMICAL ENGINEERING

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Koppers010504

Stream No.	17
Name	VOC's
- - Overall - -	
Molar flow lbmol/h	22.0837
Mass flow lb/h	408.7261
Temp F	200.0000
Pres psia	14.7000
Vapor mole fraction	0.0000
Enth MMBtu/h	-2.64847
Tc F	711.0477
Pc psia	3294.9958
Std. sp gr , wtr = 1	1.002
Std. sp gr , air = 1	0.639
Degree API	9.7819
Heating values (60 F)	
Gross Btu/lbmol	9619.
Net Btu/lbmol	-9645.
Average mol wt	18.5081
Actual dens lb/ft3	60.1468
Actual vol ft3/hr	6.7955
Std liq gpm	0.8158
Std vap 60F scfh	8380.2881
- - Liquid only - -	
Molar flow lbmol/h	22.0837
Mass flow lb/h	408.7261
Average mol wt	18.5081
Actual dens lb/ft3	60.1468
Actual vol gpm	0.8473
Std liq gpm	0.8158
Std vap 60F scfh	8380.2881
Cp Btu/lbmol-F	18.2749
Z factor	0.0009
Visc cP	0.3031
Th cond Btu/hr-ft-F	0.3733
Surf tens dyne/cm	58.7270

ATTACHMENT 5

CHEMCAD ANALYSIS OF FUME RECOVERY SYSTEM EMISSIONS, 1-MONTH BASIS

Stream No.	1	33	20	5
Name	Pitch Fumes	Heavy Oil	Vap Totalizr	Minus Water
- - Overall - -				
Molar flow lbmol/h	0.0943	233.2134	102.4526	20.4882
Mass flow lb/h	24.7000	38289.0352	5062.2417	3585.6523
Temp F	400.0000	200.0000	200.0000	200.0000
Pres psia	14.7000	14.7000	14.7000	14.7000
Vapor mole fraction	0.0000	0.0000	0.0000	0.0000
Enth MMBtu/h	0.0114518	3.35397	-8.37564	1.51017
Tc F	1293.1027	1217.8970	874.6153	952.4783
Pc psia	395.1926	2408.7273	4633.7319	454.2526
Std. sp gr , wtr = 1	1.049	1.092	1.063	1.091
Std. sp gr , air = 1	9.046	5.669	1.706	6.043
Degree API	3.4243	-1.9726	1.6691	-1.7662
Heating values (60 F)				
Gross Btu/lbmol	4.308E+006	2.593E+006	5.878E+005	2.940E+006
Net Btu/lbmol	4.162E+006	2.492E+006	5.540E+005	2.847E+006
Average mol wt	261.9927	164.1803	49.4106	175.0107
Actual dens lb/ft3	56.9831	64.6572	63.1629	64.5217
Actual vol ft3/hr	0.4335	592.1855	80.1459	55.5728
Std liq gpm	0.0471	70.0686	9.5243	6.5722
Std vap 60F scfh	35.7763	88499.5000	38878.5859	7774.8315
- - Liquid only - -				
Molar flow lbmol/h	0.0943	233.2134	102.4526	20.4882
Mass flow lb/h	24.7000	38289.0352	5062.2417	3585.6523
Average mol wt	261.9927	164.1803	49.4106	175.0107
Actual dens lb/ft3	56.9830	64.6572	63.1629	64.5217
Actual vol gpm	0.0540	73.8394	9.9934	6.9294
Std liq gpm	0.0471	70.0686	9.5243	6.5722
Std vap 60F scfh	35.7763	88499.5000	38878.5859	7774.8315
Cp Btu/lbmol-F	132.7899	72.3780	28.2225	68.6495
Z factor	0.0104	0.0086	0.0021	0.0067
Visc cP	0.8220	1.761	0.4025	1.261
Th cond Btu/hr-ft-F	0.0624	0.0790	0.1258	0.0746
Surf tens dyne/cm	30.2345	40.3694	41.1704	34.4760

Stream No.	12
Name	CIrculation
- - Overall - -	
Molar flow lbmol/h	212.7850
Mass flow lb/h	51290.7813
Temp F	199.9745
Pres psia	14.7000
Vapor mole fraction	0.0000
Enth MMBtu/h	16.6586
Tc F	1274.0345
Pc psia	454.6739
Std. sp gr , wtr = 1	1.079
Std. sp gr , air = 1	8.323
Degree API	-0.4005
Heating values (60 F)	
Gross Btu/lbmol	3.936E+006
Net Btu/lbmol	3.793E+006
Average mol wt	241.0452
Actual dens lb/ft3	63.6808
Actual vol ft3/hr	805.4355
Std liq gpm	95.0009
Std vap 60F scfh	80747.3438
- - Liquid only - -	
Molar flow lbmol/h	212.7850
Mass flow lb/h	51290.7813
Average mol wt	241.0452
Actual dens lb/ft3	63.6808
Actual vol gpm	100.4294
Std liq gpm	95.0009
Std vap 60F scfh	80747.3438
Cp Btu/lbmol-F	101.7720
Z factor	0.0124
Visc cP	3.336
Th cond Btu/hr-ft-F	0.0735
Surf tens dyne/cm	40.0285

ATTACHMENT 6

DESIGN BASIS OF SCRUBBER

PORTLAND FUME SCRUBBER

TABLE 2. GAS HANDLING CAPACITIES—TYPE 7010 SCRUBBERS WITH *STANDARD* NOZZLES

DRAFT (in. H_2O Diff.)	WATER PRESSURE (psig)	SCRUBBER SIZE (inches)															
		3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
		CAPACITIES (cfm air at flowing conditions)															
ZERO DRAFT	20	28	59	155	265	435	1040	1497	1848	2331	3310	4880	7626	11416	16230	21888	29792
	40	48	102	270	460	750	1600	2304	2844	3644	5174	7629	11921	17846	25370	34214	46569
	60	64	135	355	600	990	2000	2880	3555	4675	6637	9787	15292	22893	32545	43891	59740
	80	74	161	425	620	1180	2430	3499	4319	5105	7247	10686	16697	24996	35535	47923	65228
	100	86	183	485	815	1340	2660	3830	4728	5902	8380	12356	19306	28902	41088	55411	75420
1/4"	20	19	41	110	185	300	830	1195	1475	1644	2334	3442	5378	8051	11446	15436	21011
	40	45	95	250	425	700	1500	2160	2666	3362	4773	7038	10998	16464	23405	31564	42963
	60	61	130	345	580	955	1930	2779	3431	4430	6289	9273	14490	21692	30837	41587	56604
	80	74	158	415	705	1160	2360	3398	4195	4921	6986	10301	16095	24095	34254	46195	62876
	100	85	180	475	800	1320	2630	3787	4675	5767	8188	12073	18865	28241	40148	54144	73696
1/2"	20	13	27	71	120	200	560	806	995	1251	1777	2620	4094	6129	8713	11750	15993
	40	40	85	225	380	625	1330	1915	2364	3006	4268	6293	9834	14721	20928	28224	38416
	60	58	123	325	550	905	1840	2649	3271	4062	5766	8503	13285	19889	28274	38131	51900
	80	72	153	405	680	1120	2270	3268	4035	4724	6707	9850	15453	23134	32887	44352	60368
	100	83	176	465	785	1290	2560	3686	4551	5608	7961	11739	18343	27460	39037	52646	71657
3/4"	20	8.5	18	47	80	130	420	604	746	944	1341	1978	3090	4626	6577	8870	12073
	40	35	75	195	335	550	1130	1627	2008	2601	3693	5446	8509	12738	18109	24422	33241
	60	54	115	305	510	845	1730	2491	3075	3608	5122	7552	11800	17666	25114	33868	46099
	80	69	147	390	655	1080	2180	3139	3875	4528	6428	9479	14811	22172	31520	42508	57859
	100	81	172	455	770	1260	2490	3585	4426	5424	7700	11354	17741	26559	37756	50918	69305
1"	20	5.2	11	29	49	80	300	432	533	711	1010	1489	2328	3485	4954	6681	9094
	40	31	66	175	295	485	1000	1440	1777	2233	3170	4675	7305	10936	15546	20966	28537
	60	50	106	280	475	780	1600	2304	2844	3215	4564	6730	10516	15743	22380	30182	41081
	80	66	140	370	625	1030	2050	2952	3644	4344	6167	9093	14209	21271	30239	40780	55507
	100	78	166	440	740	1210	2400	3456	4266	5227	7421	10943	17099	25597	36389	49075	66796
1 1/2"	40	24	51	135	230	375	750	1080	1333	1718	2439	3596	5619	8412	11959	16128	21952
	60	43	92	240	410	675	1350	1944	2399	2613	3710	5471	8549	12798	18194	24537	33398
	80	59	125	330	560	915	1790	2577	3182	3865	5487	8091	12643	18927	26907	36288	49392
	100	73	155	410	690	1140	2200	3168	3911	4810	6829	10070	15734	23554	33485	45158	61465
2"	40	17	37	98	165	270	570	820	1013	1288	1829	2697	4214	6309	8969	12096	16464
	60	38	80	210	360	585	1070	1540	1902	2233	3170	4675	7305	10936	15546	20966	28537
	80	53	113	300	505	830	1600	2304	2844	3387	4808	7090	11078	16584	23576	31795	43276
	100	67	142	375	635	1040	2000	2880	3555	4246	6028	8888	13888	20790	29556	39859	54252
3"	40	7	15	40	67	110	300	432	533	809	1149	1695	2649	3965	5637	7603	10348
	60	27	57	150	255	420	800	1152	1422	1779	2526	3724	5820	8712	12386	16704	22736
	80	44	94	250	420	690	1240	1785	2204	2712	3850	5677	8870	13279	18878	25459	34652
	100	54	120	315	535	880	1630	2347	2897	3276	4651	6858	10717	16043	22807	30758	41865
4"	60	19	40	105	180	295	570	820	1013	1276	1811	2671	4174	6249	8883	11980	16307
	80	36	76	200	340	560	920	1324	1635	2172	3083	4546	7104	10635	15119	20390	27753
	100	46	98	260	440	720	1320	1900	2346	2822	4007	5908	9231	13820	19647	26496	36064
6"	80	21	45	120	200	330	500	720	888	1423	2020	2979	4656	6970	9908	13363	18188
	100	30	63	165	280	460	890	1281	1582	2049	2909	4290	6703	10034	14265	19238	26185
8"	100	16	35	92	155	255	480	691	853	1435	2038	3005	4696	7030	9994	13478	18345
		MOTIVE LIQUID FLOW (gpm)															
NOZZLE FLOW	20	1.9	3.4	9.2	16	26	42	60	74	103	146	215	337	504	717	967	1317
	40	2.6	4.8	14	24	38	58	84	104	144	204	302	472	706	1004	1354	1843
	60	3.2	5.9	17	29	48	71	103	127	176	250	368	576	862	1226	1654	2251
	80	3.8	6.8	20	34	54	82	118	145	201	285	421	658	895	1400	1889	2571
	100	4.2	7.6	22	39	60	92	132	163	225	320	472	738	1105	1571	2119	2885

Data on larger and/or specially constructed units can be furnished on request.

2½" → 1050

65 → 73 GPM

3

Koppers010510

DEQ-NON-6/4/99

Koppers010511

ACFX 0149

Koppers010513

Koppers010514

Koppers010515

Koppers010516

USED OIL FOR RECYCLE

Koppers010518

Date: 12/20/99 11:32 AM
Sender: Amos Kamerer
To: Traci Self
cc: Mark Cilley; Leslie Hyde; JohnNCox@email.msn.com
Priority: Normal
Subject: ODEQ - NON

Traci,

Attached are the digital pictures of the drum storage area, hopefully they are what you want.

I will fax the documents on the 2 corrosive drum disposals.

Call if any questions.

Mvc-186e.jpg Mvc-187e.jpg Mvc-188e.jpg

Amos

Mvc-189e.jpg Mvc-190e.jpg

Mvc-185e.jpg Mvc-191e.jpg

2/18/00
Mailed Traci copies
of the Manifest

SWO#

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039 Expires 9-30-96

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: ORD027734359
Manifest Document No.: 99901

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address: KOPPERS INDUSTRIES, INC.
7540 NW ST. HELENS ROAD
PORTLAND, OR 97210

4. Generator's Phone (503) 286-3681

A. State Manifest Document Number: 10099901

B. State Generator's ID:

5. Transporter 1 Company Name: SAFETY-KLEEN (TS), INC.

6. US EPA ID Number: SCD987574647

C. State Transporter's ID:

D. Transporter's Phone: (253)288-2800

7. Transporter 2 Company Name: SAFETY KLEEN (TS)

8. US EPA ID Number: SCD987574647

E. State Transporter's ID:

F. Transporter's Phone: 253 288 2800

9. Designated Facility Name and Site Address: SAFETY-KLEEN LTD. (DELTA)
7842 PROGRESS WAY
DELTA, BC V4G 1A4

10. US EPA ID Number: PS8388

G. State Facility's ID:

H. Facility's Phone: (604) 940-0894

11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)	HM		12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. 5	X	WASTE Corrosive liquid, basic, inorganic, n.o.s., (Contains Potassium hydroxide), 8, UN3266, PG-II	001	DF	00300	P	D002
			~~002~~	~~DM~~	~~00600~~		
b. 6	X	WASTE CORROSIVE LIQUID, ACIDIC, INORGANIC, n.o.s., UN3264, PG II 8 (MURIATIC ACID, HYDROFLUORIC ACID)	001	DF	00300	P	D002
c.							
d.							

J. Additional Descriptions for Materials Listed Above
A: 990901-001-~~002~~, ~~1x 30g PD~~, 1x85g PD (OVER PACK) (ERG# 154)
B: 990901-002, 1X 30g PD (ERG# 126)
C:
D:

K. Handling Codes for Wastes Listed Above
Sept 13 '99 POE
Rich Thomas Blaine
Rich Thomas Wash
A: 103691 B: 103692

15. Special Handling Instructions and Additional Information
Profile Number a. 2201935 b. 2201936 c. d.
SWO#
Emergency Contact: 1-800-451-8346 3E
POINT OF DEPARTURE: BLAINE, WA

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.
and conforms to the terms of the attached EPA Acknowledgment of Consent.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: [signature] Signature: [signature] Date: Month 09 Day 02 Year 99

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Michael D. Rabinowitz Signature: Michael D. Rabinowitz Date: Month 09 Day 02 Year 99

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: John W. Wallace Signature: John W. Wallace Date: Month 9 Day 9 Year 99

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.
Printed/Typed Name: WAYNE MA. Signature: [signature] Month 9 Day 24 Year 99

GENERATOR / TRANSPORTER / FACILITY

EPA Form 8700-22 (Rev. 9-88) previous editions obsolete

SAFETY-KLEEN CORP.

90290

6

ORIGINAL-RETURN TO GENERATOR

223, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

INSTRUCTIONS FOR COMPLETION OF THIS FORM, REFER CODE OF FEDERAL REGULATIONS, 40, PART 262.20.

Koppers010520

LDR NOTIFICATION FORM

Generator Name *Koppers Industries* **Manifest No.** *99901*

Pursuant to 40 CFR §268.7(a), I hereby notify that this shipment contains waste restricted under 40 CFR Part 268 Land Disposal Restrictions (LDR).

A. GENERAL WASTE NOTIFICATION

Form Line No.	SK Profile No.	EPA Waste Codes & LDR Subcategories (if any) *List codes or use Attachment 1*	NWW	WW	Waste Constituent Notification *Check the "None" box or List Legend Constituent # or use Attachment 2*
1	*221935*	*D002* ☐ Check if Attachment 1 has been used	☒	☐	☐ None ☐ Check if Attachment 2 has been used
2	221936	D002 ☐ Check if Attachment 1 has been used	☒	☐	☐ None ☐ Check if Attachment 2 has been used
3		☐ Check if Attachment 1 has been used	☐	☐	☐ None ☐ Check if Attachment 2 has been used
4		☐ Check if Attachment 1 has been used	☐	☐	☐ None ☐ Check if Attachment 2 has been used
5		☐ Check if Attachment 1 has been used	☐	☐	☐ None ☐ Check if Attachment 2 has been used
6		☐ Check if Attachment 1 has been used	☐	☐	☐ None ☐ Check if Attachment 2 has been used

B. HAZARDOUS DEBRIS NOTIFICATION

☐ This hazardous debris, as identified above on Line No(s). _____ is subject to the alternative treatment standards of 40 CFR §268.45.

The waste contains the following contaminants subject to treatment (check all that apply):

☐ Toxicity characteristic debris ☐ Debris contaminated with listed waste ☐ Cyanide reactive debris

C. CONTAMINATED SOIL NOTIFICATION & CERTIFICATION

☐ This contaminated soil, as identified above on Line No(s). _____ is subject to the alternative treatment standards of 40 CFR §268.49(c).

Complete the following: "I certify under penalty of law that I personally have examined this contaminated soil & it [☐does/ ☐does not] contain listed hazardous waste & [☐does / ☐does not] exhibit a characteristic of hazardous waste & [☐is subject to / ☐complies with] soil treatment standards as provided by §268.49(c) or the universal treatment standards". *Note: Constituents subject to treatment are any constituents listed in 40 CFR §268.48 Universal Treatment Standards that are reasonably expected to be present in any given volume of contaminated soil, except fluoride, selenium, sulfides, vanadium & zinc, & are present at concentrations greater than ten times the universal treatment standard.*

D. LAB PACK (INCINERATION) NOTIFICATION & CERTIFICATION

☐ This lab pack, as identified above on Line No(s). _____ is subject to the alternative treatment standards of 40 CFR §268.42(c).

"I certify under penalty of law that I personally have examined & am familiar with the waste & that the lab pack contains only wastes that have not been excluded under Appendix IV to 40 CFR Part 268 & that this lab pack will be sent to a combustion facility in compliance with the alternative treatment standards for lab packs at 40 CFR §268.42(c). I am aware that there are significant penalties for submitting a false certification, including the possibility of fine or imprisonment".

E. EXTENSIONS & VARIANCES

☐ This waste, as identified above on Line No(s). _____ is not prohibited from land disposal & is subject to a deadline extension or variance, e.g., treatability variance, case-by-case extension. *Describe below any extension or variance that applies to this waste & include applicable dates:*

T.J. Tucker Gen Foreman 9 / 2 / 99

Generator's Authorized Signature | Name & Title (Printed or Typed) | Date

DWALKER LDR NOTIFICATION 11.23.98

[redacted]

** TOTAL PAGE.03 **

Date: 12/10/99 4:29 PM
Sender: Traci Self
To: Amos Kamerer; Mark Cilley
cc: Leslie Hyde; "John N. Cox" <JohnNCox@email.msn.com>
Priority: Normal
Subject: Notice of Non compliance

Hi Amos and Mark,

As discussed during my site visit, I reviewed the file on the NON.
We have provided information to address the concerns outlined in
the original NON and subsequent correspondence. The only additional
information we should provide would be on the disposal of the drums
and additional photos documenting the present condition of the
product storage area. Providing this information may give us an
avenue to contact the attorney at ODEQ to try and negotiate a
resolution to the NON.

If you can provide me with the photos and disposal information, I
can contact the ODEQ attorney and try to get a feel for his desire
to pursue enforcement especially since Rebecca Paul is no longer
working for ODEQ. Please let me know what you think. Thank You.

Traci

ACFX 1149

Koppers010524

Koppers010525

DIESEL
DIESEL
DIESEL

DIESEL
DIESEL
DIESEL

USED OIL ONLY
OIL FOR RECYCLE

Koppers010529

PAGE NO. 116

KOPPERS

Organic Materials Group
Koppers Company, Inc.

T-170 REV. 6
200 BKS. 5-80
PRINTED IN U.S.A.

LOCATION _____ DATE _____ BY _____

SUBJECT _____

	Gallons	From	Customer	Truck	Temp	Loader	
11-28-88	5605	68	Wy Sea	K-40	145	RHB	
"	5605	68	Wy Sea	K-30	146	RHB	
"	8407	68	Taylor	P. Motors	146	RHB	
12-7-88	5605	68	Wy Sea	K-40	170	RHB	
12-7-88	2497	T-823044	CALIF	K-40	390	RHB	
12-12-88	5605	68	Wy Sea	K-40	172	RHB	
"	5605	68	Wy Sea	K-30	172	RHB	
12-13-88	5605	68	Wy Sea	K-40	180	RHB	
"	5605	68	Wy Sea	K-30	180	RHB	
12-14-88	5605	68	Wy Sea	K-40	185	RHB	
	5605	68	Wy Sea	K-30	185	RHB	
12-15-88	5605	68	Wy Sea	K-40	185	RHB	
	5605	68	Wy Sea	K-30	185	RHB	
12-16-88	5605	68	Wy Sea	K-40	188	RHB	
	6605	68	Taylor	K-30	188	RHB	
12-19-88	5605	68	Wy Sea	K-40	180	SH	
12-19-88	5605	68	Wy Sea	K-30	180	SH	
12-20-88	5605	68	Wy Sea	K-40	180	SH	
"	5605	68	Wy Sea	K-30	180	SH	
12-21-88	5605	68	Wy Sea	K-40	184	SH	
"	5605	68	Taylor	K-30	184	SH	
12-22-88	5605	68	Wy Sea	K-40	190	SH	
"	5605	68	Wy Sea	K-30	190	SH	
12-27-88	5605	68	Wy Sea	K-40	160	SH	
"	5605	68	Wy Sea	K-30	160	SH	
12-28-88	5605	68	Wy Sea	K-40	174	SH	
"	5605	68	Wy Sea	K-30	174	SH	
1-2-89	5605	68	Dome Tar	K-40	162	SH	BC
"	5605	68	Dome Tar	K-30	162	SH	BC
1-3-89	7703	68	Taylor	P. Motors	160	RHB	BC
1-4-89	7356	68	Dome Tar	P. Motors	190	HB	BC
"	7356	68	Dome Tar	P. Motors	190	HB	BC
"		T-823038	Cain	K-40	190	RHB	BC
"		T-823038		K-30	190	RHB	

PAGE NO: 60

KOPPERS

Organic Materials Group
Koppers Company, Inc.

T-170 REV. 6
200 BKS. 5-80
PRINTED IN U.S.A.

LOCATION _____ DATE _____ BY _____

SUBJECT _____

Date	Tc No	From	Pro	Tc out	Tc Dome	Tc Temp	Tc Image	Rec. TANK	Tc residue
9-1-88	ACFX 79688	Chi	Cl Gr 3	42	13¼	184	77	T-T	
9-1-88	NATX 76029	Chi	Gr 3	35½	12½	200	82	T-20	
9-1-88	GATX 94541	Chi	Gr 3	34	13	194	90	20	
9-9-88	NATX 76295	Chi	Cl, Gr 3	38	12½	164	90	T-T	
9-6-88	PTXX 223585	Fall	Methyl					3	
	ACFX 87745	Chi	IK-364	29	17	240	90½		
9-15-88	UTLX 79956	Chi	Cl Gr 3	36½	14	180	82in	T-T+62	1 in
9-10-88	UTLX 79296	Chi	Gr 3	34	15	190	93	68	1 3/4
9-14-88	NATX 25534	Chi	Gr 3	32	12½	180	89in	68	1/4
10-5-88	UTLX 79969	Chi	Cl Gr 3	32 3/4	10½	190	81½	67	4 in
10-18-88	UTLX 79423	Chi	Cl Gr 3	30½	14½	150	96½	67	13½ in
10-25-88	ACFX 79624	Youngstown	Koliveum	28	13½	110	89½	38	
11-1-88	GATX 13713	Chi	Gr 3	30½	8	199	98in	68	6½
11-4-88	UTLX 79981	Chi	Gr 3	26½	11½	158	88	68	4 in
11-8-88	TLDX 223109	Chi	Gr 3	31½	12½	205	89	68	12 in
11-11-88	PTLX 78359	Chi	Gr 3	29	12½	186	90	68	1 in
	GATX 94540	Chi	Gr 3	26½	12½	200	95	68	
11-30-88	ACFX 81225	Chi	Gr 3	26	10	170	78½	68	7 in
12-2-88	NATX 76371	Chi	Koliveum	31½	14½	172	88½	39+33	2
12-1-88	TLDX 223004	Chi	Gr 3	36	14½	162	85½	68	3 in
12-2-88	TLDX 223039	Chi	Gr 3	31	14½	196	91	68	12
12-6-88	GATX 56351	Chi	Gr 3	25	8	190	91½	68	7 in
12-6-88	UTLX 79403	Chi	Gr 3	36	14½	174	91½	68	3 in
12-8-88	ACFX 79680	Chi	Gr 3	27	13	198	92½	68	
12-7-88	PTLX 223559	Chi	Gr 3	30	13	204	91in	68	3½ in
1-4-89	NATX 25534	Chi	Gr 3	34	12	60	83in	68	
12-30-88	UTLX 78462	Chi	Gr 3	31	15	162	97½	68	3½
12-31-88	NATX 76429	Chi	Clean 3	36½	15½	45	82½	33	6½
1-3-89	UTLX 78476	Chi	Gr 3	40	14	192	87½	68	5
1-3-89	TLDX 223238	Chi	Clean 3	33	14¼	140	90		1
1-5-89	UTLX 75164	Chi	Gr 3	31	14½	154	95	68	12 in
1-6-89	ACFX 79676	Chi	Gr 3	19½	13½	220	99	68	10½
1-7-89	ACFX 88604	Chi	Gr 3	29	11½	212	91½	68	1
1-9-89	GATX 94541	Chi	H-oil	35	13	194	86	33	3
1-9-89	NATX 13006	Chi	Gr 3	25½	14	130	91	68	13

Organic Materials Group
Koppers Company, Inc.

KOPPERS

PAGE NO. 61

T-170 REV. 6
200 BKS. 5-80
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LOCATION _____ DATE _____ BY _____

BY SUBJECT	START	STOP	START	STOP	TANK TEMP	GALLONS	FACTOR	GALLONS @ 60°
GH+HB	77½	54½	54½	1-9½	195			
HB GH	3-4½	5-½			146	18,146	1.0344	17,542
HB GH	1-7	3-4½			138	19507	1.0312	18917
HB GH				TT				
HB GH	0-4	6-6½			60	21,012	1	21,012
HB								
HB	20-1	23-1			180	18316	1.048	17382
HB	23-1	25-3			186	18216	1.0504	17341
HB	1-9	7-2			186	18713	1.0504	17815
HB	2-1½	7-10			186	19,721	1.0504	18,774
HB	0-2½	10-2			186	18935	1.036	18277
HB	4-4½	6-7½			200	18917	1.056	17914
HB GH	3-2	5-8			192	21019	1.0528	19965
HB GH	3-10	6-1½			178	19,267	1.0472	18,398
HB	4-9½	7-3½			198	21019	1.0552	19917
	6-6	9-0			198	21019	1.056	19
GH+HB	5-3½	7-4			176	17866	1.0464	17,073
GH+HB	T-39-2-2	5-7	T-33 0-5	9-8	102	T-39: 2960 T-33 1,6916	1:HB 1.0164	20,000
GH+HB	7-4	9-5½			170	17,866	1.044	17,113
GH HB	8-9	11-1½			190	19,967	1.052	18,980
GH+HB	11-1½	13-5½			176	19,617	1.0464	18,747
GH HB	13-5½	15-8½			180	18,917	1.048	18,050
GH HB	18-2	20-4½			180	18,566	1.048	17,715
GH HB	15-8½	18-2			180	20,668	1.048	19,721
GH HB	12-2	13-½	6-7½	7-9½	200	17,165	1.056	16,478
GH HB	11-8	14-1½			188	20,668	1.0512	19,661
GH HB	0-1½	10-5½	Year End		100	19,642	1.0160	19,332
GH HB	6-3½	8-4½			175	17,516	1.054	16,618
	Trnc	KS	3-8	3-11	178			2 loads Trnc
	7-1	9-4½			190	19267	1.052	18316
	9-4½	10-7			190	18,516	1.048	17,670
	10-2	12-3			194	17516	1.0528	16,636
	0-3	10-4			134	19168	1.0258	18,684
GH HB	5-0	7-3½			183	19260	1.0492	18,360

Koppers010532

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Purchase Order

Date: December 15, 1999

Purchase Order # OM0-1670-1

Page: 1

Contact: WAYNE F. PLOVIC, 412-227-2223

To: Reilly Industries, Inc.
C/O Carbon Management, Inc.
Liberty Court, Suite 400
260 Highway 202 and 31
Flemington, NJ 08822
Attn: Mr. Ted Bart

Ship To: Koppers Industries, Inc.
c/o Port of Portland
Portland, Oregon USA

Koppers requests that Seller furnish the material and/or services listed below. Acceptance of this purchase order is expressly limited to the terms and conditions on the face and on the reverse side hereof.

The purchase order number must be shown on all correspondence, shipping papers, invoices, etc.

QUANTITY	DESCRIPTION	PRICE

COAL TAR PENCIL PITCH

QUANTITY: 1,000 metric tons

PRICE: $300.00 US per metric ton delivered to Portland, Oregon

SOURCE: Anshan, China

SPECIFICATION:

Softening point	ASTM D 3104	108-113°C.
Toluene insoluble	ASTM D 3671	20% minimum
Quinoline insoluble	ASTM D 2318	4% to 6%
Coking value	ASTM D 2416	52% minimum
Specific gravity	ASTM D 71	1.30% minimum
Distillation to 360 °C.	ASTM D 2569	5% maximum (prefer 3% maximum)
Ash	ASTM D 2415	0.25% maximum
Sodium		200 PPM maximum
*Moisture		0.50% maximum

* 0.5% maximum does not infer an average moisture content.

DELIVERY: Please advise Amos Kamerer 503-286-3681of delivery schedule.
Truck delivery to be arranged by Carbon Management Inc.

All material must meet the above Specification. A preshipment sample shall be Faxed to Koppers Industries, Inc., Attention: Amos Kamerer, 503-285-2831

ALL FEDERAL EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION REQUIREMENTS IN REGARD TO RACE, SEX, RELIGION, NATIONAL ORIGIN, HANDICAP AND VIETNAM VETERAN OR DISABLED VETERAN STATUS, AS FOUND IN 41 CFR 60-1.4, 41 CFR 60-250.3, AND 41 CFR 741.3, ARE HEREIN INCORPORATED BY REFERENCE.

KOPPERS INDUSTRIES IS ENTITLED TO ALL REMEDIES PURSUANT TO THE UNIFORM COMMERCIAL CODE.

COPY

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Purchase Order

KOPPERS INDUSTRIES

Date: December 15, 1999
Page: 2

Purchase Order # OM0-1670-1

Contact: WAYNE F. PLOVIC, 412-227-2223

To: Reilly Industries, Inc.
C/O Carbon Management, Inc.
Liberty Court, Suite 400
260 Highway 202 and 31
Flemington, NJ 08822
Attn: Mr. Ted Bart

Ship To: Koppers Industries, Inc.
c/o Port of Portland
Portland, Oregon USA

Koppers requests that Seller furnish the material and/or services listed below. Acceptance of this purchase order is expressly limited to the terms and conditions on the face and on the reverse side hereof.

The purchase order number must be shown on all correspondence, shipping papers, invoices, etc.

QUANTITY	DESCRIPTION	PRICE
	PLEASE ACKNOWLEDGE YOUR ACCEPTANCE OF THIS ORDER BY SIGNING AND RETURNING THE ATTACHED COPY.	

ACCEPTED BY:

Wayne F. Plovic

KOPPERS INDUSTRIES, INC.
AUTHORIZED SIGNATURE
WAYNE F. PLOVIC/pm

_____
SELLER'S AUTHORIZED SIGNATURE

TITLE _____

c: K. J. Fitzgerald – K-1600
C. E. Kraynik – K-1600
A. Kamerer – Portland
J. W. Kunkle – K-1600

COPY

RECEIVED
DEC 27 1999
KOPPERS INDS, INC.
PORTLAND OR

TO: AMOS

Reilly pitch

Analysis Date: 7/20/99
Sample Number: 99-2287

Material: Chinese Pitch

~~Reported By~~ Dave's: GLS & RP

Softening Point	110	109.7
T.I.	19.1	18.4
Q.I.	3.3	3.2
CVC	53.1	
ASH		.27
Sp. Grav.	1.2776	1.2956

Distillation

0-300	0
300-355	1
355-360	1.2
Residue	98.2

FROM: STACEY

Sent for petrography

CONFIDENTIAL

KOPPERS INDUSTRIES

FAX TRANSMITTAL

7540 N.W. Saint Helens Rd.
Portland, Oregon 97210-3663
Phone: (503) 286-3681
Fax: (503) 285-2831
Web Page: www.koppers.com

TO: K. Fitzgerald, D. Evans, W. Plovic DATE: 5/11/99

FROM: Amos TOTAL # OF PAGES: 3

Howard McCall stopped by the office day with 2 - 1 gallon sample CAN's of pencil pitch. I was not in and did not talk to him. The attached analysis' were attached to each CAN. Do you want us to send portions of these to HTC for additional testing? If so, Adv. Erin, I'm out tomorrow —

IF THIS TRANSMITTAL IS IN ERROR, PLEASE CALL 503-286-3681 FAX # 503-285-2831

Koppers010536

AlliedSignal
CHEMICALS

ANALYSIS NOTIFICATION

April 30, 1999

Mr. Ted Bart

Mr. Howard McCall
Reilly Industries Inc.
Longview, Wa.

PRODUCT: COAL TAR PITCH FOR Reilly Industries Inc.

PARAMETER:	ASTM METHOD	ANALYSIS
SOFTENING POINT, C	D-3104-77	112.9
TOLUENE INSOLUBLE, %	D-4072	17.2
QUINOLINE INSOLUBLE, %	D-2318-76	6.3
COKING VALUE, %	D-2416-73	57.6
ASH CONTENT, %	D-2415-66	0.07
DISTILLATION to 360 C, %	D-2569-75	2.4
SULFUR CONTENT, %	LECO	0.5

Howard E. McCall
Signature

"Quality essential product that meets the Longview Specification"

13.10.24

AlliedSignal
CHEMICALS

ANALYSIS NOTIFICATION

April 30, 1999

Mr. Ted Bart

Mr. Howard McCall
Reilly Industries Inc.
Longview, Wa.

PRODUCT: COAL TAR PITCH FOR Reilly Industries Inc.

PARAMETER:	ASTM METHOD	ANALYSIS
SOFTENING POINT, C	D-3104-77	113
TOLUENE INSOLUBLE, %	D-4072	17.8
QUINOLINE INSOLUBLE, %	D-2318-76	5.7
COKING VALUE, %	D-2416-73	56.2
ASH CONTENT, %	D-2415-66	0.05
DISTILLATION to 360 C, %	D-2569-75	5.5
SULFUR CONTENT, %	LECO	0.44

Howard E McCall
Signature

"Quality essential product that meets the Longview Specification"

B-10-23

Author: Wayne Plovic at PITT
Date: 4/29/99 7:27 AM
Priority: Normal
TO: Amos Kamerer
Subject: Reilly Pitch -Longview
---------- Message Contents ----------

Amos,

Assume you and Kevin talked about the potential 1000 tons of low QI import pitch from Reillys' melter in Longview.

Any way Ted Bart(Reillys agent) called and said they have two types of low QI pitch available. He is going to have Howard McCall deliver a sample of each to you so we can determine which type we want.

If you have any questions please advise.

Wayne

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650763
SHIPMENT DATE: 11/4/98

Toluene Insoluble	38.7
Quinoline Insoluble	23.9
Coking Value	59.7
Distillation	4.9
Ash	.44
Sp. Gr.	1.349

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 NOV 05'98 10:26 No.001 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650775
SHIPMENT DATE: 9/25/98

Toluene Insoluble	39.4
Quinoline Insoluble	24.6
Coking Value	59.7
Distillation	5.0
Ash	.42
Sp. Gr.	1.355

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 OCT 01'98 11:06 No.003 P.02

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650819 - UTLX 650774
SHIPMENT DATE: 10/2/98 - 10/7/98

Toluene Insoluble	40.1
Quinoline Insoluble	24.8
Coking Value	59.6
Distillation	5.0
Ash	.48
Sp. Gr.	1.354

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 OCT 07'98 10:51 No.008 P.02

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650837 - UTLX 650763
SHIPMENT DATE: 7/22/98

Toluene Insoluble	37.7
Quinoline Insoluble	21.1
Coking Value	58.6
Distillation	.7
Ash	.3
Sp. Gr.	1.349

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 JUL 27'98 15:42 No.018 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650774
SHIPMENT DATE: 8/05/98

Toluene Insoluble	37.6
Quinoline Insoluble	22.0
Coking Value	59.4
Distillation	2.3
Ash	.3
Sp. Gr.	1.349

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 AUG 06'98 13:59 No.006 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: ACFX 94476 - UTLX 650819
SHIPMENT DATE: 7/29/98

Toluene Insoluble	37.5
Quinoline Insoluble	21.1
Coking Value	59.0
Distillation	2.4
Ash	.3
Sp. Gr.	1.349

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 JUL 31'98 8:58 No.001 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 670775
SHIPMENT DATE: 7/20/98

Toluene Insoluble	37.1
Quinoline Insoluble	21.4
Coking Value	58.3
Distillation	.8
Ash	.3
Sp. Gr.	1.3480

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 JUL 27'98 15:42 No.018 P.02

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650837
SHIPMENT DATE: 5/29/98

Toluene Insoluble	35.9
Quinoline Insoluble	20.0
Coking Value	57.8
Distillation	.8
Ash	.24
Sp. Gr.	1.3430

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 JUN 11'98 8:32 No.001 P.02

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650763
SHIPMENT DATE: 5/6/98

Toluene Insoluble	35.5
Quinoline Insoluble	21.0
Coking Value	58.1
Distillation	1.0
Ash	.24
Sp. Gr.	1.3400

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 MAY 13'98 12:53 No.003 P.03

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650774 - UTLX 650775
SHIPMENT DATE: 4/28/98

Softening Point	108.0
Toluene Insoluble	37.0
Quinoline Insoluble	20.6
Coking Value	58.2
Distillation	1.0
Ash	.27
Sp. Gr.	1.3400

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 APR 29'98 9:50 No.001 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650819
SHIPMENT DATE: 5/13/98

Toluene Insoluble	35.9
Quinoline Insoluble	20.6
Coking Value	59.1
Distillation	.9
Ash	.25
Sp. Gr.	1.3500

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 MAY 20'98 8:08 No.001 P.02

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: ~~UTLX~~ ACFX 94476
SHIPMENT DATE: 4/23/98

Softening Point	108.4
Toluene Insoluble	35.8
Quinoline Insoluble	20.5
Coking Value	60.9
Distillation	1.0
Ash	.27
Sp. Gr.	1.3500

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 APR 27'98 11:12 No.007 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650819
SHIPMENT DATE: 3/13/98

Softening Point	110.3
Toluene Insoluble	38.5
Quinoline Insoluble	23.2
Coking Value	59.3
Distillation	1.0
Ash	.29
Sp. Gr.	1.3500

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 MAR 17'98 9:53 No.001 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650774 - UTLX 650775
SHIPMENT DATE: 12/31/97

Softening Point	111.9
Toluene Insoluble	40.2
Quinoline Insoluble	24.1
Coking Value	61.2
Distillation	1.0
Ash	.28
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 JAN 06'98 15:30 No.015 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650837
SHIPMENT DATE: 11/19/97

Softening Point	108.1
Toluene Insoluble	40.3
Quinoline Insoluble	26.3
Coking Value	59.0
Distillation	1.0
Ash	.33
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 DEC 03'97 11:31 No.004 P.02

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650819 - UTLX 650897
SHIPMENT DATE: 10/27/97

Softening Point	112.0
Toluene Insoluble	43.0
Quinoline Insoluble	26.8
Coking Value	60.6
Distillation	1.7
Ash	.33
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 OCT 28'97 15:05 No.005 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650774 - UTLX 650775
SHIPMENT DATE: 10/10/97

Softening Point	109.8
Toluene Insoluble	41.7
Quinoline Insoluble	27.0
Coking Value	61.3
Distillation	1.7
Ash	.34
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 OCT 16'97 13:10 No.008 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650837
SHIPMENT DATE: 9/23/97

Softening Point	106.7
Toluene Insoluble	40.9
Quinoline Insoluble	25.5
Coking Value	60.0
Distillation	1.7
Ash	.33
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 SEP 25'97 10:59 No.003 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650819
SHIPMENT DATE: 9/4/97

Softening Point	107.8
Toluene Insoluble	40.1
Quinoline Insoluble	26.0
Coking Value	60.1
Distillation	1.7
Ash	.33
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 SEP 09'97 12:09 No.012 P.02

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650897
SHIPMENT DATE: 8/22/97

Softening Point	110.0
Toluene Insoluble	39.7
Quinoline Insoluble	25.3
Coking Value	60.1
Distillation	1.8
Ash	.26
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 AUG 25'97 13:39 No.019 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650837
SHIPMENT DATE: 8/7/97

Softening Point	104.8
Toluene Insoluble	40.5
Quinoline Insoluble	24.7
Coking Value	60.3
Distillation	1.8
Ash	.27
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 AUG 08'97 10:37 No.002 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650819
SHIPMENT DATE: 7/16/97

Softening Point	105.4
Toluene Insoluble	39.1
Quinoline Insoluble	23.7
Coking Value	59.4
Distillation	1.8
Ash	.28
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett

REILLY INDUSTRIES, INC ID:801-373-5501 JUL 21'97 12:01 No.010 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650897
SHIPMENT DATE: 7/2/97

Softening Point	108.1
Toluene Insoluble	36.2
Quinoline Insoluble	23.0
Coking Value	58.6
Distillation	1.8
Ash	.30
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett

REILLY INDUSTRIES, INC ID:801-373-5501 JUL 03'97 14:49 No.015 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppors Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650837
SHIPMENT DATE: 6/19/97

Softening Point	108.6
Toluene Insoluble	39.3
Quinoline Insoluble	25.1
Coking Value	60.5
Distillation	1.8
Ash	.28
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett

REILLY INDUSTRIES, INC ID:801-373-5501 JUN 20'97 11:21 No.009 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650819
SHIPMENT DATE: 5/29/97

Softening Point	108.0
Toluene Insoluble	38.9
Quinoline Insoluble	20.2
Coking Value	58.6
Distillation	1.9
Ash	.22
Sp. Gr.	1.3500

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett

REILLY INDUSTRIES, INC ID:801-373-5501 JUN 07.97 14:20 No.007 P.01
801 373 5501

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650897
SHIPMENT DATE: 5/22/97

Softening Point	107.0
Toluene Insoluble	39.0
Quinoline Insoluble	25.7
Coking Value	59.7
Distillation	1.8
Ash	.28
Sp. Gr.	1.3600

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett

Wayne Moffett

MAY 27'97 11:14 No.004 P.01
REILLY INDUSTRIES, INC ID:801-373-5501
801 373 5501

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650837
SHIPMENT DATE: 5/08/97

Softening Point	108.2
Toluene Insoluble	39.5
Quinoline Insoluble	25.4
Coking Value	60.6
Distillation	1.8
Ash	.29
Sp. Gr.	1.3604

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Wayne Moffett

REILLY INDUSTRIES, INC ID:801-373-5501 MAY 12'97 15:31 No.019 P.01
801 373 5501

KOPPERS INDUSTRIES, INC.

Analytical Services Group
Analysis Report

Sample No: Q97-905 Date Received: 5-6-97

Received From: KII-Portland
Amos Karmerer

Quantity: 1 bag
Description: Reilly Pitch

Analysis Date: 5-9-97 Analyzed By: LCW

Quinoline Insolubles, %:	26.4
Toluene Insolubles, %:	41.5
Beta Resins, %:	15.1
CVC, %:	60.4
Specific Gravity:	1.363
Softening Point, °C:	102.4
Ash, %:	0.28

Distillation:

up to 300°C, %:	0.0
up to 360°C, %:	4.8
Residue, %:	94.4

05/12/97 9:[illegible] WK4

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650819
SHIPMENT DATE: 4/25/97

Softening Point	108.7
Toluene Insoluble	39.4
Quinoline Insoluble	26.8
Coking Value	60.7
Distillation	1.8
Ash	.28
Sp. Gr.	1.360

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 APR 30'97 15:06 No.012 P.01
801 373 5501

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

[illegible] NUMBER: UTLX 650897
[illegible]NT DATE: 4/04/97

Softening Point	111.2
Tolu[illegible]	40.1
Quino[illegible]	27.9
Coking Value	61.0
Distillation	2.1
Ash	.29
Sp. Gr.	1.364

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 APR 21'97 15:05 No.009 P.01
801 373 5501

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650897
SHIPMENT DATE: 1/27/97

Softening Point	110.0
Toluene Insoluble	41.8
Quinoline Insoluble	26.7
Coking Value	61.2
Distillation	2.1
Ash	.35
Sp. Gr.	1.3645

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

REILLY INDUSTRIES, INC ID:801-373-5501 JAN 31,97 11:27 No.004 P.01

REILLY INDUSTRIES, INC.

P. O. Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX: 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows:

CAR (s) NUMBER: UTLX 650819 - UTLX 650837
SHIPMENT DATE: 1/29/97

Softening Point	109.0
Toluene Insoluble	41.4
Quinoline Insoluble	27.1
Coking Value	61.6
Distillation	2.1
Ash	.37
Sp. Gr.	1.36

Sincerely,

REILLY INDUSTRIES, INC.

Wayne Moffett
Lab

JAN 31'97 11:28 No.004 P.02
REILLY INDUSTRIES, INC ID:801-373-5501

KOPPERS INDUSTRIES, INC.

Analytical Services Group
Analysis Report

Sample No: Q96-1896 Date Received: 11/22/96

Received From: KII-Portland
Amos Karmerer

Quantity: 1 bag
Description: Reilly Car Sample

Analysis Date: 12-2-96 Analyzed By: MM

Toluene Insolubles, %: 41.9

Petrographic and particle size to follow.

12/03/96 96-1896.WK4

Typical Pitch Specs. for Blending

	Reilly	Chinese	Korean	Calculated Average
S.P.	110.0	111.0	111.0	
T.I.	42.0	20.0	28.0	
Q.I.	26.0	3.0	10.0	
C.V.	61.0	53.0	58.0	
Ash	.38	.11	.11	
Dist.	3.5	3.5	2.1	

% Blend

Typical Pitch Specs. for Blending

	Reilly	Chinese	Korean	Calculated Average
S.P.	110.0	111.0	111.0	
T.I.	42.0	20.0	28.0	
Q.I.	26.0	3.0	10.0	
C.V.	61.0	53.0	58.0	
Ash	.38	.11	.11	
Dist.	3.5	3.5	2.1	

% Blend

GRESHAM TRANSFER INC.

PORTLAND TERMINAL: (503) 255-7900 • 1-800-727-7900
KENT TERMINAL: (206) 878-7980 • 1-800-727-7980

Wayne 11/25/96

Reilly Specs

QI	24 - 27
A	.35 - .4
S	108 - 112
CV	56 min

KII Cars - 6 or so in the service
250 ± Tons per month
3 x 87 = 261 Tons

CONFIDENTIAL

KOPPERS INDUSTRIES

FAX TRANSMITTAL

Koppers Industries, Inc.
7540 N.W. St. Helens Road
Portland, OR 97210-3663
Telephone: 503-286-3681
Fax: 503-285-2831

TO: Fitzgerald, Stadel DATE: 11/21/96

FROM: Amos TOTAL # OF PAGES: 2

F.Y.I. — the MATHEMATICAL VS. ACTUAL BATCH RESULTS ON the 2nd Reilly CAR.

Looks good!
O

IF THIS TRANSMITTAL IS IN ERROR, PLEASE CALL 503-286-3681 FAX # 503-285-2831

Koppers010576

GRESHAM TRANSFER INC.

PORTLAND TERMINAL: (503) 255-7900 • 1-800-727-7900
KENT TERMINAL: (206) 878-7980 • 1-800-727-7980

11/8/96

	melton	Reilly	chinese	Korean	Avg.	Batch #96-48 Act.
SP	109	114.7	111.1	110.8	110.1	108.5
TI	~~27.0~~ 26.5	42.3	20.2	28.0	26.5	26.1
QI	8.5	27.6	3.6	8.8	8.4	8.3
CV	~~57.0~~ 56.2	61.6	53.2	58	56.5	57.0
Ash	.13	.38	.11	.11	.13	.13
Dist.	~~2.4~~ 2.8	3.5	3.5	2.1	2.7	2.9
Tons	~~1275~~ ~~1600~~	87	424 (113)	817 (217)	= 2603	
%	49.0	3.3	16.3	31.4	= 100	

~~SG~~ 1.32

+ 825 @ 90 = 742
10 = 83

GRESHAM TRANSFER INC.

PORTLAND TERMINAL: (503) 255-7900 • 1-800-727-7900
KENT TERMINAL: (206) 878-7980 • 1-800-727-7980

11/8/96

	melton	Reilly	chinese	Korean
SP	109	114.7	111.1	110.8
TF	~~27.0~~ 26.5	42.3	20.2	28.0
QI	8.5	27.6	3.6	8.8
CV	~~57.0~~ 56.2	61.6	53.2	58
Ash	.13	.38	.11	.11
Dist.	~~2.4~~ 2.8	3.5	3.5	2.1
Tons	~~1275~~ [redacted]	87		
%				

CONFIDENTIAL

KOPPERS INDUSTRIES

FAX TRANSMITTAL

Koppers Industries, Inc.
7540 N.W. St. Helens Road
Portland, OR 97210-3663

Telephone: 503-286-3681
Fax: 503-285-2831

TO: K. Fitzgerald, P. Stadel, C. Kraynik DATE: 11/6/96

FROM: Ames TOTAL # OF PAGES: 2

F.Y.I.

Attached is the pre-blend calculations and the actual results of our first batch using the Reilly high Q.I. pitch — only problem came with unloading the Reilly car.

IF THIS TRANSMITTAL IS IN ERROR, PLEASE CALL 503-286-3681 FAX # 503-285-2831

Koppers010579

GRESHAM TRANSFER INC

PORTLAND TERMINAL: (503) 255-7900 • 1-800-727-7900
KENT TERMINAL: (206) 878-7980 • 1-800-727-7980

	Melton	Reilly	Chinese	Korean		Avg.	Act.
SP	109	114.7	111.1	110.8		109.8	* 108.8
TI	27.0	42.3	20.2	28.0		26.7	26.5
QI	8.5	27.6	3.6	8.8		8.5	8.5
CV	57.0	61.6	53.2	58		56.7	56.2
Ash	.13	.38	.11	.11		.13	.13
Dist.	2.4	3.5	3.5	2.1		2.6	2.8
Tons	1650	87	375	375	=	2487	
%	66.3	3.5	15.1	15.1	=	100	

* Heavy oil was added.

CONFIDENTIAL

GRESHAM TRANSFER INC.

PORTLAND TERMINAL: **(503) 255-7900 • 1-800-727-7900**
KENT TERMINAL: **(206) 878-7980 • 1-800-727-7980**

	melton	Reilly	chinese	Korean
SP	109	114.7	111.1	110.8
TF	27.0	42.3	20.2	28.0
QI	8.5	27.6	3.6	8.8
CV	52.0	61.6	53.2	58
Ash	.13	.38	.11	.11
Dist.	2.4	3.5	3.5	2.1
Tons	1650	87		
%				

GRESHAM TRANSFER INC.

PORTLAND TERMINAL: **(503) 255-7900 • 1-800-727-7900**
KENT TERMINAL: **(206) 878-7980 • 1-800-727-7980**

X2

825	5	=	41.25	
	25	=	206.25	
	70	=	577.5	

				X2	
900	— .05	=	45.	90	R
	.25	=	225.	450	C
	.70	=	630.	1260	K
				1800	

	Oct.	Nov.
production	3100	2200
	(1800)	(1800)
	1300	400
	X 90/10	X 90/10
	K = 1170	k = 360
	C = 130	c = 40

REILLY INDUSTRIES, INC.

P. O. Box 50086
Provo, Utah 84605-0088

Telephone 801 373-5670
Fax 801 373-5501

Celebrating 100 Years
1896 - 1996

September 30, 1996

Koppers Industries, Inc.
Oregon

0831 (fax)

analysis covers shipments UTLX 650911 and UTLX 650908 shipped from our
11/96.

	Korean	Chinese	Avg
	110.8	111.1	111.1
	28	20.2	26.8
	8.8	3.6	8.4
	58.0	53.2	57
	.11	.11	.12
	2.1	3.5	2.5
Mix - 5%	70%	25%	

D. Mac McKeff

D. Mac McKeff

			STONS
UTLX 650908	- Net #	173,600	86.8
911	"	172,300	87.15
		345,900	172.95

REILLY INDUSTRIES, INC ID:801-373-5501 OCT 01'96 No.008 P.01

CONFIDENTIAL

REILLY INDUSTRIES, INC

P. O Box 50086

Provo, Utah 84605

Mr. Amos Kamerer
Koppers Industries, Inc.
Portland, Oregon

FAX. 1 503 285 2831

Our analysis on the reference shipment(s) of pitch from our Provo, Utah plant is as follows.

CAR (s) NUMBER: UTLX 650837
SHIPMENT DATE: 10/9/98

[illegible]	40.3
[illegible] soluble	25.0
Coking Value	60.1
Distillation	5.0
[redacted]	[redacted]
Sp. Gr.	1.359

Sincerely,

REILLY INDUSTRIES, Inc.

Wayne Moffett
Lab

CONFIDENTIAL

Author: AMOS KAMERER at PITT
Date: 5/16/99 11:23 AM
Priority: Normal
TO: Kevin Fitzgerald at PITT
TO: Jim Dietz at PITT
TO: Don Evans at PITT
Subject: Allied Flake Pitch from Longview

---------- Message Contents ----------

Kevin,

I am faxing the lab analysis on the 2 samples that Allied sent down from Longview. The density's and TI's were low and the distillation was high. Hopefully you can get some Anchan pitch, rather than having to use this.

Amos

Post-it® Fax Note 7671	Date 5/16/99	# of pages ▶ 1
To K. Fitzgerald	From Amos	
Co./Dept. J. Dietz	Co.	
Phone # D. Evans	Phone #	
Fax #	Fax #	

PORTLAND PITCH

SAMPLE # B-10-23, 24

BATCH # Allied 5.7, 6.3 QI Flake pitch

ANALYSIS DATE/S: 5-14 5-16

N O T E S O N S A M P L E :

Flake pitch

Allieds stated QI of the Samples >	5.7	6.3
SOFTENING POINT:	112.7	112.9
QI:	6.0	6.0
TI:	16.9	17.3
BETA RESIN:	10.9	11.3
ASH:	.05	.07
COKING VALUE :	57.19	57.44
DENSITY @ 25°C:	1.3028	1.3037
DISTILLATION TO 270°C:	0	0
300°C:	2.4	2.3
355°C:	5.2	5.1
360°C:	5.7	5.7
OV.	8.3	8.6
Res.	90.5%	

Start 258° Start 256°

End 365° End 364°

Res. 81.2%

PORTLAND PITCH ANALYSIS

SAMPLE # Allied Chinese Taylor hauling to Vanalco

BATCH # _____

ANALYSIS DATE/S: _____ 3-11 3-12

N O T E S O N S A M P L E :

_____

_____

_____

		HTC
SOFTENING POINT:	111.3	110.3
QI:	3.6	3.6
TI:	16.2	19.0
BETA RESIN:	12.6	
ASH:	.18	.10
COKING VALUE :	53.4	52.9
DENSITY @ 25°C:	1.293	1,294
DISTILLATION TO 270°C:	0	
300°C:	.4	
355°C:	1.9	
360°C:	2.4	3.7

Author: AMOS KAMERER at PITT
Date: 3/24/98 10:40 AM
Priority: Normal
TO: Kevin Fitzgerald at PITT
Subject: Allied Signal Chinese Pitch from Longview,WA
---------- Forwarded ----------
Author: STACEY McKINNEY at TECHCTR 3/24/98 11:57 AM
TO: Amos Kamerer at PITT
Subject: Allied Signal Chinese Pitch from Longview,WA
---------- Message Contents ----------

Kevin,
FYI. This is Chinese pitch. Taylor Trucking is still hauling it to Vanalco. They will get me another sample later this week.
Amos

---------- Forward Header ----------
Subject: Allied Signal Chinese Pitch from Longview,WA
Author: STACEY McKINNEY at TECHCTR
Date: 3/24/98 11:57 AM

Amos:

Following are the results reported on the Allied Chinese sample:

SP:	110.3
TI:	19.0
QI:	3.6
CVC:	52.9
Ash:	0.1
SG:	1.294
Dist.:	3.7

Please call me if there are any other questions.

Stacey

Author: AMOS KAMERER at PITT
Date: 3/16/98 6:45 PM
Priority: Normal
TO: Drew Bachman at PITT
Subject: Re[2]: Allied Chinese Pencil Pitch
---------- Message Contents ----------

Drew,
Kevin and discussed this and he didn't think that we should take the chance of offending them by asking this question at this time.
Amos

---------- Reply Separator ----------
Subject: Re: Allied Chinese Pencil Pitch
Author: Drew Bachman at PITT
Date: 3/15/98 9:31 AM

Amos -- Please confirm with Vanalco the actual reason why our offer to supply Chinese material from Portland was not taken.

Thanks

Drew

---------- Reply Separator ----------
Subject: Allied Chinese Pencil Pitch
Author: AMOS KAMERER at PITT
Date: 3/13/98 10:48 AM

To confirm my previous reports. Allied has hired our pencil pitch trucking company, Taylor Trucking, to start hauling next Monday, Chinese pencil pitch from Allied's Longview, Wash. storage building to Vanalco, Inc., for blending with their wet pencil pitch.

Taylor is renting 4 of our truck tops and will be hauling all of next week. My guess is that they will be able to make 3 turns per day , per truck, thus, they should be able to haul a total of 60 loads for the week, and would average 22 tons per load, or 1320 tons for the week.

Taylor made a test run for them last week and brought me back a sample of the pitch. We sent a portion to HTC for analysis, which has not been completed as yet, and then we ran our own here in Portland, with the results as follows:

SP	111.3
QI	3.6
TI	16.2
BR	12.6
ASH	.18
CVC	52.4
SG	1.293
DIS-360C	2.4

As you will recall, I offered to send Vanalco up to 2,000 tons of Chinese pencil pitch off of the vessel we just unloaded last weekend, against our 6,000 MT order for this year, and they said that they didn't have any storage room for it. So, my guess it that they had already made this purchase from Allied and couldn't get out of it, or that Allied's price was better than ours.

Amos

PS: Stacy, please include all of these gentlemen on your copy list for the results on this material. Thanks.

Author: AMOS KAMERER at PITT
Date: 1/7/98 11:47 AM
Priority: Normal
TO: Walter Turner at PITT
TO: Kevin Fitzgerald at CHIMAIN
Subject: ALLIED SIGNAL
---------- Message Contents ----------

Regarding my earlier note where the guys at the allied melter said that they were blending 4 different QI pitches, my contacts advise that all of the cargo's discharged at the Port of Longview came from either China or Japan, 3 from each. Thus the 7.5, 14.1 and the 14.7 QI's had to all be from Japan, just different batches with different Qi's. Not from any new or different sources, which is good news.

Amos

Author: Walter Turner at PITT
Date: 12/21/97 9:10 PM
Priority: Normal
TO: AMOS KAMERER at PITT
Subject: Re: ALLIED SIGNAL

---------- Message Contents ----------

Amos, is there any way you can find out the origin of the four pitches? Through the port, etc.

Thanks, Walt

8

Reply Separator

Subject: ALLIED SIGNAL
Author: AMOS KAMERER at PITT
Date: 12/18/97 7:40 AM

I stopped in to visit these people while in Longview yesterday. Joe Jacobson, manager is retiring at the end of January and the new guy is from Lake Charles, Howard McCall. He knows Rob and George Gonzoles but didn't remember you, Kevin.

They were just completing a 1 1/2 week shut down for annual maintenance and to add a cooling tower to the stack off of the melter. The state air quality people revised their operating permit calling for a max. discharge temperature of 85 F.

They indicated that they were blending 4 import pitches at this time. There producing about a 9 QI, Reynolds would like a 10 QI, but they don't have enough high QI to do so. I asked and he said that they were blending using the following pitches:
QI's - 3.8, 7.5, 14.1 and 14.7 and again he said that they were all imports.

Amos

Author: AMOS KAMERER at PITT
Date: 12/18/97 7:20 AM
Priority: Normal
TO: Walter Turner at PITT
TO: Kevin Fitzgerald at CHIMAIN
Subject: ALLIED SIGNAL
---------- Message Contents ----------

I stopped in to visit these people while in Longview yesterday. Joe Jacobson, manager is retiring at the end of January and the new guy is from Lake Charles, Howard McCall. He knows Rob and George Gonzoles but didn't remember you, Kevin.

They were just completing a 1 1/2 week shut down for annual maintenance and to add a cooling tower to the stack off of the melter. The state air quality people revised their operating permit calling for a max. discharge temperature of 85 F.

They indicated that they were blending 4 import pitches at this time. There producing about a 9 QI, Reynolds would like a 10 QI, but they don't have enough high QI to do so. I asked and he said that they were blending using the following pitches:
QI's - 3.8, 7.5, 14.1 and 14.7 and again he said that they were all imports.

Amos

Kamerer Amos

From: Kamerer Amos
Sent: Wednesday, May 09, 2001 5:29 PM
To: Dietz Jim
Subject: Solid Pitch Storage

Jim,

Below is the approximate SF of solid pitch stored in the 2 storage buildings:

KII - Korean	4,104
KII - Chinese	3,927
KII - Japanese	1,071
Reilly - Chinese	14,382

On the Japanese, these are super sacks on pallets and could be stored in a more tightly fashion, to reduce this area, or they could be stored out side and covered with tarps.

Amos

CONFIDENTIAL

KII - Korean

72' X 57' = 4,104 SF

KII - Chinese

20' X 51' = 1,020 SF

51' X 57' = 2,907 SF

3,927 SF

KII - Japanese

21' X 51' = 1,071 SF

Kelly - Chinese

102' X 141' = 14,382 SF

GRESHAM TRANSFER INC.

PORTLAND TERMINAL: **(503) 255-7900 • 1-800-727-7900**
KENT TERMINAL: **(206) 878-7980 • 1-800-727-7980**

Jim – PTSI

15,000 TONS $35/TON (35¢/SP)

25,000 TONS #

8/1/01

old 126 X 185

New 150 X 200

CONFIDENTIAL

PORTLAND

Tank #		Product	Residue (Gals.)
T-1	(A)	Crude Tar/other	19,755 -
T-2	(A)	Crude Tar	26,851 -
T-3	(A)	Methyl Naphthanate	1,691 -
T-101	(B)	Distillate (mostly Creosote)	169,184 -
T-11	(B)	Creosote	3,131 -
T-17	(A)	Distillate	425 -
T-18	(A)	"	2,547 -
T-19	(A)	"	566 -
T-20	(A)	"	5,444 -
T-23	(A)	"	1,977 -
T-34	(A)	"	1,585 -
T-4	(A)	"	16,081 -
T-53	(C)	Creosote/dirt+rock	2,400
T-66	(B)	Creosote	18,815 -
T-74	(C)	Creosote/dirt+ Rock	500
T-99	(A) (D)	Distillate/WATER	17,400 - (3,600 product, 13,800 water)

16 Tanks

		Gals	#@ 9#/gal	@ %	Tons Needed to blend
A)	Materials/others than Creosote	80,522	724,698#/362.4T.	2%	18,120
B)	Creosote	191,130	1,720,170#/860.1T	4%	21,503
C)	Non-Recyclable	2,900			
D)	Water to be disposed.	13,800			
					39,623

CONFIDENTIAL

Approximate Composition of a 110 °C SP Pitch and Parent Coaltar.

Component, area %	Pitch	Tar
Indane	Trace	0.29
Indene	Trace	0.31
Naphthalene	0.05	11.90
Thionaphthalene	0.02	0.39
Quinoline	Trace	0.27
2-Methyl naphthalene	0.02	1.28
Methylnaphthalenes	Trace	0.22
1 - Methylnaphthalene	0.01	0.64
Biphenyl	Trace	0.36
1- + 2-Ethylnaphthalene	0.01	0.13
2,6- and 2,7 Dimethylnaphthalene (DMN)	0.01	0.18
1,3-.+ 1,6- + 1,7-DMN	0.01	0.26
1,4- + 1,5- + 2,3-DMN	Trace	0.07
1,2- DMN + Acenaphthylene	0.01	0.06
Acenaphthene	0.26	1.91.
Dibenzofuran	0.05	1.27
Fluorene	0.11	1.68
Methyldibenzofurans	0.08	0.85
Methylfluorenes	0.05	0.24
Dibenzothiophene	0.05	0.40
Phenanthrene	0.86	5.70
Anthracene	0.31	2.04
Benzoquinolines	0.05	0.32
Carbazole	0.15	0.72
3- Methylphenanthrene	0.05	0.23
2- Methylphenanthrene	0.07	0.31
Methylphenanthrenes	0.27	1.02
2-Phenylnaphthalene	0.06	0.25
Fluoranthene	1.50	3.67
Pyrene	1.39	2.78
Benzofluorenes + Methylfluorenes	0.85	1.49
Methylpyrenes	0.90	1.46
3,4- Benzophenanthrene	0.15	0.17
Benzo(ghi)fluoranthene	0.27	0.3
1,2-Benanthracene	1.33	1.30
Chrysene	1.61	1.39
Triphenylene	0.55	0.52
Benzo(a)fluoranthene	0.46	0.31
Benzo(e)pyrene	1.19	0.66
Benzo(a)pyrene	1.81	1.04
Perylene	0.46	0.39
Methylbenzopyrenes	1.67	1.24
Indenopyrene	1.01	0.49
Dibenzanthracenes	0.50	0.23
Benzo(ghi)perylene	0.53	0.22
Anthanthrene	0.36	0.14
Total Unidentified (> 125)	3.35	6.02
High boiling pitch compounds	71.66	39.90

Typical Coal Tar Pitch

Other Properties:	
Carbon, wt. %	~ 92
Hydrogen, wt. %	~4.5
Sulfur, wt. %	0.6
Nitrogen, wt. %	~1
Oxygen, wt. %	~2
Sodium, ppmw	20- > 500
Potassium, ppmw	2-100
Silicon, ppmw	100- 500
Iron, ppmw	50-500
Calcium, ppmw	10-250
Lead, ppmw	40-500

The above ppmw analyses are for Pitch. Coal Tar would be approximately half of these values.
NOTE: Sulfur is typically 0.6 % in both Coal Tars and Pitches.

Emerald Service

206-832-3030

Rick Ramsey

BLD98-03151

B98-
03757

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KOPPERS INDUSTRIES

ENGINEERING SPECIFICATIONS FOR LIQUID PITCH UNLOADING PORTLAND TERMINAL

ChemTech

Koppers010602

KOPPERS INDUSTRIES

ENGINEERING SPECIFICATIONS FOR LIQUID PITCH UNLOADING PORTLAND TERMINAL

MECHANICAL & CIVIL

November 18, 1998

PROJECT NO. P-6526

ChemTech

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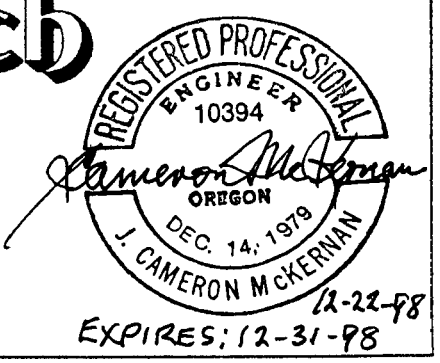

CONSTRUCTION SPECIFICATIONS

For

LIQUID PITCH UNLOADING

Portland Terminal

Project # 6526

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   - 6526AS09 **Pitch Tank T-200** API-650 Spec.

City of Portland
Bureau of Buildings
MULTNOMAH COUNTY
APPROVED
The documents bearing this stamp have been reviewed and found to be in compliance with the building codes and regulations currently regulated by the City of Portland.
This approval is for only those codes and regulations stated herein. Separate reviews and approvals are required for other codes and regulations.
Building Permit No.: _____
Approved for Issuance by _____ Date
Building Code Edition: _____

MECHANICAL

MECHANICAL SPECIFICATIONS
LIQUID PITCH UNLOADING
KOPPERS INDUSTRIES
PORTLAND, OR

BY

CHEMTECH CONSULTANTS, INC.

PROJECT P-6526

NOVEMBER 18, 1998

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1. PROJECT INTRODUCTION

1.1. The purpose of this project is to unload, store and transfer for shipment liquid pitch that has been delivered by ship. This includes (1) new pitch tank, foundations for (2) tanks, pumps, associated piping, hot oil heating system with piping and nitrogen blanketing system.

1.2. Location and Contacts

1.2.1. All work is to be done at the Koppers Industries Plant located at
7540 NW Saint Helens Road
Portland, OR 97210

1.2.2. The Project Manager is Mr. William A. Meisinger, PE
1001 William Pitt Way
Pittsburgh, PA 15238-1362
Telephone 412-826-3962, Fax 412-826-3999
E-mail: bill_meisinger@koppers.com

1.2.3. The Purchasing Manager is Mr. Jack Stephenson
1001 William Pitt Way
Pittsburgh, PA 15238-1362
Telephone 412-826-3907, Fax 412-826-3905
E-mail: jack_stephenson@koppers.com

1.2.4. The Plant Manager is Mr. Amos Kamerer
7540 NW Saint Helens Road
Portland, OR 97210
Telephone 503-286-3681, Fax 503-285-2831
E-mail: amos_kamerer@koppers.com

1.2.5. ChemTech Consultants Project Manager is Dr. Ted Andersen
Fourth Floor
1370 Washington Pike
Bridgeville, PA 15017
Telephone 412-220-4555, Fax 412-220-5685
E-mail: ts_andersen @ chemtech88.com

1.3. Definitions

1.3.1. Koppers Industries, Inc. will be referred to as the Purchaser or Koppers

1.3.2. ChemTech Consultants, Inc. has design responsibility for the phases of the project covered by this specification., and will be referred to as the Engineer or ChemTech.

1.4. All work will be done at the direction of the Koppers' Field Construction Supervisor. The Contractor is expected to supply his own field supervisor to work with Koppers' representative.

1.5. General Requirements and Conditions

1.5.1. It is understood and agreed that the Contractor has, by careful examination, fully satisfied himself as to the nature and location of the work; quality and quantity of material required; and kind of equipment and facilities needed preliminary to and during the performance of the work. The Contractor is aware of the general and local conditions and all other matters which can in any way affect the work.

1.5.2. Work on this project shall commence immediately after the Contractor has received notice from the Purchaser to proceed. The work shall be prosecuted with sufficient personnel, tools, equipment, and material for as many hours per shift and as many shifts per week as may be required to complete the work on or before the specified completion date (Refer to Paragraph 2.3.1)

1.5.3. The Contractor must realize that ChemTech has made every effort to assure that the dimensions given on the drawings are as accurate as possible. However, it is the contractor's responsibility to verify these dimensions before beginning the installation.

1.5.4. The Contractor understands that the final connection of pipelines into existing lines shall be Contractor's responsibility and shall be scheduled with the Construction Superintendent.

1.5.5. It will be the Contractor's responsibility to coordinate his work activities with the Construction Superintendent so as not to interfere with any of the Purchaser's production activities.

1.5.6. The Contractor shall comply with all applicable sections of ASME B31.3 (Normal Fluid Conditions) code for pressure piping and any applicable state and local codes. In case of any conflict with codes, the most stringent requirements shall govern.

1.5.7. The Contractor is expected to perform in a professional, workmanlike manner during the installation of this equipment. He and his personnel will be required to follow the Koppers Safety Rules while in the plant (obtain copies when visiting the plant).

1.5.8. Koppers will designate a laydown area for the Contractor's use during the duration of the project. The Contractor will be responsible for maintaining and working within this area so as not to interfere with Plant activities.

1.5.9. Contractor shall maintain the work site in an orderly condition and provide personnel and supervision to continuously clean up the work area.

1.5.10. The contractor must be aware of the fact that an insulation contractor will be covering equipment and piping runs as they are completed. It will be the mechanical contractor's responsibility to inform the insulation contractor when these items will be available for covering.

1.6. Utilities

1.6.1.1. Koppers will not furnish any utilities for the Contractor's use during this project.

1.6.2. Contractor will furnish

1.6.2.1. All of the electricity required for the job.

1.6.2.2. All fuel used in construction equipment.

1.6.2.3. Compressed air required for power tools and pressure testing.

1.6.2.4. All telephone services or any other communication devices or services required.

1.7. Safety

1.7.1. Contractor should obtain copies of Koppers' Safety Regulations when visiting the plant. These regulations are to be followed by all personnel while working in the plant.

2. BID AND CONTRACT REQUIREMENTS

2.1. The Contractor is to firm bid all equipment, material, labor and anything else required for a complete installation of all phases of this project as defined by these drawings and specifications.

2.2. Form of bid

2.2.1. The bid is to list separate costs for each of the following work sections.

2.2.1.1.Demolition and Relocation

2.2.1.2.Civil Work

2.2.1.3.Piping & Mechanical

2.2.1.4.Structural Steel

2.2.1.5.Painting

2.2.2. Labor and Material are to be listed separately for each of the above cost centers.

2.2.3. The Contractor is requested to list the following sub-contract information.

2.2.3.1.The number and type of sub-contract expected to be let to complete the job.

2.2.3.2.The names of the sub-contractors which will be used on the job.

2.2.3.3.The value of each sub-contract included in the bid.

2.2.4. The Contractor will submit a construction schedule with his bid. The schedule will be in the form of a Gantt Chart including the staffing requirements required to achieve the completion date.

2.3. Reporting

2.3.1. The Contractor will submit weekly updates to the Purchaser to this schedule detailing the progress achieved.

2.4. Contract Extra Costs

2.4.1. Once the contract has been let, extra costs will be approved ONLY as follows:

2.4.1.1. In the event the contractor feels an item is an extra cost not covered by the original scope of the contract, he must obtain the agreement, in writing, of the Koppers Field Construction Supervisor.

2.4.1.2. The contractor is to then submit an estimate of the cost required to perform the extra work.

2.4.1.3. An additional sheet to the original purchase order will be issued to cover the extra cost.

2.4.1.4. No extra costs will be honored which have not been first authorized in this manner.

3. SCOPE OF WORK

3.1. This Construction Specification is intended to provide for the supply and installation of all civil, mechanical and painting to complete the project. In general the following work is included:

3.1.1. Demolition

3.1.1.1. The site must be cleared of all buildings, structures or any other obstructions before construction can begin.

3.1.2. Civil Work

3.1.2.1. Supply all labor and material for foundations and concrete work in the pitch storage area including foundations for the following:

3.1.2.1.1. Pitch Pumps P-220, 225, 230, 235

3.1.2.1.2. Hot Oil Pumps P-255, 275, 280, 285, 290

3.1.2.1.3. Liquid Pitch Tanks T-200, 210

3.1.2.1.4. Hot Oil Heater E-270

3.1.2.1.5. Primary Hot Oil Pumps P-260, 265

3.1.2.1.6. Hot Oil Drain & Charging Tank T-250

3.1.2.1.7. Nitrogen Storage Pad

3.1.2.1.8. Pipe supports

3.1.2.1.9. Pipe "sleepers"

3.1.2.1.10. Pitch area floor & curb

3.1.2.1.11. Pipe bridges #1 & #2

3.1.2.1.12. Trench and Collection Sump

3.1.2.1.13. MCC/ Control Room extension

3.1.2.1.14. Pitch Pump Shed

3.1.2.1.15. Hot Oil Pump Shed

3.1.2.1.16. Foundations in the Pitch Unloading Line Area

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3.1.3. Piping & Equipment Installation

3.1.3.1.Supply and install the following pipe lines.

3.1.3.1.1.Pitch unloading line

3.1.3.1.2.Pitch circulating lines

3.1.3.1.3.Pitch evacuation lines

3.1.3.1.4.Hot oil supply and return lines

3.1.3.1.5.Hot oil tracing

3.1.3.1.6.Fume line

3.1.3.1.7.Natural gas line

3.1.3.1.8.Nitrogen lines

3.1.3.1.9.Steam lines

3.1.3.1.10.Steam tracing

3.1.3.1.11.Condensate lines

3.1.3.1.12.Sump discharge line

3.1.3.2.Install the following equipment

3.1.3.2.1.Four (4) pitch pumps P-220, 225, 235, 238

3.1.3.2.2.Four (4) pitch pump strainers S-221, 226, 236,239

3.1.3.2.3.Four (4) hot oil pumps P-255, 275, 280, 285

3.1.3.2.4.One (1) hot oil heater, stack and control panel E-270

3.1.3.2.5.Eight (8) pitch tank hot oil heaters. Four (4) each on E-201, 202

3.1.3.2.6.Two (2) hot oil transfer pumps P-260, 265

3.1.3.2.7.One (1) hot oil fill and drain pump P-245

3.1.3.2.8.One (1) hot oil expansion tank T-240

3.1.3.2.9.One (1) hot oil drain and charging tank T-250

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3.1.3.2.10.One (1) sump pump P-320

3.1.3.2.11.Tank shell plate coils and tank nozzle plate coils

3.1.4. Structures

3.1.4.1.Supply and install structural pipe supports in the liquid pitch storage area.

3.1.4.2.Supply and install MCC/Control Room extension

3.1.4.3.Supply and install Pitch Pump Shed

3.1.4.4.Supply and install Hot Oil Pump Shed

3.1.4.5.Supply and install Pipe Bridges #1 & #2

3.1.5. Painting

3.1.5.1.All exposed steel will be Hot Dipped Galvanized

3.1.5.2.Paint all bare pipe (nitrogen and natural gas). Exclude galvanized sump discharge pipe

3.1.5.3.Paint all hand rail and toe plates over galvanized surface.

3.2. Equipment and Materials

3.2.1. In general, Koppers will furnish all major equipment and instruments. It will be the contractor's responsibility to unload store, safe-keep and install these items. The contractor is to provide a lockable trailer for this purpose.

3.2.2. Koppers will furnish

3.2.2.1.Four (4) pitch pumps P-220, 225, 235, 238

3.2.2.2.Four (4) pitch pump strainers S-221, 226, 236, 239

3.2.2.3.Four (4) hot oil pumps P-255, 275, 280, 285

3.2.2.4.One (1) hot oil heater and stack E-270

3.2.2.5.Eight (8) pitch tank hot oil heaters. Four each on E-201, 202

3.2.2.6.Two (2) hot oil transfer pumps P-260, 265

3.2.2.7.One (1) hot oil fill and drain pump P-245

3.2.2.8.One (1) hot oil expansion tank T-240

3.2.2.9.One (1) hot oil drain and charging tank T-250

3.2.2.10.One (1) sump pump P-320 (relocate existing)

3.2.2.11.All instruments, control valves, transmitters, indicators, thermocouples and thermal wells

3.2.2.12.All permits

3.2.3. Liquid pitch storage tank T-200 will be installed by others and is not part of this contract.

3.2.4. The nitrogen storage equipment will be furnished by the nitrogen supplier. The contractor is responsible for the pad.

3.2.5. In general, the Contractor is responsible for all labor, materials, tools, and supervision necessary to complete the installation of the entire project. The Contractor is to supply all materials necessary for the complete installation of the entire project with the exception of those items specifically noted as being supplied by Koppers.

3.2.6. The Contractor is responsible for, but not limited to, the supply of the following items:

3.2.6.1.All structural steel, pipe supports and bridges.

3.2.6.2.All piping, valves, fittings, flanges, gaskets, studs and nuts.

3.2.6.3.Stainless steel tracing, fittings and silver solder.

3.2.6.4.All field supplies, weld rod, industrial gases, grout etc.

3.2.6.5.All tools and construction materials.

3.2.6.6.All temporary construction service facilities for field labor including field labor.

3.3. Storage

3.3.1. The contractor will be responsible for unloading, storing and safe-keeping all equipment and material pertaining to the mechanical part of this project.

3.3.2. A locked trailer and or area is to be provided at a site designated by Koppers for storage

3.3.3. Contractor must have personnel available to unload and store equipment purchased and received by Koppers as well as material he has purchased and received.

3.4. Standard Specifications and Codes:

3.4.1. All work performed at Koppers, Portland, OR is to be accomplished within, but not limited to the adherence of the following codes and standards:

3.4.1.1. National codes

3.4.1.2. All work and equipment covered herein shall conform to current editions of all applicable national codes and standards of the following organizations.

ACI American Concrete Institute

AISC American Institute of Steel Construction

ASME American Society for Mechanical Engineers.

ASCE American Society for Civil Engineers.

ASTM American Society for Testing Materials

AWS American Welding Society

NEC National Electric Code

OSHA Occupational Safety and Health Act

SSPC Steel Structures Painting Council

UBC Unified Building Code (Oregon Amendments)

3.4.1.3. All applicable requirements of pertinent federal, state, and municipal laws, regulations, codes, standards or ordinances.

3.4.2. Reference herein and in other attached documents to these and other standards and codes is to the editions thereof in effect as of the date of the Contract.

3.4.3. Where compliance with two or more industry standards or sets of requirements are specified and overlapping of those different standards or requirements establish different or conflicting minimums, the most stringent requirement is intended and will be enforced, unless specifically detailed language written into the Specification clearly indicates that a less stringent requirement is to be fulfilled.

3.4.4. The Contractor is to report any conflict between the various codes or between any code and Specification to the Koppers Project Manager for interpretation and decision.

3.5. General

3.5.1. The Contractor is to follow the guidelines listed within the drawings.

3.5.2. All piping work shall be done in accordance with the ASME Power Piping Code B 31.3 for Chemical Plants and Process Piping. All fluids are considered as "Normal Fluid Service".

3.5.3. All repairs and/or replacements thereof are to be made with equal or better materials.

3.5.4. All piping repairs to be made with appropriate materials for the service intended. Contractor shall coordinate with Purchaser for material specifications.

3.5.5. All Hot Work permits required for the project are the joint responsibility of the Purchaser and the Contractor.

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4. DEMOLITION AND RELOCATION

4.1. The Liquid Pitch Storage Area must be cleared of all obstructions before construction can proceed.

4.2. The following drawing applies to work in this area.

6526-G002 Liquid Pitch Unloading General Arrangement

4.3. The Contractor is responsible for supplying all labor, material and equipment for completing all work in this area.

4.4. There is no specific material or equipment that will be supplied by the Purchaser in this section.

4.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

4.6. The Contractor is to dismantle and remove or relocate all obstructions in the Liquid Pitch Storage Area.

4.6.1. The locations of these obstructions are indicated on drawing 6526-G002 General Arrangement.

4.6.2. The Contractor is responsible for, but not limited to, removing the following obstructions.

4.6.2.1. Weigh shed

4.6.2.2. Two (2) horizontal tanks

4.6.2.3. One (1) vertical column

4.6.2.4. Four (4) pipe supports

4.6.2.5. One (1) tank car loading station

4.6.2.6. One (1) truck loading gangway

4.6.2.7. One (1) pitch pipe manifold

4.6.2.8. Maintenance building

4.6.2.9. All piping , electrical conduit and foundations associated with the equipment and structures

4.6.3. Relocate one (1) sump pump and remove discharge line to post tower

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4.6.3.1.Note: Relocated sump pump P-320 will connect to this line. Do not remove any more pipe than necessary.

4.6.4. Relocate tank car heating station. This will require relocating heating panels and associated electrical equipment, conduit and wiring.

4.6.4.1.A support structure and foundation must be supplied for the panels at a new location. See drawing 6526-G002

4.6.5. The Contractor will be responsible for removing any other above ground obstructions with associated foundations in this area that is not listed here or indicated on the drawing.

4.6.6. For special requirements for subsurface conditions, refer to Appendices B & D

5. CIVIL WORK

5.1. This section covers the foundations and concrete work for the Liquid Pitch Storage Area of this project. The installation of a grounding loop is also in this section.

5.2. The following drawings apply to work in this section.

6526-C001	Hot Oil Pump Shed - Foundation Plan & Sections
6526-C002	Hot Oil Heater E-270 - Plan, Section & Details
6526-C003	Pipe Support Foundations - Plan, Section & Details
6526-C004	Pump Foundation Plan & Sections
6526-C005	Storage Tank Ares - Foundation Location Plan
6526-C006	Storage Tank Area - Foundation Sections & Details
6526-E006	Grounding Plan
6526-E007	Grounding Details
6526-E012	Conduit Routing & MCC Grounding
6526-G002	General Arrangement
	Topographical Survey Map
	Nitrogen Pad

5.3. The Contractor is responsible for supplying all labor, material and equipment for all work in this section. This includes, but is not limited to the following:

5.3.1. All materials necessary for site preparations, excavations, ground leveling, final yard dressings, etc. necessary for the installation.

5.3.2. All concrete, concrete reinforcements, anchor bolts, cinch anchors etc. necessary for the installation.

5.3.3. All electrical wiring, cable, grounding rods and any other material necessary for the grounding loop.

5.3.4. All necessary safety equipment required by any and all Federal, State, and Local Codes.

5.4. There is no specific material or equipment that will be supplied by the Purchaser in this section.

5.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

5.6. The foundations and piling for the Liquid Pitch Tank is not included in this specification. Refer to Appendix B. Note: Two (2) Liquid Pitch Tank foundations will be included even though only one (1) tank will be installed at this time.

5.7. Any civil work associated with the pitch unloading line from the dock to the Liquid Pitch Storage Tank is not included in this specification. Refer to Appendix C.

5.8. The existing railroad track at the Liquid Pitch Unloading Area must remain open during construction. This is not part of this specification. For construction methods, refer to Appendix B.

5.9. The relocated heating station will require a foundation for the support structure.

5.10. Electrical grounding loop

5.10.1. The Contractor is to supply and install an electrical grounding loop around the Liquid Pitch Storage Area and the Hot Oil Heating Area as shown on drawings 6526-E006, 6526-E007 & 6526-E012

5.10.2. The grounding system shall be installed in strict compliance with Article 250 of the National Electric Code.

5.10.3. Refer to drawings 6526-E0006 and 6526-E0012 for location of stub-ups.

5.10.3.1. At stub ups around the process perimeter, pigtails are to be of length adjustable to reach final termination point. They are to be coiled, wrapped in plastic and taped to make ready for final installation.

5.10.4. See drawing notes for materials and connection techniques.

5.10.5. The Contractor shall be responsible for testing the installed grounding loops and inspecting that the installation is in accordance with the drawings and specifications. Tests to be included, witnessed and reported are listed below.

5.10.5.1. Continuity tests to establish grounding system integrity.

5.10.5.2. Three point Fall-of-Potential tests to establish grounding system resistance to earth. Tests are to be taken at wells in opposite corners of the process.

5.10.5.3. The construction superintendent shall be notified of upcoming tests to witness.

5.10.5.4. A brief written report shall be submitted to the Engineer within one week of tests stating the results of the tests.

5.11. Equipment and structural foundations

5.11.1. The Contractor is to supply all labor and material necessary to install concrete foundations for the following equipment and structures.

5.11.1.1.Pitch Pumps P-220, 225, 230 Refer to drawing 6526-C005 for details. Note: Pump P-230 will not be purchased at this time.

5.11.1.2.Pitch Pump P-238 Refer to drawing 6526-C004 for details.

5.11.1.3.Hot Oil Pumps P-255, 275, 280, 285, 290 Refer to drawing 6526-C004 for details. Note: Pump P-290 will not be purchased at this time.

5.11.1.4.Hot Oil Heater E-270 & Stack Refer to drawing 6526-C002 for details.

5.11.1.5.Hot Oil Pumps P-260, 265 Refer to drawing 6526-C002 for details.

5.11.1.6.Hot Oil Drain & Charging Tank T-250 Refer to drawing 6526-C002 for details.

5.11.1.7.Hot Oil Pump P-245 Refer to drawing 6526-C002 for details.

5.11.1.8.Control/MCC Building extension Refer to drawing 6526-C002 for details.

5.11.1.9.Hot Oil Pump Shed Refer to drawing 6526-C001 for details.

5.11.1.10.Pitch Pump Shed Refer to drawing 6526-C005 for details.

5.11.1.11.Pipe supports & bridge Refer to drawing 6526-C005 for details.

5.11.1.12.Pipe support "sleepers". Refer to drawing 6526-C005 for details. Note: Cinch anchors are to be included on these structures to permit installation of structural steel beams.

5.11.1.13.Nitrogen pad Refer to vendor PE Stamped drawing for details.

5.12. Liquid Pitch Storage Area concrete floor and curb

5.12.1. A concrete floor with a curb will be installed at the Liquid Pitch Storage Area. Refer to Appendix B

5.12.2. A trench and sump will be installed in the floor for drainage. Refer to Appendix B

5.13. Asphalt Repairs

5.13.1. The Contractor will be responsible for repairing existing asphalt. Refer to drawing 6526-G002 for repair or replacement procedure.

6. PIPING AND EQUIPMENT INSTALLATION

6.1. This section covers the installation of all pipe lines in the Liquid Pitch Storage Area. The instruments that are installed in the pipe lines are included. Also included is the installation of the equipment.

6.2. The following drawings apply to work in this section.

6526-A001	Pitch Storage Tank T-200, Plan, Elev., Section & Details
6526-A002	Pitch Tank T-200 Details
6526-A003	Pitch Tank Hot Oil Heaters E-201, 202 Plan & Details
6526-D002	Mechanical Legend Sheet P & I Diagram
6526-D003	Instrument Legend Sheet P & I Diagram
6526-D004	Pitch Tanks T-200 & T-210 P & I Diagram
6526-D005	Hot Oil System P & I Diagram
6526-D006	Hot Oil Distribution P & I Diagram
6526-D007	Bulk Nitrogen System P & I Diagram
6526-D008	Miscellaneous Utilities P & I Diagram
6526-D009	Existing Hot Oil Distribution Modifications P & I Diagram
6526-G002	General Arrangement
6526-P001	Piping Plan
6526-P002	Pitch Piping at Tk Outlet to Pumps, Hot Oil, N_2, Stm Trac.
6526-P003	Pitch Tank Piping - Section
6526-P004	Pitch Tank Area - Piping _ Sections
6526-P005	Hot Oil Expansion Tank - Plan & Sections
6526-P006	Hot Oil Shed Piping - Plan & Sections
6526-P007	Hot Oil Shed Piping - Sections
6526-P008	Hot Oil Sections & Details 1/3
6526-P009	Hot Oil Sections & Details 2/3

6526-P010	Hot Oil Sections & Details 3/3
6526-P011	Existing Hot Oil System - Piping Isometric - Revisions
6526-P012	Hot Oil System Tracing Details
6526-P013	Hot Oil Tracing Isometrics
6526-P014	Tie Point Details
6526-P015	Pipe Supports/Anchors - Sheet 1 of 2
6526-P016	Pipe Supports/Anchors - Sheet 2 of 2
6526-P017	Plan Steam to Maintenance Building
6526-P018	Steam to Maintenance Building - Sections & Details
6526-A006	Hot Oil Drain & Charging Tank T-250

6.3. The Contractor is responsible for supplying all labor , equipment and material in this section with the exception of those items specifically listed as supplier by the Purchaser. The Contractor will supply but not be limited to the following items.

6.3.1. All piping, valves and fittings.

6.3.2. All miscellaneous piping items such as flanges, nuts, studs, bolts, gaskets, etc..

6.3.3. All materials necessary for the complete installation of all pipe supports, hangers, pipe anchors, guides etc.

6.3.4. All gaskets for piping, as specified on the above drawings.

6.3.5. All studs and nuts for pipe assembly shall be Alloy Studs ASTM A-193 Grade B-7 with American Standard Heavy Hex Nuts A-194 Class 2H, as specified on the above drawings.

6.3.6. All tracing, fittings and soldering materials.

6.3.7. All mobile equipment, cranes, welding machines, pipe threaders, etc..

6.4. The Purchaser will provide the following equipment and material.

6.4.1. Four (4) pitch pumps P-220, 225, 235, 238

6.4.2. Four (4) pitch pump strainers S-221, 226, 236, 239

6.4.3. Four (4) hot oil pumps P-255, 275, 280, 285

6.4.4. One (1) hot oil heater, stack and control panel E-270

6.4.5. Eight (4) pitch tank hot oil heaters, four (4) each for E-201, 202

6.4.6. Two (2) hot oil transfer pumps P-260, 265

6.4.7. One (1) hot oil fill and drain pump P-245

6.4.8. One (1) hot oil expansion tank T-240

6.4.9. One (1) hot oil drain and charging tank T-250

6.4.10. One (1) sump pump P-320 (relocate existing sump pump)

6.4.11. All instruments, control valves, transmitters, indicators, thermocouples and thermal wells

6.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

6.6. The Pitch Storage Tank T-200 will be installed by the tank fabricator and is not the Contractor's responsibility.

6.7. The liquid pitch unloading line that runs from the dock to inlet connection on Tank T-201 is not part of this specification. This includes any associated supports and Pitch Pump P-235. Refer to Appendix C

6.8. Equipment installation

6.8.1. Purchaser furnished equipment shall be handled and installed strictly in accordance with the manufacturers' recommendations.

6.8.2. The Contractor shall locate, assemble as required, erect, orient, align, shim to required elevation, grout in place and shall perform all other work including lubrication and checking rotation and instrumentation necessary to install Purchaser-furnished equipment complete and ready to operate.

6.8.3. The following equipment is to be set and piped up as shown on the drawings. Refer to General Arrangement Drawing 6526-G002 for general equipment location..

6.8.3.1. Pitch Pumps P-220, 225 are gear pumps 312 gpm @ 130 psid, 50 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P220

6.8.3.2. Pitch Pump P-238 is a gear pump 13 gpm @ 120 psid, 3 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P235

6.8.3.3. Hot Oil Pump P-255 is a centrifugal pump 25 gpm @ 75' head, 2 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P255

6.8.3.4. Hot Oil Pump P-275 is a centrifugal pump 32 gpm @ 320' head, 15 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P275

6.8.3.5. Hot Oil Pump P-280 is a centrifugal pump 30 gpm @ 82' head, 3 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P280

6.8.3.6. Hot Oil Pump P-285 is a centrifugal pump 120 gpm @ 95' head, 5 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P285

6.8.3.7. Hot Oil Pumps P-260, 265 are centrifugal pumps 410 gpm @ 290' head, 50 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P260

6.8.3.8. Hot Oil Pump P-245 is a centrifugal pump 25 gpm @ 75' head, 2 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P245

6.8.3.9. Hot Oil Heater E-270 is a natural gas fired heater with a rating of 8 million BTU/Hr. It includes a 2 HP blower all mounted on a common base plate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526E270

6.8.3.10. Pitch Heaters E-201, 202 (4 heaters each) are fin tube heaters and are installed inside Pitch Tank T-200. Refer to drawing 6526-A003 for details on the installation and specification 6526E201 for details on the heaters.

6.8.3.11. Hot Oil Expansion Tank T-240 is a horizontal carbon steel tank that will be located on top of an existing structure (24' height). There is an existing tank on this structure that will have to be removed before the new tank can be installed. Refer to specification 6526T240.

6.8.3.12. Hot Oil Drain & Charging Tank T-250 is a horizontal carbon steel tank that will be attached to anchor bolts on a foundation installed in the civil part of this project. See specification 6526T250.

6.8.3.12.1. The Contractor will be required to install a new nozzle on this tank. See specification 6526T250 for details and drawing 6526-A004 for the location.

6.8.3.12.2. This tank should be installed before the installation of Tank T-250. The existing tank that Tank T-250 is to replace is full of oil. This oil can be drained into the new Tank T-240 prior to removal.

6.8.3.13. Sump Pump P-320 is the existing sump pump that will be relocated to the new Rain Water Collection Sump. This pump must be revamped to fit the new sump.

6.9. Piping installation

6.9.1. The Contractor will be responsible for supplying and installing all piping in the Pitch Storage Area. This includes but is not limited to the following pipe lines.

6.9.1.1. Pitch circulating lines

6.9.1.2. Pitch evacuation line

6.9.1.3. Hot oil supply and return lines

6.9.1.4. Hot oil tracing

6.9.1.5. Fume line

6.9.1.6. Nitrogen lines

6.9.1.7. Natural gas line

6.9.1.8. Steam lines

6.9.1.9. Steam tracing

6.9.1.10. Condensate lines

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6.9.1.11. Sump line

6.9.1.12. Drip Pan drain line.

6.9.1.13. Heavy Oil line.

6.9.1.14. Reroute PVC Sewer (T-250 Area)

6.9.2. Refer to pipeline commodity list in Appendix A for list of required lines.

6.9.3. The details for this piping are shown on piping drawings 6526-P001 through 6526-P018.

6.9.4. Refer to Pipeline Specification and Material of Construction 6526-PS01 for details on the piping materials of construction.

6.9.5. The Contractor's work shall include but not be limited to the following:

6.9.5.1. Purchase all materials according to the specifications and drawings provided. Should the Piping Contractor, after a through review of the drawings provided, have questions regarding details or material specifications, or be uncertain of any details or intent of the drawings, they shall contact ChemTech's project manager as soon as possible for resolution.

6.9.5.2. The Piping Contractor shall attend all project planning, scheduling and safety meetings held by Koppers, or other on-site contractors that interface with the piping. Part of this responsibility is to assure that water is not injected into any piping that will contain pitch, pitch vapor or hot oil.

6.9.5.3. All pressure testing of this piping shall be done using compressed air that has passed through a pressure receiver sized by the compressor manufacturer for moisture removal, including a automatic water removal device. This supply of air for pressure testing shall be supplied by the Piping Contractor. Pressure testing shall be performed at 110% of the design pressure of the pipe as specified on specification 6526-PS01. Water shall not enter, in any way, pitch or hot oil piping since it has the potential to cause an explosion during heatup of the system.

6.9.5.4. Purchase secure, store, handle, install and pressure test all piping, fittings, valves, pipe anchors, guides and rests, etc., for the project, including all blanks and gaskets for pressure testing.

6.9.5.5. Coordinate all insulation work. Most of the pitch and vent piping require that the pipe be installed and tested, then insulation applied, followed with heat up under pressure with final tightening of flanges, before final insulation. It is the responsibility of the Piping Contractor to coordinate and turn over to the Insulation Contractor sections of pipe as soon as possible so that the Insulation Contractor can maintain schedule. This must be done by clearly marking and recording completed piping work, including testing, so that there is no re-work of insulation or metal jacketing.

6.9.5.6. Dismantle existing piping manifold as per section CC on drawing 6526-P003. Rebuild plug valves for new manifold

6.9.5.7. Install the hot oil traced pitch and steam traced vent piping, and the hot oil piping per drawing 6526-P001 and pressure test per ASME 31.3. All tracing connections are silver soldered using Eutectic Xuper XFC rod, Eutectic-Silweld 1618 flux.

6.9.5.7.1. All steam tracing will be 1/2" stainless steel tubing. Hot oil tracing will be 1" or 1-1/2" piping. All pitch lines & vent lines will be traced. Refer to drawing 6526-P003 for steam tracing and drawings 6526-P012 and 6526-P013 for hot oil tracing details.

6.9.5.8. Install and pressure test the hot oil supply and return piping.

6.9.5.9. Install and pressure test the nitrogen piping. Since the nitrogen will be used to purge the pitch tanks, and the hot oil expansion tank and supply all instruments that require it, this piping shall be pressure tested with compressed air, or nitrogen, as previously specified. Refer to drawing 6526-P001

6.9.5.10. Install and pressure test natural gas piping to Hot Oil Heater E-270. Refer to drawing 6526-P005.

6.9.5.11. Install and pressure test steam line to Maintenance Shop. Refer to drawing 6526-P017.

6.9.5.12. Install sump line from sump pump P-320 to existing line. This is the line that connected to the original sump pump that was removed at the beginning of construction on this project. Refer to drawing 6526-P001

6.9.5.13. Install condensate lines. Refer to drawing 6526-P002

6.9.5.14. After the pitch tank is hydrostatically tested with water (the only water injected into any vessel or pipe that will contain pitch or hot oil) it will be turned over to Koppers who will remove all water before turning it over to the Piping Contractor for connecting the piping. The Piping Contractor shall remove and dispose of the blanks on the tank prior to making the piping connections. Where necessary, these blanks or new blanks shall be installed for pressure testing and then removed after elimination of all leaks. Where

valves are on the tank nozzles, they may be used in the shut-off position for pressure testing, or blanks installed prior to the valves.

6.9.5.15. The Contractor shall install the thermocouples and wells in the piping as shown on the drawings, but will not be responsible for wiring.

6.9.5.16. Install all instruments in the piping as shown on the piping and P&ID drawings. Note: The pipelines must be pressure tested using by-passes before installation of the instruments.

6.9.5.17. Install the instruments, relief valves, nitrogen purge devices, etc., as shown on the P&ID's and Tank drawings.

6.10. Revisions are required to the existing hot oil system. Refer to drawing 6526-P011 for details.

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7. STRUCTURES

7.1. This section includes the structural steel pipe supports, and building structures in the Liquid Pitch Storage Area.

7.2. The following drawings apply to work in this section.

6526-E010	Lighting Enlarged Plans
6526-G002	General Arrangement
6526-S001	Hot Oil Pump Shed & General Steel Notes
6526-S002	Pitch Pump Shed & Pipe Bridge #2 - Plans,, Detail & Sect.
6526-S003	Pitch Pump Shed & Pipe Bridge #2 - Sections & Details
6526-S004	Pipe Bridge #1 - Plan, Elevations & Details
6526-S005	Pipe Supports Elevations & Details
6526- S006	Pipe Support Location & Plan

7.3. The Contractor is responsible for supplying all labor, equipment and material in this section. The Contractor will supply but not be limited to the following items.

7.3.1. All structural steel necessary for the installation of all pipe and yard supports as shown on the drawings. This includes structural "attachments" to the concrete pipe "sleepers"

7.3.2. All miscellaneous hardware and small parts, nuts, bolts, washers, etc. necessary for the installation. For structural steel assembly use American Standard Regular Hex Head bolts with American Standard Heavy Cold Pressed Hex Nuts.

7.3.3. All lumber, plaster board siding and roofing materials required for the extension to the MCC/Control Room.

7.3.4. All structural steel, siding and roofing materials required for the construction of the Pitch Pump & Hot Oil Pump Sheds.

7.4. There is no specific material or equipment that will be supplied by the Purchaser in this section.

7.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

7.6. All structural pipe supports for the pitch unloading line between the dock and Pitch Tank T-200 are not part of this specification. Refer to Appendix C

7.7. All exposed structural steel will be galvanized before installation.

7.7.1. After installation of equipment and appurtenances, all damaged and abraded areas of galvanized surfaces shall be cleaned and re-coated using cold galvanizing compound, applied as per manufacturer's instructions.

7.8. The Contractor is to supply all material and labor required for the erection of the following structures.

7.8.1. Pitch Pump Shed is an open sided steel structure with a roof. Refer to drawing 6526-S002 & 6526-S003 for details.

7.8.1.1. All steel and hardware (nuts, bolts, washers etc.) is to be galvanized.

7.8.2. Hot Oil Pump Shed is a steel structure with two (2) open sides, Two (2) closed sides and a roof. Refer to drawing 6526-S001 for details.

7.8.2.1. All steel and hardware is to be galvanized.

7.8.3. MCC//Control Building is an existing wooden structure that will be extended to accommodate additional equipment. South end of the existing building is to be removed. The addition is to be 12'x14' and match the existing structure

7.8.3.1. The roof to be 22 gage steel

7.8.3.2. Wood siding to match existing structure. Provide 8'-0' side walls (2x4's @ 16" c/c), 1/2" thick plasterboard, (2x6's roof framing 16" c/c) with R-19 insulation @ walls & roof

7.8.3.3. Ceiling tile is to be 2'x4' with suspension grid to match to match the existing

7.8.3.4. Paint to match the existing. Roof to be blue. Siding to be white. Paint the entire interior.

7.8.3.5. Refer to drawing 6526-E010 for lighting details

7.9. Structural steel pipe supports

7.9.1. Contractor will fabricate and install all structural steel pipe supports in the Liquid Pitch Loading Area. Refer to drawing 6526-S005 for details.

7.9.2. Fabricate and install pipe bridge #1 and pipe bridge #2 tower. Refer to drawings 6526-S002 through 6526-S004.

7.9.3. This steel and hardware is all to be galvanized.

8. PAINT

8.1. This section is for the painting of all noninsulated (bare) carbon steel pipe not including the galvanized sump line. It also includes safety painting of all handrail and toe plate. All other steel is galvanized and does not require painting.

8.2. Refer to Koppers for painting specifications.

8.3. The Contractor is responsible for all labor, material and equipment required in this section.

8.4. There is no specific material or equipment that will be supplied by the purchaser in this section.

8.5. Items to be painted

8.5.1. All bare carbon steel pipe not including galvanized sump line.

8.5.1.1. The pipelines requiring painting are all nitrogen and natural gas piping.

8.5.2. All hand rail and toe plates are to be painted safety yellow over the galvanized surface. This includes all handrail and toe plate associated with Pitch Tank T-200

9. COMMISSIONING AND GENERAL INSTALLATION NOTES

9.1. It is the intent of this Contract that the Contractor commission all installations that are their responsibility. The following is required of the Contractor.

9.2. Pipeline testing procedures

9.2.1. All pipelines shall be pressure tested in accordance with ASME Code for Pressure Piping, B31.3. Additionally, all welds over water are to be x-rayed, with the boundry as detailed on the piping drawings.

9.2.2. All pipelines and tracers are to be pneumatically tested. Use no water.

9.2.3. Piping sections are to be isolated using blind flanges or slip blanks as required. Valves may be used for isolation, but they shall be tested for leaks as part of the piping system.

9.2.3.1. Do not include process vessels, or tanks in the pressurized testing.

9.2.3.2. The Contractor is responsible for supply of all slip blanks and/or blind flanges and gaskets required for the testing.

9.2.3.3. The Contractor is responsible for replacement of gaskets destroyed during the tests.

9.2.4. Pipeline valves shall be installed and in the open position during the test, except where they are used to isolate a section or piping system.

9.2.5. All pipe and tracing is to be pneumatically tested to 110% of the design pressure listed on specification 6526-PS01

9.2.5.1. The compressor hookup to the piping system is to include a shutoff valve. On the piping side of the shutoff valve is to be installed a pressure gauge, a vent valve, and a relief valve set to the test pressure.

9.2.5.2. Pressurize the piping system to 25 psig, then shut the valve to the compressor. Perform a preliminary check for leaks in the piping system.

9.2.5.3. If no leaks are found at 25 psig, pressurize the piping system to the test pressure in increments of 10 psig. After each increase in pressure, shut the valve at the connection and wait 3-5 minutes to permit piping stresses to equalize. During these periods inspect the piping for leaks. All steam traced lines are to be additionally hot tested with steam before insulation is applied.

9.2.5.4. Once the test pressure is reached, shut the valve at the connection and hold the system at the test pressure long enough to equalize piping strains. Then reduce the pressure to the design pressure before examining the piping system for leakage.

9.2.5.5. Proceed with the leak detection at the design pressure. Leak detection and inspection shall consist of thoroughly wetting every weld, flange, threaded connection, soldered connection, packing gland, or other possible source of leak including any welded attachment to the piping with "Snoop" or other suitable leak testing non-corrosive fluid, or inspected using an ultrasonic leak detection device, on all of the possible leak sources.

9.2.6. The Contractor is responsible for any repairs required:

9.2.6.1. Any leaking welds are to be ground out and re-welded at the leak point after pressure has been relieved.

9.2.6.2. Any leaking packing glands are to be drawn up while under pressure and the pipeline pressure restored to the test pressure. If unable to stop the leaking, the gland is to be re-packed after pressure has been relieved.

9.2.6.3. Any leaking flanges are to be drawn up while under pressure and the pipeline pressure restored to the test pressure. If unable to stop the leaking, the gasket is to be replaced after pressure has been relieved.

9.2.6.4. Leaking threaded connections require tightening or, at the discretion of the Field Construction Superintendent, back-welding.

9.2.7. If repairs require relief of pressure, the system is to be re-tested after the repairs have been made, using the pressurization procedure outlined in paragraph 9.2.5, and re-testing, as specified above, those items which have been repaired.

9.2.8. After the piping system has been inspected and passed leak testing with "Snoop" or an ultrasonic tester, check the pressure gauge in the compressor hook-up for pressure loss.

9.2.8.1. Pressure loss of 5 psi or less can be attributed to line cooling during the testing procedure.

9.2.8.1.1. This assumes a temperature drop of 10° F while testing 100 ft. of 3" Schedule. 40 pipe.

9.2.8.1.2. Shorter piping systems or smaller line temperature drops allow for less acceptable pressure drop.

9.2.8.1.3. The test pressure shall be maintained for a minimum of 10 minutes before accepting the line as having been tested.

9.2.8.2. Pressure loss greater than 5 psi is probably due to undiscovered leakage.

9.2.8.2.1. Re-pressurize the piping system and retest.

9.2.8.2.2. Re-test all connections with "Snoop", or an ultrasonic leak detector.

9.2.8.3. All tests shall be recorded. Records shall include :

9.2.8.3.1. The date and time at the beginning of the test

9.2.8.3.2. The identification of the piping system tested, by line number

9.2.8.3.3. The test fluid used (air)

9.2.8.3.4. The testing process used (Snoop or ultrasonic, etc.)

9.2.8.3.5. The final test pressure and time of day along with a statement indicating that the test lasted at least 10 minutes and the loss of pressure was less than 5 psi.

9.2.8.3.6. Certification of results by the examiner

9.2.8.3.7. Examination procedures

9.2.8.3.8. Examination personnel qualifications

9.2.8.3.9. All testing records shall be retained and submitted to Koppers.

9.2.8.3.10. Per ASME 31.3, Koppers shall retain these records for at least 5 years.

9.3. Pipeline flange tightening after testing and process heat-up

9.3.1. If flanged connections are found to be leaking, the Contractor may re-tighten the flange bolts to stop the leak.

9.3.2. If the leak cannot be stopped, the Contractor shall replace the gasket. This procedure must be coordinated with Koppers to permit the required shutdown.

9.3.3. The Contractor shall also inspect all threaded connections to assure they exhibit no signs of leakage.

9.3.3.1. If threaded connections are found to be leaking, the Contractor may tighten the connection to stop the leak.

9.3.3.2. If the leak cannot be stopped, the Contractor shall disassemble the fitting, check for scarred threads, and, if the threads are in good condition, re-apply pipe thread sealant and assemble the connection. This procedure must be coordinated with Koppers to permit the required shutdown.

9.3.3.2.1. Thread sealant in pitch and hot oil service must be capable of 650° F. Do not use Teflon tape.

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10. PROJECT DRAWING LIST

10.1. The following lists all drawings that are part of this project.

6526-A001	Pitch Storage Tank T-200, Plan, Elev., Section & Details
6526-A002	Pitch Tank T-200 Details
6526-A003	Pitch Tank Hot Oil Heaters E-201, 202 Plan & Details
6526-A004	Hot Oil System - Expansion Tank T-240.
6526-A005	Hot Oil System - Storage Tank T-250.
6526-A006	T-200 Pitch Tank – Support Clip Details
6526-C001	Hot Oil Pump Shed - Foundation Plan & Sections
6526-C002	Hot Oil Heater E-270 - Plan, Section & Details
6526-C003	Pipe Support Foundations - Plan, Section & Details
6526-C004	Foundation Details & Sections (Hot Oil Heater E-270 Area).
6526-C005	Storage Tank Areas - Foundation Location Plan
6526-C006	Storage Tank Area - Foundation Sections & Details
6526-D002	Mechanical Legend Sheet P & I Diagram
6526-D003	Instrument Legend Sheet P & I Diagram
6526-D004	Pitch Tanks T-200 & T-210 P & I Diagram
6526-D005	Hot Oil System P & I Diagram
6526-D006	Hot Oil Distribution P & I Diagram
6526-D007	Bulk Nitrogen System P & I Diagram
6526-D008	Miscellaneous Utilities P & I Diagram
6526-D009	Existing Hot Oil Distribution Modifications P & I Diagram
6526-D010	Ship Unloading – P&I Diagram
6526-E006	Grounding Plan
6526-E007	Grounding Details

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6526-E010	Lighting Enlarged Plans
6526-E011	Conduit Routing Sheet 1 of 2
6526-E012	Conduit Routing & MCC Grounding Sheet 2 of 2.
6526-G001	Drawing Index.
6526-G002	General Arrangement
6526-P001	Overall Piping Plan
6526-P002	Pitch Piping at Tk Outlet to Pumps, Hot Oil, N_2, Stm Trac.
6526-P003	Pitch Tank Piping - Section
6526-P004	Pitch Tank Area - Piping _ Sections
6526-P005	Hot Oil Expansion Tank - Plan & Sections
6526-P006	Hot Oil Shed Piping - Plan & Sections
6526-P007	Hot Oil Shed Piping - Sections
6526-P008	Hot Oil Expansion Tank Piping Sections & Details
6526-P009	Hot Oil Shed Piping Isometric
6526-P010	Micellaneous Sections & Details 3/3
6526-P011	Existing Hot Oil System - Piping Isometric - Revisions
6526-P012	Hot Oil System Tracing Details
6526-P013	Hot Oil Tracing Isometrics At Pitch Area
6526-P014	Modifications to Hot Oil Heating System – Piping Isometric
6526-P015	Pipe Supports/Anchors - Sheet 1 of 2
6526-P016	Pipe Supports/Anchors - Sheet 2 of 2
6526-P017	Plan Steam to Maintenance Building
6526-P018	Steam to Maintenance Building - Sections & Details
6526-S001	Hot Oil Pump Shed & General Steel Notes
6526-S002	Pitch Pump Shed & Pipe Bridge #2 - Plans,, Detail & Sect.

6526-S003	Pitch Pump Shed & Pipe Bridge #2 - Sections & Details
6526-S004	Pipe supports and Pipe Bridge #1 - Plan, Elevations & Details
6526-S005	Pipe Supports Elevations & Details
6256-S006	Pipe Support Location Plan
	Topographical Survey Map
	Nitrogen Pad

APPENDIX A

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Koppers Industries
Portland Liquid Pitch Terminal

November 18, 1998

LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
101	2-101-1-12/40-S-F/3	Existing Vapor line From T-65 to Scrubber			150	881		
102	1-102-1-4/40-R-F/3	Existing Pitch Transfer line from T-65 / T-68 to Car Loading Manifold			400	265		
201	1-201-1-8/40-O-M/6	Pitch Ship Unloading Line, Dock to Shore	550	130	400	1,040	800	
202	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee	550	130	1607	6,583	3,214	
203	1-203-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-200 Top Nozzle	550	130	115	299	230	
204	1-204-1-6/40-O-M/4	T-200 Pitch Outlet, P-220 Suction & Disch to Reducer	550	75	30	45	60	
205	1-205-1-6/40-O-M/4	T-200 Pitch Outlet, P-225 Suction & Disch to Reducer	550	150	20	30	40	
206	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200	550	150	200	132	200	
207	1-207-1-4/40-O-M/3	T-200 Pitch Recirculation to Top Fill Riser	550	150	10	7	20	
208	2-208-1-8/40-S-F/3	T-200 Vent to Tee	400	25	40	104	160	
209	1-209-1-10/40-N	T-200 Internal Fill Tube	550	75				
210	1-210-1-6/40-O-M/3	P-225 Pitch Supply & Discharge to Reducer	550	150	12	18	24	
211	1-211-1-4/40-O-M/3	P-225 Pitch Discharge to Header	550	150	8	5	8	
212	1-212-1-16/30-O-M/4	T-200 to T-210 Pitch Overflow	550	75	16		32	
213	1-213-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-210 Top Nozzle	550	130	100	260	200	
214	1-214-1-6/40-O-M/4	T-210 Pitch Outlet, P-230 Suction & Disch to Reducer	550	75	30	45	60	
215	1-215-1-6/40-O-M/4	T-210 Pitch Outlet, P-225 Suction to Tee	550	150	20	30	40	
216	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210	550	150	200	132	200	
217	1-217-1-4/40-O-M/3	T-210 Pitch Recirculation to Top Fill Riser	550	150	10	7	20	
218	2-218-1-8/40-S-F/3	T-210 Vent to Tee	400	25	40	104	160	
219	1-219-1-10/40-N	T-210 Internal Fill Tube	550	75				
220	2-220-1-8/40-S-F/3	Combined Tank Vent, Tee to Exisiting Header TP-21	400	25	100	260	400	
221	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11	550	150	120	79	240	
222	1-222-1-2/40-O-M/3	Dock Evacuator Pump P-235 Suction	550	75	4	1	8	
223	1-223-1-2/40-O-M/3	Dock Evacuator Pump P-235 Discharge	550	75	4	1	8	
224	1-224-1-2/40-O-M/3	Evacuator Pump P-238 Suction	550	75	4	1	4	
225	1-225-1-2/40-O-M/3	Evacuator Pump P-238 Discharge	550	75	4	1	4	
226	0-226-0-0/0--/0	UNUSED						
227	5-227-3-2/40-N	Fuel Gas to E-270	100	50	12	2		
228	5-228-3-.75/40-N	Pilot Gas to E-270	100	50	12			
229	6-229-2-2/40-N	Nitrogen to Operate HO Valves	100	120	100	17		
230	6-230-2-2/40-N	Nitrogen to operate valves near T-200 & T-210	100	120	100	17		
231	6-231-2-2/40-N	Nitrogen Supply Header from E-310	100	120	320	56		
232	6-232-2-2/40-N	Nitrogen Supply to T-200 Reducer	100	120	80	14		
233	6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200	100	120	2	0		
234	6-234-2-1/40-N	Nitrogen Purge to PT on T-200 nozzle W	100	120	4	0		

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
235	6-235-2-2/40-N	Nitrogen Supply to T-210 Reducer	100	120	80	14		
236	6-236-2-2/40-N	Reduced Pressure Nitrogen Supply to T-210	100	120	2	0		
237	6-237-2-4/40-N	Low Pressure Nitrogen Blanket to T-210	100	120	4	3		
238	6-238-2-2/40-N	Nitrogen Supply to T-240 Reducer	100	120	30	5		
239	6-239-2-1/40-N	Reduced Pressure Nitrogen Blanket to T-240	100	120	6	0		
240	3-240-2-1/40-P-M/2	T-240 & T-250 HO Fill	575	150	20		20	1
241	3-241-2-1/40-P-M/2	T-240 HO Overflow	575	150	20		20	1
242	3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction	575	150	12		12	5
243	3-243-2-1/40-P-M/3	P-245 HO Discharge	575	150	16		16	1
244	3-244-1-4/40-P-M/3	Primary HO Suction Head From TP-31	575	150	48		48	32
245	3-245-1-4/40-P-M/3	Primary HO Pump Suction Header From TP-36	575	150	16		16	11
246	3-246-1-4/40-P-M/3	P-260 Suction	575	150	6		6	4
247	3-247-1-4/40-P-M/3	P-265 Suction	575	150	6		6	4
248	3-248-1-4/40-P-M/3	P-260 Discharge	575	150	6		6	4
249	3-249-1-4/40-P-M/3	P-265 Discharge	575	150	6		6	4
250	3-250-1-4/40-P-M/3	Primary HO Pump Discharge Header, Bypass to TP-32 Cross-Connect	575	150	24		24	16
251	3-251-1-4/40-P-M/3	HO Inlet to E-270 Fired Heater	575	150	6		6	4
252	3-252-1-4/40-P-M/3	E-270 Outlet to TP-33 Cross-Connect	575	150	18		18	12
253	3-253-1-3/40-P-M/3	Primary HO Supply Header	575	150	250		250	96
254	3-254-1-4/40-P-M/3	Primary HO Return Header	575	150	250		250	165
255	3-255-2-2/40-P-C/3	HO Drain Header	575	150	120		120	21
256	3-256-2-1/40-P-M/2	P-255 Drain Pump Discharge	575	150	24		24	1
257	3-257-1-4/40-P-M/3	PSV 2104 Discharge, E-270 to Return Header	575	150	10		10	7
258	3-258-2-3/40-N	PSV 2127 Discharge, T-240 to T-250	575	150	24		24	9
259	3-259-1-4/40-P-M/3	PSV 2193 Discharge	575	150	4		4	3
260	3-260-1-3/40-P-C/3	P-275 HO Supply	575	150	10		10	4
261	3-261-1-2/40-P-M/3	P-275 HO Discharge	575	150	1707		1,707	298
262	3-262-1-2/40-P-C/3	P-275 Pump Bypass	575	150	16		16	3
263	3-263-1-1.5/40-T	Main Unloading Line Supply Trace	575	150	450		450	41
264	3-264-1-1.5/40-T	Main Unloading Line Return Trace	575	150	450		450	41
265	3-265-1-2/40-P-M/3	P-275 HO Return	575	150	1707		1,707	298
266	3-266-1-2/40-P-C/3	P-275 HO Recirculation	575	150	16		16	3
267	3-267-2-1/40-P-C/2	P-275 Drain Connector	575	150	5		5	0
268	3-268-1-4/40-P-M/3	P-260 Startup Suction From T-240	575	150	25		25	17
269	3-269-1-3/40-P-M/3	PSV-2159 Discharge	575	150	10		10	4
270	3-270-1-3/40-P-C/3	P-280 HO Supply	575	150	10		10	4
271	3-271-1-2/40-P-M/3	P-280 HO Discharge	575	150	80		80	14
272	3-272-1-2/40-P-C/3	P-280 Pump Bypass	575	150	16		16	3

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
273	3-273-1-1.5/40-T	Tank Area Pitch Line Supply & Transfer Line Trace	575	150	120		120	11
274	3-274-1-1.5/40-T	Tank Area Pitch Line Return & Transfer Line Trace	575	150	120		120	11
275	3-275-1-2/40-P-M/3	P-280 HO Return	575	150	80		80	14
276	3-276-1-2/40-P-C/3	P-280 HO Recirculation	575	150	16		16	3
277	3-277-2-1/40-P-C/2	P-280 Drain Connector	575	150	5		5	0
278	0-278-0-0/0--/0							
279	3-279-1-2/40-P-M/3	PSV-2169 Discharge	575	150	10		10	2
280	3-280-1-3/40-P-C/3	P-285 HO Supply	575	150	10		10	4
281	0-281-0-0/0--/0	Replaced by 3" 283			30			
282	3-282-1-3/40-P-C/3	P-285 Pump Bypass	575	150	16		16	6
283	3-283-1-3/40-P-M/3	T-200 Heater HO Supply	575	150	12		12	5
284	3-284-1-3/40-P-M/3	T-200 Heater HO Return	575	150	12		12	5
285	0-285-0-0/0--/0	Replaced by 3" 284			30			
286	3-286-1-3/40-P-C/3	P-285 HO Recirculation	575	150	16		16	6
287	3-287-2-1/40-P-C/2	P-285 Drain Connector	575	150	5		5	0
288	3-288-2-1/40-P-M/2	T-200 HO Drain Connector	575	150	30		30	1
289	3-289-1-3/40-P-M/3	PSV-2179 Discharge	575	150	10		10	4
290	3-290-1-3/40-P-C/3	P-290 HO Supply	575	150	10		10	4
291	0-291-0-0/0--/0	Deleted			120			
292	3-292-1-3/40-P-C/3	P-290 Pump Bypass	575	150	16		16	6
293	3-293-1-3/40-P-M/3	T-210 Heater HO Supply	575	150	12		12	5
294	3-294-1-3/40-P-M/3	T-210 Heater HO Return	575	150	12		12	5
295	0-295-0-0/0--/0	Deleted			120			
296	3-296-1-3/40-P-C/3	P-290 HO Recirculation	575	150	16		16	6
297	3-297-2-1/40-P-C/2	P-290 Drain Connector	575	150	5		5	0
298	3-298-1-1/40-P-M/2	T-210 HO Drain Connector	575	150	120		120	5
299	3-299-1-3/40-P-M/3	PSV-2189 Discharge	575	150	10		10	4
300	0-300-0-0/0--/0	Deleted - Function by 273 / 274						
301	3-301-1-1/40-P-M/2	Dock Line Trace & HV2083 Jacket	575	150	800		800	36
302	3-302-1-1/40-P-M/2	Dock Line Trace & P-235 Jacket	575	150	800		800	36
303	3-303-1-1/40-P-M/2	Dock Line Trace & ZV2082 Jacket	575	150	800		800	36
304	3-304-1-1/40-P-M/2	Dock Line Trace & HV2081 Jacket	575	150	800		800	36
305	3-305-1-1/40-T	T-200 Outlet & P-225 Jacket	575	150	180		180	8
306	3-306-1-1/40-T	T-200 Unloading Riser & Roof Nozzle Trace	575	150	280		280	13
307	3-307-1-1/40-T	T-200 Recirculation Trace & P-220 Jacket	575	150	280		280	13
308	3-308-1-3/40-N	T-200 Internal Supply / Return to E201	575	150	100		100	38
309	3-309-1-3/40-N	T-200 Internal Supply / Return to E202	575	150	100		100	38
310	3-310-1-1/40-T	T-200 Shell Nozzle Jackets	575	150	300		300	13
311	3-311-1-1/40-T	T-210 Outlet & P-225 Jacket (hold)	575	150	180		180	8

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
312	3-312-1-1/40-T	T-210 Unloading Riser & Roof Nozzle Trace & Overflow to T-200	575	150	280		280	13
313	3-313-1-1/40-T	T-210 Recirculation Trace & P-230 Jacket	575	150	280		280	13
314	3-314-1-3/40-N	T-210 Internal Supply / Return to E211	575	150	100		100	38
315	3-315-1-3/40-N	T-210 Internal Supply / Return to E212	575	150	100		100	38
316	3-316-2-1/40-T	T-210 Shell Nozzle Jackets	575	150	300		300	13
317	0-317-0-0/0--/0	UNUSED						
318	0-318-0-0/0--/0	UNUSED						
319	0-319-0-0/0--/0	UNUSED						
320	3-320-1-4/40-P-M/3	FV2145 Flow Bypass on E-170 Outlet to Return	575	150	10		10	7
321	3-321-1-4/40-P-M/3	Pump P-1 Recirculation Line	575	150	12		12	8
322	0-322-0-0/0--/0	UNUSED						
323	3-323-1-4/40-P-M/3	Pump P-3 Recirculation Line	575	150	12		12	8
324	3-324-1-3/40-P-M/3	Pump P-4 Recirculation Line	575	150	12		12	5
325	3-325-1-2/40-P-M/3	Pump P-5 / 6 Recirculation Line	575	150	12		12	2
326	0-326-0-0/0--/0	UNUSED						
327	0-327-0-0/0--/0	UNUSED						
328	0-328-0-0/0--/0	UNUSED						
329	0-329-0-0/0--/0	UNUSED						
330	4-330-5-2/40-N	Tank Area Sump Discharge Piping to TP 41	100	50	40	7		
331	11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace	400	150				
332	11-332-4-.50/.035-T	Steam Tracers on Tank T-200 Fume Vent Line	400	150				
333	11-333-2-2/40-H-M/1.5	Steam Supply to Maintenance Building from TP-112	400	150				
2080	A-208	(FUTURE) Side Entering Agitator, Plenty Swivel Type 29P-STM 60 hp / 85 mm shaft	450	250				
2090	A-209	(FUTURE) Side Entering Agitator, Plenty Swivel Type 29P-STM 60 hp / 85 mm shaft	450	250				
2180	A-218	(FUTURE) Side Entering Agitator, Plenty Swivel Type 29P-STM 60 hp / 85 mm shaft	450	250				
2190	A-219	(FUTURE) Side Entering Agitator, Plenty Swivel Type 29P-STM 60 hp / 85 mm shaft	450	250				
1700	E-170	Existing AHE-700 Fired HTF Heater, 7 MMBtu/hr output	575	150				
2010	E-201	Finned Pipe Tank Heater, 4 x AH-3-6-28, 3000 ft2 total	575	150	672		672	258
2020	E-202	Finned Pipe Tank Heater, 4 x AH-3-6-28, 3000 ft2 total	575	150	672		672	258
2110	E-211	Finned Pipe Tank Heater, 4 x AH-3-6-28, 3000 ft2 total	575	150	672		672	258
2120	E-212	Finned Pipe Tank Heater, 4 x AH-3-6-28, 3000 ft2 total	575	150	672		672	258
2700	E-270	Fired HTF Heater AHE-1000 derated to 10MMBtu input, ~7hp blower, 2hp oil pump, etc ?	575	150	627		627	415

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
3100	E-310	Nitrogen Evaporator, 3000 SCFH	100	120				
2200	P-220	Pitch Transfer Pump, Viking 223 QS 300 gpm @ 130 psid / 350 rpm, 40 hp /1750 rpm Was Rotan size 152, 312 gpm @ 130 psid / 280 rpm, 50 hp / 1750 rpm	550	150				
2250	P-225	Pitch Transfer Pump, Viking 223 QS 300 gpm @ 130 psid / 350 rpm, 40 hp /1750 rpm Was Rotan size 152, 312 gpm @ 130 psid / 280 rpm, 50 hp / 1750 rpm	550	150				
2300	P-230	Pitch Transfer Pump, Viking 223 QS 300 gpm @ 130 psid / 350 rpm, 40 hp /1750 rpm Was Rotan size 152, 312 gpm @ 130 psid / 280 rpm, 50 hp / 1750 rpm	550	150				
2350	P-235	Dock Pitch Evacuator Pump, Viking 4223 K 25 gpm @ 120 psid / rpm Was Rotan size 33 13 gpm @ 120 psid, 3 hp / 1750 rpm	550	130				
2380	P-238	Tank Riser Pitch Evacuator Pump, Viking 4223 K 25 gpm @ 120 psid / rpm Was Rotan size 33 13 gpm @ 120 psid, 3 hp / 1750 rpm	550	130				
2450	P-245	HO Fill & Drain Pump 25 gpm @ 75' head, 1x3x8.5, 2hp / 1750 rpm	575	150				5
2550	P-255	HO Drain Transfer Pump 25 gpm @ 75' head, 1x3x8.5, 2hp / 1750 rpm	575	150				5
2600	P-260	Primary Hot Oil Pump 410 gpm @ 290' head, 3x4x8.5, 50 hp/ 3500 rpm	575	150				10
2650	P-265	Primary Hot Oil Pump 410 gpm @ 290' head, 3x4x8.5, 50 hp/ 3500 rpm	575	150				10
2750	P-275	Unload Line Hot Oil Pump 32 gpm @ 320' head, 2x3x9, 15hp / 3500 rpm	575	150				10
2800	P-280	Pitch Transfer Lines Hot Oil Pump 30 gpm @ 82' head, 2x3x9, 3hp / 1750 rpm	575	150				10
2850	P-285	E201, 202 Hot Oil Pump 235 gpm @ 53' head, 3x4x7.5, 5hp / 1750 rpm	575	150				10
2900	P-290	E211, 212 Hot Oil Pump 235 gpm @ 53' head, 3x4x7.5, 5hp / 1750 rpm	575	150				10
3200	P-320	Containment Sump Pump, 60 gpm@___ ' head, 2" discharge 2 hp	100	15				
2210	S-221	Pitch Pump Strainer - Viking	550	75	3		3	
2260	S-226	Pitch Pump Strainer - Viking	550	75	3		3	
2310	S-231	Pitch Pump Strainer - Viking	550	75	3		3	

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
2360	S-236	Pitch Pump Strainer - Viking	550	75	3		3	
2390	S-239	Pitch Pump Strainer - Viking	550	75	3		3	
2000	T-200	Liquid Pitch Tank	550	2 / +4 " WC				
2100	T-210	Liquid Pitch Tank	550	2 / +4 " WC				
2400	T-240	HTF Expansion Tank, 2000 gal, 30 psig	575	30				
2500	T-250	HTF Drain & Charging Tank 2000 gal, atm.	575	atm				
3000	T-300	3000 gal, 400 MSCF Bulk Nitrogen Storage Tank	100					
	TOTAL Lengths & Volumes				**19855**	10,465	21,251	3,170

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VALVE LIST - Project # 6526 KOPPERS Industries, Inc. Portland, OR - LIQUID PITCH UNLOADING

Note: Valves with limit switches and/or operators are per Instrument Specifications

Note: Missing Valve Numbers indicate either "Future" or number not used.

Valve #	Valve Size	Line #	P&ID	Comm	Valve Type	Notes	Line Tag	Line Description
	inches			Service				
V001	2	222	10	1	Gate		1-222-1-2/40-O-M/3	Dock Evacuator Pump P-235 Suction
V002	2	223	10	1	Gate		1-223-1-2/40-O-M/3	Dock Evacuator Pump P-235 Discharge
V003	1	201	10	1	HEX Sample	See Pipe Spec.	1-201-1-8/40-O-M/6	Pitch Ship Unloading Line, Dock to Shore
V004						Unused, duped V041	#N/A	#N/A
V005	8	203	4	1	Spectacle Blind		1-203-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-200 Top Nozzle
V006	3	270	6	3	Globe		3-270-1-3/40-P-C/3	P-280 HO Supply
V007	8	213	4	1	Spectacle Blind		1-213-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-210 Top Nozzle
V008	2	224	4	1	Gate		1-224-1-2/40-O-M/3	Evacuator Pump P-238 Suction
V009	2	213	4	1	Gate		1-213-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-210 Top Nozzle
V010	2	225	4	1	Gate		1-225-1-2/40-O-M/3	Evacuator Pump P-238 Discharge
V011	8	208	4	2	Butterfly	Teflon Lined	2-208-1-8/40-S-F/3	T-200 Vent to Tee
V012		218				RESERVED for FUTURE	2-218-1-8/40-S-F/3	T-210 Vent to Tee
V013						RESERVED for FUTURE	#N/A	#N/A
V014	2	233	4	6	Ball		6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V015	2	233	4	6	Ball		6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V016	6	204	4	1	Gate	w/Gear Operator	1-204-1-6/40-O-M/4	T-200 Pitch Outlet, P-220 Suction & Disch to Reducer
V017	6	214	4	1	Gate	RESERVED for FUTURE	1-214-1-6/40-O-M/4	T-210 Pitch Outlet, P-230 Suction & Disch to Reducer
V018	1	205	4	1	HEX Sample	See Pipe Spec.	1-205-1-6/40-O-M/4	T-200 Pitch Outlet, P-225 Suction & Disch to Reducer
V019						RESERVED for FUTURE	#N/A	#N/A
V020	6	205	4	1	Gate	w/Gear Operator	1-205-1-6/40-O-M/4	T-200 Pitch Outlet, P-225 Suction & Disch to Reducer
V021	6	215	4	1	Gate	RESERVED for FUTURE	1-215-1-6/40-O-M/4	T-210 Pitch Outlet, P-225 Suction to Tee
V022	6	205	4	1	Gate	w/Gear Operator	1-205-1-6/40-O-M/4	T-200 Pitch Outlet, P-225 Suction & Disch to Reducer
V023	6	215	4	1	Gate	w/Gear Operator	1-215-1-6/40-O-M/4	T-210 Pitch Outlet, P-225 Suction to Tee
V024	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V025	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V026	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V027	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V028	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V029	4	207	4	1	Gate	w/Hand Wheel	1-207-1-4/40-O-M/3	T-200 Pitch Recirculation to Top Fill Riser
V030	4	207	4	1	Gate	w/Hand Wheel	1-207-1-4/40-O-M/3	T-200 Pitch Recirculation to Top Fill Riser
V031	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V032	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V033	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V034	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V035	4	217	4	1	Gate	RESERVED for FUTURE	1-217-1-4/40-O-M/3	T-210 Pitch Recirculation to Top Fill Riser
V036	4	217	4	1	Gate	RESERVED for FUTURE	1-217-1-4/40-O-M/3	T-210 Pitch Recirculation to Top Fill Riser
V037	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V038	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V039	4	216	4	1	Gate	w/Hand Wheel	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V040	4	221	4	1	Gate	w/Hand Wheel	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V041	4	221	4	1	Wedge-Plug	w/Hand Wheel	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V042	3	221	4	1	Wedge-Plug	Existing-Recondition	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V043	3	221	4	1	Wedge-Plug	Existing-Recondition	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V044	3	221	4	1	Wedge-Plug	Existing-Recondition	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V045	3	221	4	1	Wedge-Plug	Existing-Recondition	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V046	4	221	4	1	Wedge-Plug	w/Hand Wheel	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V047	1	242	5	3	Gate		3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction
V048	3	242	5	3	Gate		3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction

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Valve #	Valve Size	Line #	P&ID	Comm Service	Valve Type	Notes	Line Tag	Line Description
	inches							
V049	1	243	5	3	Globe	Throttling Valve for Drum Transfer	3-243-2-1/40-P-M/3	P-245 HO Discharge
V050	1	243	5	3	Gate		3-243-2-1/40-P-M/3	P-245 HO Discharge
V051	1	243	5	3	Check		3-243-2-1/40-P-M/3	P-245 HO Discharge
V052	1	240	5	3	Gate		3-240-2-1/40-P-M/2	T-240 & T-250 HO Fill
V053	1	240	5	3	Gate		3-240-2-1/40-P-M/2	T-240 & T-250 HO Fill
V054	3	242	5	3	Gate	Could be 3" with reducer on tank	3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction
V055	4	268	5	3	Gate	Was listed as in 244	3-268-1-4/40-P-M/3	P-260 Startup Suction From T-240
V056	4	245	5	3	Gate		3-245-1-4/40-P-M/3	Primary HO Pump Suction Header From TP-36
V057	4	246	5	3	Gate		3-246-1-4/40-P-M/3	P-260 Suction
V058	4	245	5	3	Gate		3-245-1-4/40-P-M/3	Primary HO Pump Suction Header From TP-36
V059	4	250	5	3	Gate		3-250-1-4/40-P-M/3	Primary HO Pump Discharge Header, Bypass to TP-32 Cross-Connect
V060	4	247	5	3	Gate		3-247-1-4/40-P-M/3	P-265 Suction
V061	4	254	5	3	Gate	Was 4" in 249	3-254-1-4/40-P-M/3	Primary HO Return Header
V062	4	248	5	3	Check	P-260 Backflow prevention	3-248-1-4/40-P-M/3	P-260 Discharge
V063	1	246	5	3	Gate	Can Eliminate - Use V194 On Stra	3-246-1-4/40-P-M/3	P-260 Suction
V064	4	249	5	3	Check	P-265 Backflow prevention	3-249-1-4/40-P-M/3	P-265 Discharge
V065	1	247	5	3	Gate	Can Eliminate - Use V198 On Stra	3-247-1-4/40-P-M/3	P-265 Suction
V066	4	248	5	3	Globe		3-248-1-4/40-P-M/3	P-260 Discharge
V067	4	249	5	3	Globe		3-249-1-4/40-P-M/3	P-265 Discharge
V068	4	250	5	3	Gate	Was listed as in 248	3-250-1-4/40-P-M/3	Primary HO Pump Discharge Header, Bypass to TP-32 Cross-Connect
V069	4	250	5	3	Gate	Was listed as in 248	3-250-1-4/40-P-M/3	Primary HO Pump Discharge Header, Bypass to TP-32 Cross-Connect
V070	4	251	5	3	Gate		3-251-1-4/40-P-M/3	HO Inlet to E-270 Fired Heater
V071	4	252	5	3	Globe	Was listed as 3" in 253	3-252-1-4/40-P-M/3	E-270 Outlet to TP-33 Cross-Connect
V072	4	244	5	3	Gate	PSV-2193 Bypass	3-244-1-4/40-P-M/3	Primary HO Suction Head From TP-31
V073	3	260	6	3	Gate		3-260-1-3/40-P-C/3	P-275 HO Supply
V074	3	260	6	3	Gate		3-260-1-3/40-P-C/3	P-275 HO Supply
V075	3	260	6	3	Globe		3-260-1-3/40-P-C/3	P-275 HO Supply
V076	3	260	6	3	Gate		3-260-1-3/40-P-C/3	P-275 HO Supply
V077	2	262	6	3	Globe		3-262-1-2/40-P-C/3	P-275 Pump Bypass
V078	2	261	6	3	Globe	300# Flanges	3-261-1-2/40-P-M/3	P-275 HO Discharge
V079	2	266	6	3	Gate		3-266-1-2/40-P-C/3	P-275 HO Recirculation
V080	2	266	6	3	Check		3-266-1-2/40-P-C/3	P-275 HO Recirculation
V081	1	267	6	3	Gate		3-267-2-1/40-P-C/2	P-275 Drain Connector
V082	2	265	6	3	Globe		3-265-1-2/40-P-M/3	P-275 HO Return
V083	1	264	6	3	Gate	Typical for Multiple Vents	3-264-1-1.5/40-T	Main Unloading Line Return Trace
V084	3	270	6	3	Gate		3-270-1-3/40-P-C/3	P-280 HO Supply
V085	3	270	6	3	Gate		3-270-1-3/40-P-C/3	P-280 HO Supply
V086	3	270	6	3	Gate		3-270-1-3/40-P-C/3	P-280 HO Supply
V087	2	272	6	3	Globe		3-272-1-2/40-P-C/3	P-280 Pump Bypass
V088	2	271	6	3	Globe	300# Flanges	3-271-1-2/40-P-M/3	P-280 HO Discharge
V089	2	276	6	3	Gate		3-276-1-2/40-P-C/3	P-280 HO Recirculation
V090	2	276	6	3	Check		3-276-1-2/40-P-C/3	P-280 HO Recirculation
V091	1	277	6	3	Gate		3-277-2-1/40-P-C/2	P-280 Drain Connector
V092	2	275	6	3	Globe		3-275-1-2/40-P-M/3	P-280 HO Return
V093	1	274	6	3	Gate	High Point Vent on T-200	3-274-1-1.5/40-T	Tank Area Pitch Line Return & Transfer Line Trace
V094	3	280	6	3	Gate		3-280-1-3/40-P-C/3	P-285 HO Supply
V095	3	280	6	3	Gate		3-280-1-3/40-P-C/3	P-285 HO Supply
V096	3	280	6	3	Gate		3-280-1-3/40-P-C/3	P-285 HO Supply
V097	3	282	6	3	Globe		3-282-1-3/40-P-C/3	P-285 Pump Bypass
V098	3	283	6	3	Globe	300# Flanges	3-283-1-3/40-P-M/3	T-200 Heater HO Supply
V099	3	283	6	3	Gate	Was Globe	3-283-1-3/40-P-M/3	T-200 Heater HO Supply
V100	3	308	6	3	Globe		3-308-1-3/40-N	T-200 Internal Supply / Return to E201
V101	3	309	6	3	Globe		3-309-1-3/40-N	T-200 Internal Supply / Return to E202
V102	3	283	6	3	Gate	Was Globe	3-283-1-3/40-P-M/3	T-200 Heater HO Supply
V103	1	288	6	3	Gate	Was Globe	3-288-2-1/40-P-M/2	T-200 HO Drain Connector

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Valve #	Valve Size	Line #	P&ID	Comm	Valve Type	Notes	Line Tag	Line Description
	inches			Service				
V104	1	284	6	3	Gate	High Point Vent	3-284-1-3/40-P-M/3	T-200 Heater HO Return
V105	3	286	6	3	Gate		3-286-1-3/40-P-C/3	P-285 HO Recirculation
V106	3	286	6	3	Check		3-286-1-3/40-P-C/3	P-285 HO Recirculation
V107	1	287	6	3	Gate		3-287-2-1/40-P-C/2	P-285 Drain Connector
V108	3	280	6	3	Globe		3-280-1-3/40-P-C/3	P-285 HO Supply
V109	3	284	6	3	Globe		3-284-1-3/40-P-M/3	T-200 Heater HO Return
V110	3	290	6	3	Gate	RESERVED for FUTURE	3-290-1-3/40-P-C/3	P-290 HO Supply
V111	3	290	6	3	Gate	RESERVED for FUTURE	3-290-1-3/40-P-C/3	P-290 HO Supply
V112	3	290	6	3	Globe	RESERVED for FUTURE	3-290-1-3/40-P-C/3	P-290 HO Supply
V113	3	290	6	3	Globe	RESERVED for FUTURE	3-290-1-3/40-P-C/3	P-290 HO Supply
V114	3	292	6	3	Globe	RESERVED for FUTURE	3-292-1-3/40-P-C/3	P-290 Pump Bypass
V115	3	293	6	3	Gate	RESERVED for FUTURE	3-293-1-3/40-P-M/3	T-210 Heater HO Supply
V116	3	314	6	3	Globe	RESERVED for FUTURE	3-314-1-3/40-N	T-210 Internal Supply / Return to E211
V117	3	314	6	3	Globe	RESERVED for FUTURE	3-314-1-3/40-N	T-210 Internal Supply / Return to E211
V118	3	314	6	3	Gate	RESERVED for FUTURE	3-314-1-3/40-N	T-210 Internal Supply / Return to E211
V119	3	315	6	3	Gate	RESERVED for FUTURE	3-315-1-3/40-N	T-210 Internal Supply / Return to E212
V120	1	298	6	3	Gate	Isolation for FUTURE	3-298-1-1/40-P-M/2	T-210 HO Drain Connector
V121	1	293	6	3	Gate	RESERVED for FUTURE Vent	3-293-1-3/40-P-M/3	T-210 Heater HO Supply
V122	3	296	6	3	Gate	RESERVED for FUTURE	3-296-1-3/40-P-C/3	P-290 HO Recirculation
V123	3	296	6	3	Check	RESERVED for FUTURE	3-296-1-3/40-P-C/3	P-290 HO Recirculation
V124	1	297	6	3	Gate	Isolation for FUTURE	3-297-2-1/40-P-C/2	P-290 Drain Connector
V125	3	294	6	3	Gate	Isolation for FUTURE	3-294-1-3/40-P-M/3	T-210 Heater HO Return
V126	3	253	6	3	Gate		3-253-1-3/40-P-M/3	Primary HO Supply Header
V127	3	253	6	3	Globe		3-253-1-3/40-P-M/3	Primary HO Supply Header
V128	3	253	6	3	Gate		3-253-1-3/40-P-M/3	Primary HO Supply Header
V129	4	254	6	3	Gate		3-254-1-4/40-P-M/3	Primary HO Return Header
V130			6	3		Chk Vlv Deleted 10/1/98		
V131	2	255	6	3	Gate		3-255-2-2/40-P-C/3	HO Drain Header
V132	1	256	6	3	Globe		3-256-2-1/40-P-M/2	P-255 Drain Pump Discharge
V133	1	283	6	3	Gate	Drain	3-283-1-3/40-P-M/3	T-200 Heater HO Supply
V134	3	290	6	3	Gate	Isol for Future Exp.	3-290-1-3/40-P-C/3	P-290 HO Supply
V135	2	232	7	6	Ball		6-232-2-2/40-N	Nitrogen Supply to T-200 Reducer
V136	2	229	7	6	Ball		6-229-2-2/40-N	Nitrogen to Operate HO Valves
V137	2	238	7	6	Ball		6-238-2-2/40-N	Nitrogen Supply to T-240 Reducer
V138	2	230	7	6	Ball		6-230-2-2/40-N	Nitrogen to operate valves near T-200 & T-210
V139	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V140	2	333	8	11	Gate		11-333-2-2/40-H-M/1.5	Steam Supply to Maintenance Building from TP-112
V141	2	330	8	4	Gate		4-330-5-2/40-N	Tank Area Sump Discharge Piping to TP 41
V142	2	330	8	4	Check		4-330-5-2/40-N	Tank Area Sump Discharge Piping to TP 41
V143	3	324	9	3	Globe		3-324-1-3/40-P-M/3	Pump P-4 Recirculation Line
V144	3	324	9	3	Check		3-324-1-3/40-P-M/3	Pump P-4 Recirculation Line
V145	4	321	9	3	Globe		3-321-1-4/40-P-M/3	Pump P-1 Recirculation Line
V146	4	321	9	3	Check		3-321-1-4/40-P-M/3	Pump P-1 Recirculation Line
V147	4	323	9	3	Check		3-323-1-4/40-P-M/3	Pump P-3 Recirculation Line
V148	1	255	6	3	Gate	Drain	3-255-2-2/40-P-C/3	HO Drain Header
V149	1	254	6	3	Gate	Vent	3-254-1-4/40-P-M/3	Primary HO Return Header
V150	1	253	6	3	Gate	Vent	3-253-1-3/40-P-M/3	Primary HO Supply Header
V151	1	254	6	3	Gate	Vent	3-254-1-4/40-P-M/3	Primary HO Return Header
V152						RESERVED for FUTURE	#N/A	#N/A
V153	1	233	4	6	Ball	Purge Flow	6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V154	2	233	4	6	Ball		6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V155						RESERVED for FUTURE	#N/A	#N/A
V156	1	234	4	6	Ball	Purge Flow	6-234-2-1/40-N	Nitrogen Purge to PT on T-200 nozzle W
V157						RESERVED for FUTURE	#N/A	#N/A
V158						RESERVED for FUTURE	#N/A	#N/A

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Valve #	Valve Size	Line #	P&ID	Comm	Valve Type	Notes	Line Tag	Line Description
	inches			Service				
V159	1	218	4	11		RESERVED for FUTURE	2-218-1-8/40-S-F/3	T-210 Vent to Tee
V160	1	236	4	6	Ball	RESERVED for FUTURE	6-236-2-2/40-N	Reduced Pressure Nitrogen Supply to T-210
V161	4	234	4	6	Ball	RESERVED for FUTURE	6-234-2-1/40-N	Nitrogen Purge to PT on T-200 nozzle W
V162	1	236	4	6	Ball	RESERVED for FUTURE	6-236-2-2/40-N	Reduced Pressure Nitrogen Supply to T-210
V163	1	239	5	6	Ball		6-239-2-1/40-N	Reduced Pressure Nitrogen Blanket to T-240
V164	1	241	5	3	Gate		3-241-2-1/40-P-M/2	T-240 HO Overflow
V165	2	227	5	5	Ball		5-227-3-2/40-N	Fuel Gas to E-270
V166	4	253	5	3	Gate		3-253-1-3/40-P-M/3	Primary HO Supply Header
V167	1	288	6	3	Gate	Was Globe	3-288-2-1/40-P-M/2	T-200 HO Drain Connector
V168	2	325	9	3	Globe		3-325-1-2/40-P-M/3	Pump P-5 / 6 Recirculation Line
V169	2	325	9	3	Check		3-325-1-2/40-P-M/3	Pump P-5 / 6 Recirculation Line
V170						RESERVED for FUTURE	#N/A	#N/A
V171						RESERVED for FUTURE	#N/A	#N/A
V172	1	202	10	1	Gate	Plugged Vent	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V173	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V174	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V175	1	202	10	1	Gate	Plugged Vent	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V176	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V177	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V178	1	202	10	1	Gate	Plugged Vent	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V179	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V180	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V181	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V182	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V183	1	331	8	11	Globe		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V184	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V185	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V186	1	331	8	11	Gate	Isolation for FUTURE T-210	11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V187						RESERVED for FUTURE	#N/A	#N/A
V188						RESERVED for FUTURE	#N/A	#N/A
V189						RESERVED for FUTURE	#N/A	#N/A
V190	1	206	4	1	Gate	On PI-2046	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V191	1	211	4	1	Gate	On PI-2056	1-211-1-4/40-O-M/3	P-225 Pitch Discharge to Header
V192	1	2400	5	6	Gate	On PI-2125	T-240	HTF Expansion Tank, 2000 gal, 30 psig
V193	1	246	5	3	Gate	On PI-2101	3-246-1-4/40-P-M/3	P-260 Suction
V194	1	246	5	3	Gate	On S-261	3-246-1-4/40-P-M/3	P-260 Suction
V195	1	246	5	3	Gate	On PI-2102	3-246-1-4/40-P-M/3	P-260 Suction
V196	1	248	5	3	Gate	On P-2103	3-248-1-4/40-P-M/3	P-260 Discharge
V197	1	247	5	3	Gate	On PI-2111	3-247-1-4/40-P-M/3	P-265 Suction
V198	1	247	5	3	Gate	On S-266	3-247-1-4/40-P-M/3	P-265 Suction
V199	1	247	5	3	Gate	On PI-2112	3-247-1-4/40-P-M/3	P-265 Suction
V200	1	249	5	3	Gate	On PI-2113	3-249-1-4/40-P-M/3	P-265 Discharge
V201	1	242	5	3	Gate	On S-246	3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction
V202	1	260	6	3	Gate	On PI-2151	3-260-1-3/40-P-C/3	P-275 HO Supply
V203	1	260	6	3	Gate	On S-276	3-260-1-3/40-P-C/3	P-275 HO Supply
V204	1	260	6	3	Gate	On PI-2152	3-260-1-3/40-P-C/3	P-275 HO Supply
V205	1	261	6	3	Gate	On PI-2153	3-261-1-2/40-P-M/3	P-275 HO Discharge
V206	1	265	6	3	Gate	On PI-2158	3-265-1-2/40-P-M/3	P-275 HO Return
V207	1	270	6	3	Gate	On PI-2161	3-270-1-3/40-P-C/3	P-280 HO Supply
V208	1	270	6	3	Gate	On S-281	3-270-1-3/40-P-C/3	P-280 HO Supply
V209	1	270	6	3	Gate	On PI-2162	3-270-1-3/40-P-C/3	P-280 HO Supply
V210	1	273	6	3	Gate	On PI-2163	3-273-1-1.5/40-T	Tank Area Pitch Line Supply & Transfer Line Trace
V211	1	275	6	3	Gate	On PI-2168	3-275-1-2/40-P-M/3	P-280 HO Return
V212	1	280	6	3	Gate	On PI-2171	3-280-1-3/40-P-C/3	P-285 HO Supply
V213	1	280	6	3	Gate	On S-286	3-280-1-3/40-P-C/3	P-285 HO Supply

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Valve #	Valve Size	Line #	P&ID	Comm	Valve Type	Notes	Line Tag	Line Description
	inches			Service				
V214	1	280	6	3	Gate	On PI-2172	3-280-1-3/40-P-C/3	P-285 HO Supply
V215	1	281	6	3	Gate	On PI-2173	0-281-0-0/0--/0	Replaced by 3" 283
V216	1	285	6	3	Gate	On PI-2178	0-285-0-0/0--/0	Replaced by 3" 284
V217	1	253	6	3	Gate	On PI-2107	3-253-1-3/40-P-M/3	Primary HO Supply Header
V218	1	254	6	3	Gate	On PI-2190	3-254-1-4/40-P-M/3	Primary HO Return Header
V219	1	255	6	3	Gate	On S-256	3-255-2-2/40-P-C/3	HO Drain Header
V220	1	255	6	3	Gate	On PI-2191	3-255-2-2/40-P-C/3	HO Drain Header
V221	1	256	6	3	Gate	On PI-2192	3-256-2-1/40-P-M/2	P-255 Drain Pump Discharge
V222	1	305	6	3	Gate		3-305-1-1/40-T	T-200 Outlet & P-225 Jacket
V223	1	306	6	3	Gate		3-306-1-1/40-T	T-200 Unloading Riser & Roof Nozzle Trace
V224	1	307	6	3	Gate		3-307-1-1/40-T	T-200 Recirculation Trace & P-220 Jacket
V225	1	310	6	3	Gate		3-310-1-1/40-T	T-200 Shell Nozzle Jackets
V226	1.5	273	6	3	Gate		3-273-1-1.5/40-T	Tank Area Pitch Line Supply & Transfer Line Trace
V227	1.5	274	6	3	Gate		3-274-1-1.5/40-T	Tank Area Pitch Line Return & Transfer Line Trace
V228	1	310	6	3	Globe		3-310-1-1/40-T	T-200 Shell Nozzle Jackets
V229	1	307	6	3	Globe		3-307-1-1/40-T	T-200 Recirculation Trace & P-220 Jacket
V230	1	306	6	3	Globe		3-306-1-1/40-T	T-200 Unloading Riser & Roof Nozzle Trace
V231	1	305	6	3	Globe		3-305-1-1/40-T	T-200 Outlet & P-225 Jacket
V232	1	233	4	6	Gate	On PI-2013	6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V233	1	222	10	1	Gate	On S-236	1-222-1-2/40-O-M/3	Dock Evacuator Pump P-235 Suction
V234	8	203	4	1	Gate	Riser Block Valve, Lock Open	1-203-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-200 Top Nozzle
V235	8	213	4	1	Gate	FUTURE Riser Block Valve, Lock	1-213-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-210 Top Nozzle
V236	4	151	9	3	Check	P-2 Backflow prevention	#N/A	#N/A
V237	1	2500	5	3	Gate	LT-2124 Isolation	T-250	HTF Drain & Charging Tank 2000 gal, atm.
V238	1	2500	5	3	Gate	LT-2124 Isolation	T-250	HTF Drain & Charging Tank 2000 gal, atm.
V239						UNUSED	#N/A	#N/A
V240	2	333	8	11	Gate		11-333-2-2/40-H-M/1.5	Steam Supply to Maintenance Building from TP-112
V241	1	225	4	1	Gate	PI Isolation	1-225-1-2/40-O-M/3	Evacuator Pump P-238 Discharge
V242	1	223	10	1	Gate	PI Isolation	1-223-1-2/40-O-M/3	Dock Evacuator Pump P-235 Discharge
Relief, Control, and Remote Operated Valves, and Hand Valves with Position Indication, Listed in the Instrumet List, are in addtioton to those listed here.								
Additional valves are required for Standard Configuration Steamouts and Component Drains but are not numbered or Listed. See P&ID and Piping Drawings for Locations.								

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No.	ChemTech Line or Equipment	Interfacing Line or Equipment	Service	Existing System	New System	Piping Dwg.No.	P&ID Dwg. No.	Comments
TP-11	221 / V046	Header to T-65 & T-68	Pitch	Header to T-65 & T-68	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-12	221 / V045	Rail car loading thru mass flow meter	Pitch	Rail car loading thru mass flow meter	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-13	221 / V044	Flow meter bypass	Pitch	Flow meter bypass	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-14	221 / V043	Rail car unloading pump discharge	Pitch	Rail car unloading pump discharge	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-15	221 / V042	Spare	Pitch	Spare	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-16	T-200 Nozzle D	203	Pitch		Inlet nozzle @ tank T-200	JCMC 97010-36	6526-D004	Chemtech's Tie-Point with marine engineer's piping
TP-17	207	203	Pitch		Top Pitch Recirc to T-200	JCMC 97010-36	6526-D004	Chemtech's Tie-Point with marine engineer's piping
TP-18	224	203	Pitch		Pitch unload line Drain	JCMC 97010-37	6526-D004	Chemtech's Tie-Point with marine engineer's piping
TP-21	220	Fume header to scrubber	Coal Tar Vent Fumes	Fume header to scrubber	Tank T-200 & T-210		6526-D004	
TP-31	257	E-170 Heater PRV Discharge	Hot Oil	E-170 Heater PRV Discharge	E-270 Heater PRV Discharge		6526-D005	Provides parallel operation of Existing and New Hot Oil Systems
TP-32	250	E-170 hot oil heater inlet	Hot Oil	Existing hot oil heater inlet	New hot oil heater inlet		6526-D005	Provides parallel operation of Existing and New Hot Oil Systems
TP-33	252	E-170 Outlet	Hot Oil	Existing hot oil heater outlet	New hot oil heater outlet		6526-D005	Provides parallel operation of Existing and New Hot Oil Systems
TP-34	T-240 Nozzle C	Existing 4" from 12" Return Header	Hot Oil	Existing expansion tank inlet	T-240 Nozzle C		6526-D005	
TP-35	T-240 Nozzle A	Existing Startup Outlet Line	Hot Oil	Existing expansion tank Startup outlet	T-240 Nozzle A		6526-D005	
TP-36	268	Existing Startup Outlet Line	Hot Oil	Existing Startup Circulation at P-2 suction	New primary pump return header		6526-D005	
TP-37 (was TP-321)	245	Existing HO Return Header	Hot Oil	New 4" Flange on Existing 12" hot oil Return Header end cap	New hot oil return header		6526-D005 / 6526-D009	Common HO Supply to New and Existing Ssytems
TP-38	261	263	Hot Oil		Ship unloading trace line		6526-D006	Chemtech's Tie-Point with marine engineer's piping
TP-39	265	264	Hot Oil		Ship unloading trace line		6526-D006	Chemtech's Tie-Point with marine engineer's piping
TP-41	330	Existing storm water header	Rain Water	Existing storm water header	Dike area sump pump P-320		6526-D008	
TP-51	227	Existing natural gas header	Natural Gas	Existing natural gas header downstream of gas meter	Natural gas supply to new hot oil heater		6526-D005	
TP-111	331	Existing steam header adjacent to fume header	Steam	Existing steam header adjacent to fume header	Steam trace for new fume header		6526-D008	
TP-112	333	Existing steam header at pitch storage building	Steam	Existing steam header at pitch storage building	Steam line to new maintenance building		6526-D008	
TP-311	TV-2141	Pump P-1 suction	Hot Oil	Pump P-1 suction	New control valve		6526-D009	New temperature control valve @ P-1 suction
TP-312	321	Pump P-1 suction	Hot Oil	Pump P-1 suction	New bypass line		6526-D009	New bypass line around Pump P-1
TP-313	321	T-65 coils hot oil return	Hot Oil	T-65 coils hot oil return	New bypass line		6526-D009	New bypass line around Pump P-1
TP-314	TE-2141	Pump P-1 suction	Hot Oil	Pump P-1 suction	New temperature transmitter		6526-D009	New temperature transmitter @ P-1 suction

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No.	ChemTech Line or Equipment	Interfacing Line or Equipment	Service	Existing System	New System	Piping Dwg.No.	P&ID Dwg. No.	Comments
TP-321 (Now TP-37)	245	Existing HO Return Header	Hot Oil	New 4" Flange on Existing 12" hot oil Return Header end cap	New hot oil return header		6526-D009	Control modifications to existing hot oil system
TP-323	FE-2145	Existing hot oil heater inlet pipe	Hot Oil	Existing hot oil heater inlet pipe	New flow meter		6526-D005	New vortex flowmeter on existing hot oil heater inlet pipe
TP-331	TV-2143	Pump P-3 suction	Hot Oil	Pump P-3 suction	New control valve		6526-D009	New temperature control valve @ P-3 suction
TP-332	V147	Pump P-3 bypass line	Hot Oil	Pump P-3 bypass line	New check valve		6526-D009	New check valve in bypass line around Pump P-3
TP-334	TE-2143	Pump P-3 suction	Hot Oil	Pump P-3 suction	New temperature transmitter		6526-D009	New temperature transmitter @ P-3 suction
TP-341	TV-2144	Pump P-4 suction	Hot Oil	Pump P-4 suction	New control valve		6526-D009	New temperature control valve @ P-4 suction
TP-342	324	Pump P-4 suction	Hot Oil	Pump P-4 suction	New bypass line		6526-D009	New bypass line around Pump P-4
TP-343	324	T-68 heaters hot oil return	Hot Oil	T-68 heaters hot oil return	New bypass line		6526-D009	New bypass line around Pump P-4
TP-344	TE-2144	Pump P-4 suction	Hot Oil	Pump P-4 suction	New temperature transmitter		6526-D009	New temperature transmitter @ P-4 suction
TP-351	TV-2146	Pump P-5 / P-6 suction	Hot Oil	Pump P-5 suction	New control valve		6526-D009	New temperature control valve @ P-5 suction
TP-352	325	Pump P-5 / P-6 suction	Hot Oil	Pump P-5 suction	New bypass line		6526-D009	New bypass line around Pumps P-5 & P-6
TP-353	325	Hot oil return line to existing 12" header	Hot Oil	Hot oil return line to existing 12" header	New bypass line		6526-D009	New bypass line around Pumps P-5 & P-6
TP-354	TE-2146	Pump P-5 / P-6 suction	Hot Oil	Hot oil return line to existing 12" header	New bypass line		6526-D009	New bypass line around Pumps P-5 & P-6
TP-355	V236	Pump P-2 Discharge	Hot Oil	Prevent Back Flow in Parallel Opn.			6526-D005	

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PIPELINE SPECIFICAITON AND MATERIALS OF CONSTRUCTION

Per drawing 6526-D002, code "C" on the P&ID's specifies the following

1 = Carbon Steel, Butt Welded
2 = Carbon Steel Socket Welded
3 = Carbon Steel, Threaded
4 = Stainless Steel Tubing
5 = Galvanized, threaded

This specifications further defines these piping code "C"'s.

1 = CARBON STEEL, BUTT WELDED

This specification generally applies to the **Pitch, Fume and the Hot Oil** piping that is 2" IPS and larger. This specification also applies to the **Hot Oil Tracer** piping **attached** to a Pitch pipe and **inside** the insulation.

Design Criteria	Max Temperature	Max Pressure
Pitch Piping	550°F	130 psig
Hot Oil Piping	575°F	130 psig
Fume Piping	400°F	30 psig

Pipe		Seamless ASTM A-106,Grade "B"	
Fittings		Butt weld	A-234, Grade "B"
Flanges		150# ANSI B-16.5, ASTM A-150.	
Gaskets		Flexitallic style CG Filler, Flexite/Metal -304L gaskets	
Flange Bolts		Alloy studs, ASTM A-193 Gr. B-7 & American Std. Heavy Duty Hex Nuts, A-194, class 2H.	
Valves	2" and above		150# Flanged Gate or Globe with Stellite Trim For Pitch service, see the Piping drawings for valve selection.
	8" Fume	Butterfly	All wetted parts - Teflon - Garlock's "Gar-Seal 100 Series"
	Pitch Sample Valve		Use HEX Sample Valve, 316 SS construction, graphite packing, Model HS311U5141213 made by Richards Industries and supplied by Gilson Engineering Sales Voice 412-369-0100 or fax 412-369-1728

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	Pitch	4"	Pacific Wedge Plug Model HA-71-S (Hand Operator w/Steam Jacket.
	Pitch	6 & 8"	Pacific Wedge Plug Model GA-71-S (Gear Operator w/Steam Jacket
Control Valves			150# Flanged Globe Valves For Pitch service, see the Piping drawings for valve selection.
	8" Fume	Butterfly	All wetted parts - Teflon - Garlock "Gar-Seal 100 Series"
Pitch Strainers			Ductile iron, 150# flanged, strainer with no wire mesh in basket.
Hot Oil Strainers			Forged Steel, Socket Weld in Piping, Bolted Flange cover for strainer removal. Strainer 40 mesh.
Flexible Metal Hose for Pump Suction			150# S.O., R/F, Flanged Microflex, MSS 301, 321 stainless Steel wetted surfaces

Tracers - Hot Oil Piping attached to Pitch Piping.

Pitch Piping 4" and smaller

One or two 1" pipe tracers, banded on 18" centers with stainless steel bands, 3/4" wide. Butt welded inside insulation and socket welded outside insulation. See drawing 6526-P013 for the number of tracers.

Pitch Piping 6" and larger.

One or two 1 1/2" pipe tracers banded on 18" centers with stainless steel bands, 3/4" wide. Butt welded inside insulation and socket welded outside insulation. See drawing 6526-P013 for the number of tracers.

Every effort shall be made to fit the tracer piping to the contour of the pitch pipe. Welds shall be made with the minimum excess surface bead. The weld area of the surface of the tracer pipe that contacts the pitch pipe shall be ground flush to the tracer OD so that the tracer contacts the full length of the pitch pipe along straight runs. Pipe bends may be used and are preferred rather than welded fittings.

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2 = CARBON STEEL SOCKET WELD

In general this specification applies to the **Hot Oil** piping, **Hot oil Tracer** Piping that is **not** attached to the pitch pipe and is **outside** the insulation, **steam supply, condensate** and **nitrogen** piping.

Design Criteria	Max Temperature	Max Pressure
Hot Oil Piping	575°F	130 psig
Steam & Condensate Piping	380°F	150 psig
Nitrogen Piping	Ambient	150 psig

Pipe	Seamless ASTM A-106,Grade "B"
Fittings	Socket Weld, 3000# forged steel
Flanges	150# ANSI B-16.5, ASTM A-150 Used only at equipment or control valves.
Gaskets	Flexitallic style CG Filler, Flexite/Metal -304L gaskets
Flange Bolts	Alloy studs, ASTM A-193 Gr. B-7 & American Std. Heavy Duty Hex Nuts, A-194, class 2H.
Valves	Socket Weld Gate or Globe with Stellite Trim Nitrogen Service – Threaded Ball valves with Teflon Seats and Stainless Steel ball.
Control Valves	150# Flanged Globe Valves

3 = CARBON STEEL, THREADED

In general, this specification is for **Natural Gas** piping.

Design Criteria	Max Temperature	Max Pressure
Natural Gas Piping	100°F	75 psig

Pipe	Seamless ASTM A-53, Grade "A"
Fittings	Threaded, 3000# forged steel
Flanges	150# ANSI B-16.5, ASTM A-150 Used only at equipment or control valves.

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Gaskets	Flexitallic style CG Filler, Flexite/Metal -304L gaskets
Flange Bolts	Alloy studs, ASTM A-193 Gr. B-7 & American Std. Heavy Duty Hex Nuts, A-194, class 2H.
Valves	Threaded Gate or Globe with Stellite Trim
Control Valves	150# Flanged Globe Valves, 1" and larger. Smaller than 1", threaded

4 = STAINLESS STEELTUBING

In general this specifiation applies to the **Steam Tracing** Specification for the PITCH FUME PIPING. Steam Tracing meaning only the pipe that is attached to the Pitch Fume Line and inside the insulation. The steam supply and condensate piping shall be socket welded, per Code "2".

Design Criteria	Max Temperature	Max Pressure
Steam & Condensate Piping	380°F	150 psig

Tracers Tubing Four 1/2" OD with 0.049" wall (18 gauge)
ASTM 269, 304 Stainless Steel

Tracers Inside Insulation

Join lengths of tubing using Cajon stainless steel tube socket weld unions as manufactured by "Swagelok", using Silver Brazing materials as manufactured by:

Eulectic Corporation Att: Chuck Foye
40-40 172nd Street 1-800-323-4845 ext. 2811
Flushing, NY 11358-9981
Rod: XUPER 1020XFC, Precoated
Paste: Eulectic Silweld #1618
Follow Manufacturer's instructions and assure tubing and fittings are clean.

Secure tracer to pipe being heated with stainless steel bands, 3/4" wide, on 18" centers. Where unions are used, the bands shall be secured about 6" on either side of the union in order to keep as much of the tracer tubing in contact with the Fume pipe. Bands shall be tight, but shall not deform the tubing.

Tubing shall be bent around Fume piping fittings to conform to the contour of the Fume piping.

Tracers Outside Insulation

Compression type, stainless steel, "Swagelok" or equal. The use of comperssion fittings shall be used primarily for the transion from the stainless steel tubing to the carbon steel supply and condensate piping.

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5 = GALVANIZED THREADED

This specification applies to the **Sump Discharge Water.**

Design Criteria	Max Temperature	Max Pressure
Sump Discharge Water Piping	Ambient	150 psig

Pipe	Seamless ASTM A-53, Grade "A", hot dipped galvanized
Fittings	Malleable Iron, Class 150, hot dipped galvanized
Flanges	150# ANSI B-16.5, ASTM A-150 Used only at equipment or control valves when required. Use threaded joints where possible.
Gaskets	Flexitallic style CG Filler, Flexite/Metal -304L gaskets
Flange Bolts	Alloy studs, ASTM A-193 Gr. B-7 & American Std. Heavy Duty Hex Nuts, A-194, class 2H.
Valves	Threaded Gate or Globe with Stellite Trim
Control Valves	150# Flanged Globe Valves, 4" and larger. 3" and smaller threaded

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APPENDIX B

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APPENDIX "B"

T-200 - Pitch Tank Piling & Foundation

Design Drawings and Specifications to be Provided by

GeoEngineers, Inc.

7504 SW Bridgport Road

Portland, OR 97224

(503) 624-9274

&

KPFF Consulting Engineers

111 SW 5Th Ave.

Suite 2500

Portland, OR 97204-3628

(503) 227-3251

APPENDIX "B"

T-200 – Pitch Tank Piling & Foundation

Specification "Driven Piles"

Reference Plans:

Plan No.	Rev.	Title
98567-S09	0	General Structural Notes
98567-S10	0	Structural Foundation Plan
98567-S11	0	Structural Details
98567-S12	0	Structural Details

SECTION _____

DRIVEN PILES

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Furnish all plans, labor, materials, equipment, and supervision, tools, apparatus and other incidentals required to construct all driven piles in strict accordance with the Drawings and Specifications, and as reasonably inferable therefrom.

B. The piles are 16.00-inch-diameter, nominal outside diameter, steel pipe pile with a wall thickness of 0.625 inch, driven closed-ended, then filled with portland cement concrete after driving.

1.2 REFERENCE STANDARDS:

A. Use current editions of the following reference standards.

1. American Society for Testing and Materials (ASTM) A 615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

2. ASTM E 329 Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction.

3. ASTM A 252 Standard Specification for Welded and Seamless Steel Pipe Piles.

4. ASTM C 39 Standard Specification for Compressive Strength of Cylindrical Concrete Specimens.

5. ASTM E 329 Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bitumminous Materials as Used in Construction.

6. ASTM C 94 Standard Specification for Ready-Mixed Concrete.

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7. ACI 301 Standard Specifications for Structural Concrete for Buildings.

8. ACI 318 Building Code Requirements of Reinforced Concrete.

9. American Welding Society (AWS) Structural Welding Code.

B. Geotechnical engineering reports prepared by GeoEngineers, Inc., titled "Report, Geotechnical Engineering Study, Proposed Coal Tar Pitch Storage Tanks, 7540 Northwest Saint Helens Road, Portland, Oregon," dated May 9, 1997 and "Report Addendum, Tank Foundation Design/Construction Considerations, Proposed Coal Tar Pitch Storage Tanks, Portland, Oregon" dated September 18, 1998.

1.3 SUBMITTALS:

A. Provide the following submittals.

1. Submit installation procedures for driving piles at least 1 week prior to mobilization to the site. The submittal shall fully describe all proposed pile installation equipment including hammer, ram, driving cushion, pile cap and cap block.

2. Provide certification of yield strength and weldability of steel products by AWS processes acceptable to the Structural Engineer.

3. Provide mill certificates of chemical and physical properties, or equivalent.

4. Provide concrete compressive strength and mix design.

B. Driving activities shall not commence prior to completing submittals.

1.4 QUALITY ASSURANCE:

A. Contractor will provide special inspection for piling as required by Chapter 17 of the 1997 Uniform Building Code as adopted by the City of Portland.

B. Welder Qualifications: Qualify welders, welding processes and procedures in accordance with AWS Structural Welding Code and requirements of the City of Portland.

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C. Concrete

1. A minimum of three concrete test cylinders shall be provided for each 100 cubic yards or each day of pour for each concrete strength. Cylinders shall be tested as follow.
   a. One at 7 days
   b. Two at 28 days

2. Mixing shall comply with ASTM C 94

C. Pile Driving

1. Owner will retain the geotechnical engineer who will be onsite to monitor and record pile driving records. Contractor is to maintain communication with Geotechnical Engineer to assure that the engineer has sufficient notice to be on site when all driving is scheduled to occur.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to the project site in such quantities and at such times to assure the continuity of pile driving operations to the project schedule.

B. Store piles in orderly groups above ground and blocked during storage to minimize possible distortion or damage of members. Piles damaged or exhibiting variations beyond tolerance limits shall not be used in the work.

1.6 PROJECT CONDITIONS:

A. Subsurface Information:

1. The geotechnical engineering reports for this project are provided in the Appendix. This information does not necessarily reflect soil types, strata thicknesses or water level variations that may exist between explorations and is not be construed as warranty of the subsurface conditions. Neither the Owner, Engineer, nor the Geotechnical Engineer will be responsible for interpretations or conclusions drawn therefrom by the Contractor.

2. Additional explorations may be performed by the Contractor at no additional cost to the Owner, provided such explorations are acceptable and approved in writing by the Owner.

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B. Protect structures, underground utilities and other construction from damage caused by pile driving operations. Excavate for piles as required and as specified on Drawings.

PART 2 - PRODUCTS

2.1 STEEL PILES:

A. Furnish 16-inch-diameter, nominal outside diameter, 0.625-inch wall thickness pipe piles.

B. Steel for Piling: Hot-rolled carbon steel structural pipe, complying with ASTM A 252, Grade 2 and minimum yield strength (f_y) of 35 kips per square inch (ksi).

C. Steel Reinforcing: ASTM A 615, grade 60.

D. Fabrication: Provide welded connections as shown in Drawings. Pile bottom shall be equipped with a base plate as shown in Drawings.

E. Concrete Pipe Fill:

1. Concrete shall conform to requirements of ACI 318, Parts 1, 2 and 3.
2. Concrete shall have a minimum 28-day compressive strength as shown on the Drawings.

2.2 DRIVING EQUIPMENT:

A. General: Furnish pile driving equipment of a type generally used in standard pile driving practice, operate hammer at manufacturer's specified rate to develop the required rated energy per blow. Drop hammers will not be allowed.

B. Equipment and Hammer:

1. Provide equipment of adequate size and capacity to handle, brace and hold the piles to the designed alignment. This equipment shall be able to maintain the alignment of pile and hammer without damage to either.
2. Maintain all pile driving equipment in safe operating condition at all times.
3. Driving hammers shall be in good repair and operating condition and shall be capable of being operated at the manufacturer's rated number of blows per minute.
4. Equipment or methods that result in regular or repeated damage to the piles during driving, or are detrimental to the bearing capacity of piling already driven, will be rejected.

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5. The piles shall be driven with a steam, air or diesel hammer that develops a rated energy of at least 32,000 ft-lbs. per blow and as required to achieve the required pile capacity. The Contractor is responsible for selecting the driving equipment capable of installing the piling to the specified pile penetration and capacity and not causing damage to the piling during driving. Hammers may be single or double acting.
6. Pile cushion shall be used during the driving to limit stress during driving to 90 percent of the piling yield stress.

C. Driving Caps: Equip hammer with a driving cap capable of protecting pile head and providing uniform distribution of hammer energy to pile head.

D. Leads: Use fixed, rigid-type pile driver leads that will hold the pile firmly in position and alignment, and in axial alignment with the hammer. Free-swinging leads will not be permitted. Extend leads to within 2 feet of the elevation at which the pile enters the ground.

E. Geotechnical Engineer will evaluate pile installation equipment using Wave Equation analysis. Analysis will be completed to determine the suitability of the equipment for pile installation and to establish acceptable refusal criteria

PART 3 - EXECUTION

3.1 GENERAL:

A. Examine areas and conditions under which piles are to be installed, and correct conditions detrimental to the proper and timely completion of the work. Proceed with work only after unsatisfactory conditions have been corrected.

B. Pile Length Markings: Mark each pile with horizontal lines at 1'0" intervals, and the number of feet from pile point at 5'0" intervals.

C. Welding:

1. Perform manual arc-welding using shielded metal arc or submerged arc method, complying with American Welding Society (AWS) Standards and requirements of City of Portland.

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2. Use oxygen-gas or oxygen arc methods for field cutting of steel, complying with AWS recommendations.

D. Welded Splices: Clean surfaces to be welded of rust, scale, oil, paint and foreign material.

1. A maximum of one splice per pile is permitted, unless otherwise authorized by the Geotechnical Engineer. Make splices before starting driving operations wherever possible. If a welded splice is required during driving operation, make splice when top of drive pile portion is at least 3'0" above ground, to permit inspection of welded connection during welding and during subsequent driving.
2. Provide one straight pile alignment through splice and develop the full strength of pile in compression, tension and bending.

3.2 DRIVING PILES:

A. General:

1. Each pile shall be driven to refusal into the dense to very dense gravel or bedrock formation that underlies the site. The surface of the bearing layer is expected to be at about Elevation – 25; however, variations of several feet may occur over the area of the tank foundations. The required penetration for individual piling will be established on the basis of the driving record during pile driving as approved by the Geotechnical Engineer.
2. Excessive driving shall be avoided. The minimum hammer energy is an estimated value required to drive the piles to bearing at a maximum blow count of 16 blows per inch. The hammer energy and blow count value represents the end of the driving condition, with the pile tip near the estimated tip elevation. More severe or restrictive driving conditions may occur before reaching the estimated tip elevation.
3. The Geotechnical Engineer can modify the final required blow count depending on the field conditions encountered and observations made during pile installation.
4. Maintain the center of gravity for each pile to conform to the locations shown in the Drawings.
5. Locate each pile accurately in accordance with the Drawings. Reference cut-off elevations of each pile to benchmarks established by the Engineer.
6. Plumb the leads and the pile before driving. Take care during driving to prevent and to correct any tendency of piles to twist or rotate.
7. Jetting for installation of piling will not be allowed.

B. Driving Tolerances: Drive piles within the following maximum tolerances:

1. Location: 2 inches from location indicated for center of gravity of each single pile or pile groups; 2 inches for piles under walls.
2. Plumbness: Maintain 1 inch in 10'0" from the vertical, or a maximum of 3 inches, measured when the pile is above ground, in the leads.

C. Heaved Piles: Compile recorded instrument observations made during pile driving to determine whether a driven pile has lifted from its original seat during the driving of adjacent piles. If uplift occurs, redrive the affected piles to a point elevation at least as deep as the original point elevation with a driving resistance at least as great as the original driving resistance.

D. Damaged or Misdriven Piles:

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1. Damaged piles, and piles driven outside the required driving tolerances, will not be accepted.
2. Withdraw piles rejected after driving and replace with new piles.
3. Drive additional pile or piles where the centerline deviation exceeds 3 inches and an analytical determination indicates a load on any pile exceeding 110 percent of the design load.

E. Cutting-off:

1. Cut off tops of driven piles, square with pile axis and at elevations indicated.
2. Dispose of excess materials off site.

3.4 FIELD QUALITY CONTROL:

A. Survey: Employ independent Professional Land Surveyor or Registered Civil Engineer to make field survey of completed piling. Show actual pile locations with respect to planned pile locations, and plumbness.

"END OF SECTION"

APPENDIX C

APPENDIX "C"

Piping & Associated Foundations, etc.

For

Pitch Piping from Dock to Pitch Tank, T-200

Design Drawings and Specifications to be Provided by

J. Cameron McKernan

825 NE 20th Ave.

Suite 110

Portland, OR 97232

(503) 232-7211

INSULATION

SPECIFICATION FOR FIELD APPLIED INSULATION

This specification covers the materials and workmanship for insulating the pitch tank, T-200, the pitch piping with heat transfer media (HTM) tracer piping attached, and HTM piping.

TANK (T-200) INSULATION MATERIALS

INSULATION

The insulating material shall be 6" of mineral wool applied in two layers of 3" each. Mineral wool insulation shall be manufactured by Rock Wool Manufacturing Company (Delta-8, Mineral Wool Lamella), Precision Fabricated Insulation, Owens Corning, or others making a mineral wool insulation suitable for a 850°F application and with a similar thermal conductivity and other physical properties as Rock Wool's Delta-8.

Per drawing 6526-A001, Detail 1, there is a section of the tank roof that is insulated with calcium silicate. See Roof Insulation for specifications.

METAL JACKETING

The mineral wool insulation shall be covered with 0.024" thick aluminum (ASTM B-209) with an interior moisture barrier consisting of one layer of one mil polyethylene film with a protective layer of 40 pound Kraft paper.

The shell jacketing shall be corrugated, 2 1/2" valley to valley lengthwise by 5/8" valley to hill deep. This specification supersedes the dimensions of the corrugated material on the tank drawing.

The roof jacketing shall be the same as the shell but non-corrugated, i.e., flat.

The junction between the roof to shell metal jacket (flashing) shall be the same as the non-corrugated material above, and extend at least 9" under the roof jacket and at least 12" down the shell over the corrugated sheets. Sections shall be overlapped at least 3". Sheet metal screws with neoprene washers shall be used to secure the flashing to the shell jacket.

The bottom of the corrugated shell covering shall be flashed with non-corrugated aluminum as above, per ChemTech Standard drawing 6000-A006, Detail "I".

OTHER MATERIALS

All sheet metal screws, as required to secure the metal jacketing, flashing, or the bands, the sheet metal screws shall be stainless steel with neoprene washers.

Bands to secure the insulation, or the metal jacket, shall be 316 stainless steel, 3/4" wide by 0.023" thick.

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Childers 304 stainless steel pre-drilled "J" clips shall be used on the metal jacketing to hold the bands in place.

Childers "S" clips, pre-drilled or 304 stainless steel, shall be used to support the corrugates sheets.

Springs, used to tension the bands on the shell insulation, shall be 302 stainless steel Chil-Spring® as manufactured by Childers and installed according to Childers recommendations. Expansion of the circumference of the tank and the required number of springs, shall be based on a temperature change of 550°F. Springs shall be installed such that the springs are stretched 1/2" upon installation on the cold tank.

Springs, used to tension the bands on the shell metal jacketing, shall be 302 stainless steel Mity-Spring™ as manufactured by Childers and installed according to Childers recommendations. Expansion of the circumference of the tank and the required number of springs shall be based on a temperature change of 550°F. Springs shall be installed such that the springs are stretched 1/2" upon installation on the cold tank.

Bands and springs, and other band connections shall be joined with heavy duty T-304 annealed stainless steel Childers Wing Seals, 0.032" thick, or Childers Closed Seals, 0.025" thick.

Speed washers, of 302 stainless steel, approximately 2" by 2", shall be used to secure the roof insulation.

Where wire must be used, it shall be soft annealed T-304 stainless steel, 16 or 18 gauge.

Childers CP.-70 or 76, Gray, shall be used as sealant where the metal jacket sheets overlap.

A flexible elastomer weatherproof material suitable for 500°F service, such as "Silbond" RTV 6500 High Temperature Silicon sealant manufactured by Silco Inc, shall be used to seal all gaps between the metal jacket and the tank structural steel members, around nozzles, or other tank parts such as the anchor chairs.

The use of the neoprene washers on the sheet metal screws, the CP-70, 76 and the RTV is to prevent moisture from entering behind the metal jacketing.

Foamglas® insulation blocks shall be used as the bottom 6" high course of shell insulation. The Foamglas® shall be applied in two courses 3" thick with staggered joints. Each course shall be held in place with bands and springs as above.

Johns Manville #460 shall be used at tie rods as per ChemTech Standard drawing 6000-A006, accompanying this specification.

Versi-Foam® urethane foam (Standard) (Manufactured by "Universal Foam Systems, Inc) shall be used in the corrugations where the roof to shell flashing is installed. This foam shall be installed to prevent driving rain from entering the insulation.

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Any conflict between this specification and the ChemTech drawings as to the methods or materials used, this specification shall govern.

SHELL

Insulation

The bottom 6" course shall be Foamglas® as specified above. The rest of the shell insulation shall be mineral wool, 6" thick, applied in two 3" thick layers. Both the vertical and the horizontal joints shall be staggered. The only location for non-staggered joints shall be at the angle insulation support rings. The insulation shall be started with full blanket widths from the support rings up. Each layer shall be held in place with bands and springs on 9" centers. The springs shall be Chil-Spring® installed per the manufacturer's recommendations.

Banding to tie rods and around nozzles (Detail "N" and Section "X-X") shall be per ChemTech drawing 6000-A006.

Metal Jacketing

The metal jacketing shall be overlapped at least 2" going around the tank. The jacketing shall be stacked with the top sheet overlapping the lower sheet by at least 3". Childers "S" clips shall be used to support the sheets. "S" clips shall be spaced at least every 10'. Childers CP-70 shall be used under the overlaps to seal the jacketing.

The top course of jacketing shall be inserted under the 3" by 2" angle shown on drawing 6526-A002, detail 2.

The bottom of the corrugated sheeting shall be flashed with non-corrugated jacketing at least 10" under the corrugated material and extended over the concrete ringwall. This flashing shall be overlapped around the circumference of the tank by at least 3" and sealed with Childers CP-70.

Note Section "G-G" on drawing 6000-A006. The corrugated metal jacketing shall have an opening of about 12" at the tie rods to allow access to the insulation bands for tightening, should it be required after heatup of the tank. The corrugated jacketing shall cover this opening with an overlap of about 5" on either side.

The shell jacketing shall be held in place with bands, with springs, at least every 3'. The spring tension provided by the "Mity-Springs™" shall be the same as that on the insulation. The number of springs shall be per Childers recommendations.

Childers "J" clips shall be spaced at least every 10' around the tank to secure the bands. CP-70, or RTV, shall be used to seal the jacketing between the clip and the jacket.

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All gaps between the metal jacketing and any part of the tank, such as the spiral stairway supports, anchor chairs, and nozzles, shall be filled with RTV.

ROOF

Insulation

The insulation shall be 6" thick, installed in two 3" thick layers of mineral wool insulation with all joints staggered. The insulation shall be secured to the tank with 12 gauge stainless steel pins and clips on 12" centers. Pins shall be applied with a capacitor discharge welding gun (CD Welder). The courses shall be held in place with speed washers. Pins shall be approximately 7" long. The excess length shall be nipped off so as not to penetrate the aluminum jacketing. Pins shall not be installed closer than 3" from the edge of a sheet.

Drawing 6526-A001, Detail 1, shows a section of the roof, about 10 foot wide by about 20 feet long that calls for "Rigid Insulation". This "Rigid Insulation" shall be an asbestos free calcium silicate block insulation, such as Owens-Corning, or others that has a density of 15#/cu. ft. The calcium silicate block shall be applied in two 3" layers with staggered joints. The 10' by 20' area need not be cut on an arc, but the calcium silicate insulation shall be formed to a close fit against the mineral wool insulation. In order to prevent a seam at this juncture, the bottom 3" thick course of the calcium silicate shall extend about 6" under the top 3" thick mineral wool insulation. The calcium silicate block shall be secured to the roof as above. The calcium silicate block shall be covered with metal jacketing as below.

Metal Jacketing

The insulation shall be covered with non-corrugated aluminum, as specified above, overlapped at least 3" at the seams. All seams shall be sealed with Childers CP-70.

Where a seam occurs, a strip of 0.03" thick stainless steel, not less than 4" wide, shall be installed under the top speed washer. After the top of the pin is nipped off, the metal jacketing may be placed and overlapped. The metal jacketing shall be secured to the stainless steel strip with sheet metal screws (Stitching screws), with neoprene washers, placed on at least 6" intervals. The upper jacket shall overlap the lower section.

RTV shall be used to seal the gap between the jacketing and the tank nozzles, or other parts of the tank.

Per ChemTech drawing 6000-A006, "Elevation D", the roof to shell junction shall be flashed with 0.024" thick aluminum flashing with moisture barrier. The flashing shall extend down the shell at least 12". Care shall be exercised to insure that the sheet metal screw securing the flashing to the roof jacket is inserted through the bead of CP-70. The flashing shall be secured to the shell jacketing with sheet metal screws with neoprene washers on 7 1/2" centers, approximately 2" from the edge. The screws shall not be inserted into the roof support angle on the tank. The gap between the corrugations and the flashing shall be filled with Versi-Foam®.

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Special Connections

Around the nozzles for handling pitch, both the shell and the roof (4 "F"'s, 1 "M", 1 "C"), there will be installed 30" by 30" clamp-on heat transfer surface that is 1/2" thick attached to the tank shell or roof. Over these surfaces the insulation shall be reduced to 5 1/2", one course 3" and the inner layer 2 1/2 or a 2" thick layer and a third layer 1/2" thick so that the total thickness is 5 1/2" over the heat transfer surface. The outer 3" layer shall stagger the joints of the 2 1/2" thick layer, or layers. The clamp-on units have a cutout (of the nozzle size) to allow the clamp-on to be installed after the nozzle has been welded to the tank. This cutout shall be insulated with two layers of 3" of insulation.

On the following roof nozzles, "B", "D", "M", T" and "S", there will be clamp-on heat transfer surfaces clamped around the nozzle. The roof insulation and metal jacketing shall be brought up to the heat transfer surface and the joint between the jacket and the heat transfer surface sealed with RTV. The insulation contractor for the piping will insulate the piping from this junction.

Each or these heat transfer surfaces have two pipe connections (1 or 1 ½"IPS); one as hot oil feed and the other as return. Seal the jacketing around these pipes with RTV where they penetrate the jacketing. The insulation contractor for the piping will insulate the piping from this junction.

Around the roof nozzles there will be hot oil piping (3/4 or 1") looped to heat the roof around these nozzles. The insulation over this area shall be a layer 2" thick, covered with a 3" layer, with staggered joints.

The tank has a coned roof. The above aluminum jacketing shall be applied over the entire roof, but the peak of the cone shall be flashed with a cap extending about 3' around the peak. This cap shall overlap the above applied jacketing and consist of an aluminum sheet cut and bent to conform to the cone. This cap shall be sealed with Childers CP-70 and secured to the stainless steel strips with sheet metal screws (Stitching screws), with neoprene washers, placed on a minimum of 6" intervals. The upper jacket shall overlap the lower section.

PIPE INSULATION

INSULATION MATERIALS

Three types of insulation shall be used; calcium silicate, fiberglass and mineral wool. All forms of insulation shall be of the "Pre-Formed" Pipe Insulation type, similar to Rock Wool manufacturing Company's "Delta-PF" pre-formed mineral wool pipe insulation, Owens Corning Fiberglas and Ownens Corning Kaylo® calcium silicate Pipe Insulation, except the 8 and 10" pipe from the ship to the pitch tank, T-200. This piping, line #'s 201, 202 and 203, with its two 1 1/2" tracers, shall be insulated with mineral wool blanket insulation, specified below. The P&ID's shall specify the insulation type and thickness.

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Prior to the application of insulation, all pipe that is heat traced shall have all of the pipe and the tracer piping tightly wrapped with aluminum foil, 1/256" thick. The shining surface of the foil shall be against the pipes

The P&ID's specify the type of insulation by line number. This designation as to the insulating material is only a **reference as to the anticipated insulation type for the major portion** of the pipe. In general, it is intended that mineral wool insulation shall be used on all vertical piping runs. All **elevated** horizontal piping not accessible to Operating and Maintenance personnel shall be insulated with mineral wool, except line #201. Line #201, an 8" pitch fume, steam traced, pipe, shall be insulated with fiberglass insulation. Calcium silicate insulation shall be used for any horizontal piping at or near grade or near elevated walkways, where the horizontal piping could be stepped on by Operating or Maintenance personnel. In order to identify where calcium silicate insulation shall be used, the Insulation Contractor shall request the Koppers' General Foreman, T. J. Turner (503-286-3681), to mark the aluminum wrapped traced piping and any hot oil piping that is to be insulated with calcium silicate. This can be done with a spray paint. All unmarked piping shall be insulated with mineral wool.

The above paragraph does not apply to the ship to T-200 piping, lines 201, 202 and 203. The insulation system for this piping is specifically specified later in this specification.

Where pre-formed insulation pipe coverings are not commercially available, such as for reducers, the pipe shall be insulated with similar material in a blanket or block insulation. The blanket or block shall be shaped to fit the pipe and the pre-formed aluminum jacket, and banded or secured with wire.

Where there are flanges in the **hot oil and pitch** piping, the pre-formed pipe insulation shall extend up to the flange bolts, minus one and one-half times the length of the stud bolt length. This will allow access for bolt removal without damage to the insulation. In this void, place small sections of insulation that can be removed.

In **hot oil service**, all flanges shall be insulated and jacketed as per detail 1 on drawing 6526-P018. This detail shows a "weather jacket" that is used to protect the mineral wool insulation from oil that may leak when a flange is opened or the gasket leaks. This weather jacket shall be made from the same material as the metal jacketing and secured in place with stainless steel bands. Consider using Childers aluminum Cap-Jacs™ Reducing covers as the weather jacket. The insulation between the weather jackets shall be easily removable calcium silicate, a less absorbing insulation in comparison to mineral wool. The weather jacket and the calcium silicate insulation shall be covered with a Childers aluminum jacket cover, Flange-Jacs™ or Valve-Jacs™, specifying the appropriate "B" dimension to overlap the weather jacket. The system shall be secured with stainless steel bands.

JACKETING MATERIALS

All pipe insulation shall be covered with 0.024" thick aluminum pipe jacketing with a one mil polyethylene film on a 40 pound Kraft paper integrally bonded over the entire surface of the insulation. The jacketing shall be Childers' "Lock-On®" with a modified Pittsburg

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Z-lock on the longitudinal seam. A two inch wide butt strap with a CP-77 high temperature sealant and a Fabstrap shall be used to secure the jacketing around the insulation and provide a weatherproof system.

Where the pre-formed pipe insulation is cut short of the flange for bolt removal without damage to the insulation, the jacketing shall cover only the pre-formed insulation. The flange jacket covers shall include extends that overlap the pipe jacket by at least 2".

Elbows and 45's shall be covered with Childers' "Ell-Jacs®" Insulation Covers (preferably 2 piece, but 4 piece where sizes dictate), aluminum, 0.024" thick with a moisture barrier. Ell-Jacs® shall be installed per the manufacture's recommendation in order to provide a weatherproof joint.

Tees shall be covered with Childers' 2 piece or 4 piece "Tee-Jac™" and installed according to the manufactures' recommendations.

Flanges shall be covered with Childers; Flange-Jacs™" and installed according to the manufacture's recommendations.

Where piping changes sizes, the insulation shall be covered with Childers' "Bevelled-Jacs™" or "Reducer-Jacs™" aluminum jacketing and installed according to the manufacture's recommendations.

Should there be piping shapes or configurations where commercially available pre-formed aluminum jacketing are not produced, then the jacketing shall consist of the same aluminum with the moisture barrier as specified above, cut to fit with sufficient overlapping to seal the overlap with CP-70 or 76, or RTV and secured with stainless steel screws with neoprene washers and stainless steel bands.

Metal jacketing for the ship to T-200 piping will be specified below.

HOT OIL PIPING (Heat Transfer Media, HTM)

The hot oil piping, piping that is not attached as a tracer to pitch piping (designated with a "3" line number), shall be insulated with thickness as shown in the line number. In general, most of the hot oil piping is covered with 3" of insulation. There is some piping that contains hot oil, but are not normally used when the HTM is above 500oF, and this piping is covered with 2" of insulation.

PITCH PIPING (All pitch piping is traced with HTM)

ALUMINUM FOIL Prior to the application of insulation, the pipe and tracer piping shall be tightly wrapped with aluminum foil, 1/256" thick. The shining surface of the foil shall be against the pipes. This applies to all heat traced piping, both hot oil and steam traced.

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The Pitch piping is broken into the following sections:

Pitch Piping from T-200

There is 2" pitch pipe around P-235 and P-238 that will have two (2) 1" tracers attached to most of the pitch piping. Because of the layout and HTM loops, there may be some pitch pipe with only one (1) tracer. This piping shall be covered with 6" calcium silicate pipe covering, 3" thick.

There is 6" pitch piping to P-220 and P-225 suction will have two (2) 1" tracers attached to most of the pitch pipe. As above, some pitch pipe may have only one (1) tracer. This piping shall be covered with 8" calcium silicate pipe covering, 3" thick.

There is 4" pitch piping from P-220 and P-225 to distribution and tank circulation that will have one (1) 1" tracer attached to the pipe. This piping shall be covered with 6" calcium silicate pipe covering, 3" thick.

Ship to T-200 :

INSULATION This 8 and 10" pitch piping, line #'s 201, 202 and 203, is traced with two (2) HTM pipe tracers banded to the pitch pipe. Per the P&ID, this line is covered with 6" of **mineral wool** insulation. The first layer of insulation, placed over the aluminum foil, shall be 3" thick "Metal-Mesh" mineral wool blanket as supplied by Rock Wool or Fiberx. This layer shall be secured in place with either stainless steel bands or wire. The seam shall be at the bottom. . Where the pipe and tracers are supported with a clamp around the pipes, the insulation shall be cut out in the form of a slot, but only to the depth and length of the clamping bracket.

Over this 3" blanket shall be placed a 3" thick pre-formed mineral wool pipe insulation with the smallest standard size pipe diameter to fit over the blanket layer. The pre-formed pipe covering shall stagger the longitudinal blanket seams by at least 6". The two piece pre-formed pipe insulation shall be installed with its seams 90 degrees from the blanket seam. This outer layer of pre-formed pipe insulation shall be held in place with stainless steel bands placed at least every 3'. There may be locations, such as at pipe supports, where the total thickness of insulation prohibits the installation of the metal jacket over the insulation. At these locations, the outer surface of the pre-formed insulation may be shaved off to permit covering with the metal jacket, as long as no more than 1 1/2" of insulation is removed.

METAL JACKETING Aluminum jacketing shall be

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used to cover the pre-formed insulation. All pipe insulation shall be covered with 0.024" thick aluminum pipe jacketing with a one mil polyethylene film on a 40 pound Kraft paper integrally bonded over the entire surface of the insulation. The jacketing may be Childers' "Lock-On®" with a modified Pittsburg Z-lock on the longitudinal seam. A two inch wide butt strap with a CP-77 high temperature sealant and a Fabstrap shall be used to secure the jacketing around the insulation and provide a weatherproof system.

As an alternate, the 0.024" thick aluminum with a one mil polyethylene film on a 40 pound Kraft paper integrally bonded over the entire surface of the insulation, may be field cut from rolls to fit the insulation. This covering shall overlap at least 2" along the length of the pipe and 3" along the seam. These overlaps shall be sealed with Childer CP-70. Bands shall be placed over the longitudinal seams and be spaced at no less than 3' intervals. Sheet metal screws with neoprene washers shall be used to secure the longitudinal seam, spaces at least ever 6".

The metal jacket seams along the length of the pipe shall stagger the insulation joints by no less than 4".

All joints where tracers or supports penetrate the metal jacketing shall be sealed with RTV.

Elbows, tee's and other fittings shall be jacketed with Childers pre-formed metal jacketing as specified above.

Valves, Pumps, Relief Valves, Strainers and Other Devices

In pitch service, valves, relief valves and strainers will have plate-type clamp-on heat transfer heaters through which HTM will circulate. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of 19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

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In general, the Insulation Contractor shall specify, purchase and install the removable/reusable insulation covers for flanged control and block valves, the pressure relief valves, strainers, and flow elements. Note that in pitch service, these devices are supplied with plate-type clamp-on heat transfer surfaces and the removable/reusable insulation shall cover the assembled unit.

However, pumps will be purchased with the removable/reusable insulation blankets.

Steam & Steam Traced Piping

The 8" pitch fume line, line # 208, is steam traced with four (4) 1/2" OD stainless steel tubes. Prior to insulating this piping system it shall be tightly wrapped with aluminum foil, as specified above. This piping system shall then be insulated with 9" pipe diameter pre-formed pipe insulation, fiberglass, 3" thick.

This insulation shall be covered with aluminum jacketing as previously specified.

END

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EQUIPMENT

6562AS01

POSITIVE DISPLACEMENT PUMP SPECIFICATION SHEET

Plant Portland, OR **Job Number** PCC-6526 **Item Number** P-220/P-225
No. Required Two **No. Operating** One and one spare P-230 Future
Service Recirculate and transfer liquid pitch to/from pitch storage tanks T-200

Representative: Fickess Pumps, Inc.
d/b/a Power Equipment Company
1651 Sunflower Road
New Brighton, PA 15066
Attention: Ed Fickess
Phone 724-452-5227
Fax 724-452-7298

Manufacturer: Viking Pumps

DESIGN DATA:

Liq. Pumped Liquid Pitch @ 380 to 420 (°F) **Design @ 550 °F Disch Pr** 225 psig
Capacity: **Normal** 300 gpm **Max Flow** 312 gpm **Minimum Flow** 300 gpm **Suct Press** 27 psig
@400F: SG 1.19 **Visc** 400cP ; **Vap Pr** ____ psia **Diff Press** 130 psi
Avail NPSH 13 Ft(Liq) **Solids** 12 wt% **Size** **Coke (1/4" max)** ____
Req'd NPSH 5.0 Ft(Liq) **Corrosive?** No **Erosive** Yes
Priming Method Flooded **Location** ____ **Altitude** 24 Ft
Cycle of Operation Intermittent **Pump RPM** 350

CHARACTERISTICS OF LIQUID (check all that apply)

Clean ____ **Gritty** X **Volatile** ____ **Entrained Air** ____
Acidulous ____ (____%) **Alkaline** ____ **pH value** ____
Lubricating X Yes ____ No
Objectionable known metals reacting with liquid Brass, Bronze

MATERIALS OF CONSTRUCTION:

Case Cast Steel **Rotor** Ductile Iron **Idler** Ductile Iron
Rotor Shaft Hardened Steel **Idler Pin Sleeve** Tungsten Carbide **Idler Pin** Steel
Bushing Tungsten Carbide **Bracket Bushing** Hardened Cast Steel

PUMP ORIENTATION (facing pump at Shaft End):

Suction Port Location **Side** 6" 150# Flanged **Right Hand** X **Left Hand** ____
Discharge Port Location **Side** 6" 150# Flanged **Right Hand** X **Left Hand** ____
Rotation (check) **Clockwise** X **CCW** ____

PUMP FEATURES (check all that apply):

General Purpose Pump ____ **Heavy Duty Pump** X
Full Jacketed Pump Yes **Jacketed: Head** ____ **Seal Chamber** ____
Special Packing By Mfg. **Multi-Ring Deep Stuffing Box Pump** ____
Manufacturer Viking Pump **Suggested Model** QS - 223
Mechanical Seal ____ **Manufacturer** ____
Relief Valve Location **On Pump Head** ____ **In Piping** X, By Purchaser
Setting 130 psig (20 psig above Discharge Head)
Ports Tapped (inches) ____ **Flanged (inches)** 150# ANSI steel 6" 150# Flanged
Hot Oil (500°F)Connections - Pump Head Two 1", Seal Three 1 1/4"all NPT,
With Calrez gasket

TYPE OF DRIVE (check all that apply) See below. Drive includes reversible motor and variable frequency drive.

Gear X **V-Belt** ____ **Flat Belt** ____
Double Reduction- Gear ____ **V-Belt & Gear** ____ **Direct Connected** ____
Chain ____ **All Weather** ____
Totally Enclosed Guard X **Single** ____ **Twin** ____ **Mult** ____ **Special** ____
Suggested Drive Model 5.08 to 1 type 'C' helical reducer. At Pump rpm of 350, Pump delivers 312 gpm.

MOTOR DATA:

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Make	Seimens	HP	40	Type	TEFC	RPM	1800
Phase	3	Cycle	60 Hz	Volts	230/460	Frame	224T

Vendor to verify HP. Motor shall be designed Duty with a Service Factor of 1.15

NET WEIGHT		SHIPPING WEIGHT	
Pump, Base, Gear Box & Couplings	750	lbs	
Motor	650	lbs Total	lbs

Vendor to ship with motor, gear box, couplings, pump and Insulating Jacket mounted on base plate. Pump to be tested for flow and pressure.

ACCESSORIES & OTHER: Include insulating jacket for each pump purchased. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of 19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3", fitted to the shape of the pumps and the process and hot oil connections.

Pump motor shall be provided with reversible operating capability.

If quotation varies in any way from these specification, the exceptions must be noted.

Four sets of Operating and Maintenance Manuals, dimensioned drawings and priced spare parts shall be required.

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POSITIVE DISPLACEMENT PUMP SPECIFICATION SHEET

Plant Portland, OR **Job Number** PCC-6526 **Item Number** P-235 and 238
No. Required Two **No. Operating** Two
Service Evacuate Pitch piping

Representative: Fickess Pumps, Inc.
d/b/a Power Equipment Company
1651 Sunflower Road
New Brighton, PA 15066
Attention: Ed Fickess

Phone 724-452-5227
Fax 724-452-7298

Manufacturer: Vicking Pumps

DESIGN DATA:

Liq. Pumped Liquid Pitch @ 380 to 420 (°F) **Design @ 550 °F Disch Pr** 225 psig
Capacity: Normal 13 gpm **Max Flow** 15 gpm **Minimum Flow** 13 gpm **Suct Press** 27 psig
@400F: SG 1.19 **Visc** 400cP ; **Vap Pr** _____ psia **Diff Press** 130 psi
Avail NPSH 13 Ft(Liq) **Solids** 12 wt% **Size** Coke (1/4" max)_____
Req'd NPSH 5.0 Ft(Liq) **Corrosive?** No **Erosive** Yes
Priming Method Flooded **Location** _____ **Altitude** 24 Ft
Cycle of Operation Intermittent **Pump RPM** 350

CHARACTERISTICS OF LIQUID (check all that apply)

Clean _____ **Gritty** X **Volatile** _____ **Entrained Air** _____
Acidulous _____ (_____%) **Alkaline** _____ **pH value** _____
Lubricating X Yes _____ No
Objectionable known metals reacting with liquid Brass, Bronze

MATERIALS OF CONSTRUCTION:

Case Cast Steel **Rotor** Ductile Iron **Idler** Ductile Iron
Rotor Shaft Hardened Steel **Idler Pin Sleeve** Tungsten Carbide **Idler Pin** Steel
Bushing Tungsten Carbide **Bracket Bushing** Hardened Cast Steel

PUMP ORIENTATION (facing pump at Shaft End):

Suction Port Location Side 2" NPT Right Hand X Left Hand _____
Discharge Port Location Top 2" NPT Right Hand X Left Hand _____
Rotation (check) Clockwise X CCW _____

PUMP FEATURES (check all that apply):

General Purpose Pump _____ **Heavy Duty Pump** X
Full Jacketed Pump Yes **Jacketed: Head** _____ **Seal Chamber** _____
Special Packing By Mfg. **Multi-Ring Deep Stuffing Box Pump** _____
Manufacturer Viking Pump **Suggested Model** K-223
Mechanical Seal _____ **Manufacturer** _____
Relief Valve Location On Pump Head _____ In Piping X, By Purchaser
Setting 130 psig (20 psig above Discharge Head)
Ports Tapped (inches) _____ **Flanged (inches)** 150# ANSI steel 2" NPT
Hot Oil (500°F)Connections - Pump Head Two 1", Seal Three 1 1/4"all NPT.
With Calrez gasket

TYPE OF DRIVE (check all that apply) See below. Drive includes reversible motor and variable frequency drive.

Gear X **V-Belt** _____ **Flat Belt** _____
Double Reduction- Gear _____ **V-Belt & Gear** _____ **Direct Connected** _____
Chain _____ **All Weather** _____
Totally Enclosed Guard X **Single** _____ **Twin** _____ **Mult** _____ **Special** _____
Suggested Drive Model 7.65 to 1 type 'B' helical reducer. At Pump rpm of 155, Pump delivers 13 gpm.

MOTOR DATA:

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Make	Seimens	**HP**	3	**Type**	TEFC	**RPM**	1150
Phase	3	**Cycle**	60 Hz	**Volts**	230/460	**Frame**	213T

Vendor to verify HP. Motor shall be designed Duty with a Service Factor of 1.15

NET WEIGHT		SHIPPING WEIGHT	
Pump, Base, Gear Box & Couplings	350	lbs	
Motor	150	lbs Total	lbs

Vendor to ship with motor, gear box, couplings, pump and Insulating Jacket mounted on base plate. Pump to be tested for flow and pressure.

ACCESSORIES & OTHER: Include insulating jacket for each pump purchased. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of 19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3, fitted to the shape of the pumps and the process and hot oil connections.

Pump motor shall be provided with reversible operating capability.

If quotation varies in any way from these specification, the exceptions must be noted.

Four sets of Operating and Maintenance Manuals, dimensioned drawings and priced spare parts shall be required.

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6562AS02

CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR | Job Number 6526 | Item Number P-245/P-255
No. Required 2 | No. Operating 2
Location HTM Fill and Drain Pump (P-245)/ HTM Drain Transfer Pump (P-255)
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped	Caloria HT - 43		@	500	(°F)	Disch Pr		28		psig
Capacity:	Normal	25 gpm	Design	25	gpm	Suct Press	0 (P-245)/ 28 (P-255)			psig
@P.T.: SG	0.729	Visc	0.08	cP;	Vap Pr	1.74	psia	Diff Press	0	psi
@60F : SG	0.876	Visc	1.0	cP;	Vap Pr		psia	Diff Head	75	Ft
Avail NPSH		Ft(Liq)			Solids	Zero	wt%	Size		
Req'd NPSH		Ft(Liq)			Corrosive	Slight		Erosive		
Priming Method	Flooded				Location			Altitude		Ft

PUMP SPECIFICATIONS:

Manufacturer Dean | Model 3141 | No. of Stages 1
Size & Type 1 x 3 x 8.5 End Suction | Performance Curve
RPM 1750 | Eff % | Impeller Dia.; Bid Min Max in
BHP: @ Design | Max BHP Req | Recommend Driver HP 2
Circular No. | Dim Print | Section Drawing
Process Connections - Flanged - Suction 3" 300# RF | Discharge 1" 300 # RF

CONSTRUCTION MATERIALS:		CONSTRUCTION FEATURES:						
Casing & Nozzle	Case Steel A-216	Case:Back Pull Out	Split	-	Horiz	Vert		
Impeller	Cast Iron	Support:	C/L		Foot		Bracket	
Casing Ring	Cast Iron	Impeller:	Open		Closed	X	Semi-Enc	
Impeller Rings	n/a	Stuff Box:	Jacket:		Air Cooled	X		
Shaft	11-13 S/S	Mech Seal			Intern	X	External	
Shaft Sleeve	n/a				Single	X	Double	
Packing Gland	n/a				Balanced	X	Unbalan	
Packing	n/a				Manufact	J. Crane	Model	Type21
Seal Cage	Ductile Iron	Bearings:Water Jacket			No	X	Yes	
Base Plate	Steel	Lubrication:			Oil		Grease	X
		Flexible Coupling:Make		TBWoods	Type	SC Spacer		
		Coupling Guard:			Yes	X	No	
		Shaft Seal Lubrication			By Product			
		Rotation from Free End						
		Connections(inches):			Suction		Discharge	

MOTOR DATA:

Make	Seimans-EPACT	HP	2	Type	TEFC	RPM	1750
Phase	3	Cycle	60	Volts	480	Frame	145T

Net Weight			Shipping Weight		
Pump, Base, Coupling		lbs	Pump, Base, Coupling		lbs
Motor		lbs	Total		lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of

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19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

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CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number 6526 Item Number P-260/265
No. Required 2 No. Operating 2
Location: HTM Primary Hot Oil Pump (P-260/265)) **NOTE: These Pumps are being provided by American Heating Company. See AS03 Spec for E-270.**
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped	Caloria HT - 43	@	500	(°F)	Disch Pr		Max. 114	psig
Capacity:	Normal	410	gpm	Design	410	gpm	Suct Press	18	psig
@P.T.:	SG 0.729	Visc	0.08	cP;	Vap Pr	1.74	psia	Diff Press		psi
@60F :	SG 0.876	Visc	1.0	cP;	Vap Pr		psia	Diff Head	290	Ft
Avail NPSH		Ft(Liq)			Solids	Zero	wt%	Size		
Req'd NPSH		Ft(Liq)			Corrosive	Slight		Erosive		
Priming Method	Flooded				Location			Altitude		Ft

PUMP SPECIFICATIONS:

Manufacturer Dean Model 3141 No. of Stages 1
Size & Type 3 x 4 x 8.5 End Suction Performance Curve
RPM 3500 Eff % Impeller Dia.; Bid Min Max in
BHP: @ Design Max BHP Req Recommend Driver HP 50
Circular No. Dim Print Section Drawing
Process Connections - Flanged - Suction 4" 300# RF Discharge 3" 300 # RF

CONSTRUCTION MATERIALS:

Casing & Nozzle	Case Steel A-216
Impeller	Cast Iron
Casing Ring	Cast Iron
Impeller Rings	n/a
Shaft	11-13 S/S
Shaft Sleeve	n/a
Packing Gland	n/a
Packing	n/a
Seal Cage	Ductile Iron
Base Plate	Steel

CONSTRUCTION FEATURES:

Case:Back Pull Out	Split	-	Horiz	Vert			
Support:	C/L		Foot		Bracket		
Impeller:	Open		Closed	X	Semi-Enc		
Stuff Box:	Jacket:		Air Cooled	X			
Mech Seal			Intern	X	External		
			Single	X	Double		
			Balanced	X	Unbalan		
		Manufact	J. Crane	Model	Type21		
Bearings:Water Jacket			No	X	Yes		
Lubrication:			Oil		Grease	X	
Flexible Coupling:Make	TBWoods	Type	SC Spacer				
Coupling Guard:			Yes	X	No		
Shaft Seal Lubrication			By Product				
Rotation from Free End							
Connections(inches):			Suction		Discharge		

MOTOR DATA:

Make Seimans-EPACT HP 50 Type TEFC RPM 3500
Phase 3 Cycle 60 Volts 480 Frame 326T

Net Weight
Pump, Base, Coupling lbs
Motor lbs

Shipping Weight
Pump, Base, Coupling lbs
Total lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket

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Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of 19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

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CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number 6526 Item Number P-275
No. Required 1 No. Operating 1
Location HTM Booster Pump - Hot Oil to Unloading Line (P-275))
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped	Caloria HT - 43		@ 500	(°F)	Disch Pr		215..5	psig
Capacity:	Normal	32	gpm	Design	32	gpm	Suct Press	115	psig
@P.T.:	SG 0.729	Visc 0.08	cP;	Vap Pr	1.74	psia	Diff Press		psi
@60F :	SG 0.876	Visc 1.0	cP;	Vap Pr		psia	Diff Head	320	Ft
Avail NPSH		Ft(Liq)		Solids	Zero	wt%	Size		
Req'd NPSH		Ft(Liq)		Corrosive	Slight		Erosive		
Priming Method	Flooded			Location			Altitude		Ft

PUMP SPECIFICATIONS:

Manufacturer Dean Model 3141 No. of Stages 1
Size & Type 2 x 3 x 10 End Suction Performance Curve
RPM 3500 Eff % Impeller Dia.; Bid 9" Min Max in
BHP: @ Design Max BHP Req Recommend Driver HP 15
Circular No. Dim Print Section Drawing
Process Connections - Flanged - Suction 3" 300# RF Discharge 2" 300 # RF

CONSTRUCTION MATERIALS: CONSTRUCTION FEATURES:

Casing & Nozzle	Case Steel A-216	Case:Back Pull Out		Split	-	Horiz	Vert	
Impeller	Cast Iron	Support:	C/L		Foot		Bracket	
Casing Ring	Cast Iron	Impeller:	Open		Closed	X	Semi-Enc	
Impeller Rings	n/a	Stuff Box:	Jacket:		Air Cooled	X		
Shaft	11-13 S/S	Mech Seal			Intern	X	External	
Shaft Sleeve	n/a				Single	X	Double	
Packing Gland	n/a				Balanced	X	Unbalan	
Packing	n/a				Manufact	J. Crane	Model	Type21
Seal Cage	Ductile Iron	Bearings:Water Jacket			No	X	Yes	
Base Plate	Steel	Lubrication:			Oil		Grease	X

Flexible Coupling:Make TBWoods Type SC Spacer
Coupling Guard: Yes X No
Shaft Seal Lubrication By Product
Rotation from Free End
Connections(inches): Suction Discharge

MOTOR DATA:

Make	Seimans-EPACT	HP	15	Type	TEFC	RPM	3500
Phase	3	Cycle	60	Volts	480	Frame	254T

Net Weight			Shipping Weight		
Pump, Base, Coupling		lbs	Pump, Base, Coupling		lbs
Motor		lbs	Total		lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of

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19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

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CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number 6526 Item Number P-280
No. Required 1 No. Operating 1
Location Pitch Transfer Line Tracing Hot Oil Booster Pump))
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped	Caloria HT - 43		@	500	(°F)	Disch Pr		141.6	psig
Capacity:	Normal	30	gpm	Design	30	gpm	Suct Press	115	psig
@P.T.:	SG 0.729	Visc 0.08	cP;	Vap Pr	1.74	psia	Diff Press		psi
@60F :	SG 0.876	Visc 1.0	cP;	Vap Pr		psia	Diff Head	82	Ft
Avail NPSH		Ft(Liq)		Solids	Zero	wt%	Size		
Req'd NPSH		Ft(Liq)		Corrosive	Slight		Erosive		
Priming Method	Flooded			Location			Altitude		Ft

PUMP SPECIFICATIONS:

Manufacturer Dean Model 3141 No. of Stages 1
Size & Type 2x 3 x 10 End Suction Performance Curve
RPM 1750 Eff % Impeller Dia.; Bid 9" Min Max in
BHP: @ Design Max BHP Req Recommend Driver HP 3
Circular No. Dim Print Section Drawing
Process Connections - Flanged - Suction 3" 300# RF Discharge 2" 300 # RF

CONSTRUCTION MATERIALS: CONSTRUCTION FEATURES:

Casing & Nozzle	Case Steel A-216	Case:Back Pull Out		Split	-		Horiz	Vert	
Impeller	Cast Iron	Support:	C/L		Foot			Bracket	
Casing Ring	Cast Iron	Impeller:	Open		Closed	X		Semi-Enc	
Impeller Rings	n/a	Stuff Box:	Jacket:		Air Cooled	X			
Shaft	11-13 S/S	Mech Seal			Intern	X		External	
Shaft Sleeve	n/a				Single	X		Double	
Packing Gland	n/a				Balanced	X		Unbalan	
Packing	n/a				Manufact	J. Crane	Model	Type21	
Seal Cage	Ductile Iron	Bearings:Water Jacket			No	X		Yes	
Base Plate	Steel	Lubrication:			Oil			Grease	X

Flexible Coupling:Make TBWoods Type SC Spacer
Coupling Guard: Yes X No
Shaft Seal Lubrication By Product
Rotation from Free End
Connections(inches): Suction Discharge

MOTOR DATA:

Make	Seimans-EPACT	HP	3	Type	TEFC	RPM	1750
Phase	3	Cycle	60	Volts	480	Frame	182T

Net Weight			Shipping Weight		
Pump, Base, Coupling		lbs	Pump, Base, Coupling		lbs
Motor		lbs	Total		lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of

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19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

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CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number 6526 Item Number P-285/P-290
No. Required 1 No. Operating 1 P-290 is Future
Location HTM Booster Pump - Hot Oil to E-201/202 (P-285)/ Hot Oil to Future E-211/212 (P-290))
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped Caloria HT - 43 @ 500 (°F) Disch Pressure 350 psig
Capacity: Normal 135 gpm (1 HTM Coil) Design 235 gpm (2 HTM Coils) Suct Press 115 psig
@P.T.: SG 0.729 Visc 0.08 cP; Vap Pr 1.74 psia Diff Press ____ psi
@60F : SG 0.876 Visc 1.0 cP; Vap Pr ____ psia Diff Head 53 Ft
Avail NPSH ____ Ft(Liq) Solids Zero wt% Size ____
Req'd NPSH ____ Ft(Liq) Corrosive Slight Erosive ____
Priming Method Flooded Location ____ Altitude ____ Ft

PUMP SPECIFICATIONS:

Manufacturer Dean Model RA - 3141 No. of Stages 1
Size & Type 3 x 4x 8 ½ End Suction Performance Curve ____
RPM 1750 Eff ____ % Impeller Dia.; Bid 7 ½ Min ____ Max 8 ½ in
BHP: @ Design ____ Max BHP Req ____ Recommend Driver HP 5
Circular No. ____ Dim Print ____ Section Drawing ____
Process Connections - Flanged - Suction 4" 300# RF Discharge 3" 300 # RF

CONSTRUCTION MATERIALS: CONSTRUCTION FEATURES:

Casing & Nozzle	Case Steel A-216	Case:Back Pull Out	Split	-	Horiz	Vert		
Impeller	Cast Iron	Support:	C/L	____	Foot	____	Bracket	____
Casing Ring	Cast Iron	Impeller:	Open	____	Closed	X	Semi-Enc	____
Impeller Rings	n/a	Stuff Box:	Jacket:		Air Cooled	X		
Shaft	11-13 S/S	Mech Seal	____		Intern	X	External	____
Shaft Sleeve	n/a				Single	X	Double	____
Packing Gland	n/a				Balanced	X	Unbalan	____
Packing	n/a				Manufacturer	J. Crane	Model	Type21
Seal Cage	Ductile Iron	Bearings:Water Jacket			No	X	Yes	____
Base Plate	Steel	Lubrication:			Oil	____	Grease	X

Flexible Coupling:Make TBWoods Type SC Spacer
Coupling Guard: Yes X No ____
Shaft Seal Lubrication By Product
Rotation from Free End ____
Connections(inches): Suction ____ Discharge ____

MOTOR DATA:

Make Seimans-EPACT HP 5 Type TEFC RPM 1750
Phase 3 Cycle 60 Volts 480 Frame 184T

Net Weight			Shipping Weight		
Pump, Base, Coupling	____	lbs	Pump, Base, Coupling	____	lbs
Motor	____	lbs	Total	700	lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of

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19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

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CLAMP-ON HEAT TRANSFER SURFACE

Item	Plate-Type clamp-on heater suitable for HTM service to 600°F and 150 psig.	
Number	Six (6) See Tag Numbers Below	
Purpose	Maintain Tank Shell Surface hot by heating with heat transfer media (HTM)	
Manufacturer	Paul Mueller Company c/o Thermoflow Equipment 3223 Babcock Boulevard Pittsburgh, PA 15237-2886	Thomas Korenich (412) 366-2012 fax (412) 367-0842
Process	Heating Fluid	Exxon's Caloria HT 43
	Temperature	Maximum - 575°F Normal 480/520 °F
	Pressure	Maximum - 200 psig Normal - 175 psig
	Flow	25 gpm
	Pressure Drop	Less than 1/2 psig
Construction	Materials	14 gauge, Carbon steel, double embossed
	Connections	Side Inlet - 1" NPS, 3000# SW Coupling Side Outlet - 1" NPS, 3000# SW Coupling
	Mueller Type	6DKR with SW at end
	Mounting	Mounting lugs and spring bolt assembly included
	Code	ASTM, Not code stamped
Shape	Units 30" by 30" for "F" & "G". 30" by 5'-6" for "C". Slotted (Cutout) to fit over OD of Shell Nozzle as below. Rolled to fit a 79' OD tank	
Nozzle TAG NUMBER's	Four units tag "F" Nozzle (4") One unit tag "G" Nozzle (4") One unit tag "C" Nozzle (6")	

For location of inlet and outlet piping and nozzle center, see drawing 6526-P012

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CLAMP-ON HEAT TRANSFER SURFACE

Item	Plate-Type clamp-on heater suitable for HTM service to 600°F and 150 psig.	
Number	Five (5) See Tag Numbers Below	
Purpose	Maintain Tank Roof Nozzles hot by heating with heat transfer media (HTM)	
Manufacturer	Paul Mueller Company c/o Thermoflow Equipment 3223 Babcock Boulevard Pittsburgh, PA 15237-2886	Thomas Korenich (412) 366-2012 fax (412) 367-0842
Process	Heating Fluid	Exxon's Caloria HT 43
	Temperature	Maximum - 575°F Normal 480/520°F
	Pressure	Maximum - 200 psig Normal - 175 psig
	Flow	25 gpm
	Pressure Drop	Less than 1/2 psig
Construction	Materials	14 gauge, Carbon steel, double embossed
	Connections	Side Inlet - 1" NPS, 3000# SW Coupling Side Outlet - 1" NPS, 3000# SW Coupling
	Mueller Type	6D with SW at end
	Mounting	Mounting lugs and spring bolt assembly included
	Code	ASTM, Not code stamped
Shape	Units to fit nozzles with extension as shown on drawing. Rolled to fit circumference of pipe size below.	
Nozzle TAG NUMBER's	One unit tag "B" Nozzle (8") One unit tag "D" Nozzle (8")	

For location of inlet and outlet piping and nozzle extension lengths, see drawing 6526-P012

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VESSEL SPECIFICATION SHEET

Plant Portland, OR Job Number 6525 Item Number T-240
No. Required One (1)) Purpose Hold Heat Transfer Media (HTM)
Location T-240 Replaces an Existing Hot Oil Expansion Tank now Sitting some 20 feet above grade on an existing structure.
Service T-240 is HTM Expansion Tank

PERFORMANCE OF UNIT:

Type (Horiz/Vert)	Horizontal		Capacity, approx.	2,000 Nominal	gal
Diameter (ID/OD)	6'	Ft	Type Heads	Flat	
St. Side Length	10'	Ft	Corrosion Allow.		in.

See Drawing #6526-A004 for T-240 Design Criteria, nozzles and location

Operating Temp.		°F	Design Temp.		°F
Operating Pressure		psig	Design Pressure		psig

CONSTRUCTION MATERIALS:
See Drawing #6526-A004 for T-240 Design Criteria, nozzles and location

FABRICATION NOTES: As per ASME Code for Unfired Pressure Vessels, latest edition, with code stamp to show maximum allowable working pressure to design temperature. Fabrication of materials not subject to pressure or code requirements as per ChemTech Std. S10-003-0 & S10-004-0, unless otherwise noted. Shell seams shall not intersect nozzle openings. Projection of nozzles and manways from outside of shell to face of flange to be 8" for insulated tanks and 6" for uninsulated tanks. Projection of head nozzles and all true locations of nozzles and attachments shall be furnished later. Flange bolt holes shall straddle horizontal & vertical centerlines unless otherwise noted.

Stress Relieve Radiograph

CONNECTIONS: ASA Safety Valve
See Drawing #6526-A004 for T-240 Design Criteria, nozzles and location

INSULATION AND COATINGS:

Thickness	None	Material	
Weatherproofing	Painting		
Painting		SSPC-SP6-63, 1 coat Red Oxide Primer	

ACCESSORIES:

Heating or Cooling		
Ladder or Stairs		None
Anti-Swirl Baffles		
Support		
Grounding Boss		See Drawing

SHIPMENT: Ship

Special Instructions or Features: Tanks shall be dry and sealed for shipment.

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VESSEL SPECIFICATION SHEET

Plant Portland, OR Job Number 6525 Item Number T-250
No. Required One (1)) Purpose Storage of Heat Transfer Media (HTM)
Location This Tank has been designed and built by American Heating Company, per their drawing #403-A8-6A. Modifications are required and listed below.
Service T-250 is HTM Storage Tank

PERFORMANCE OF UNIT:

Type (Horiz/Vert)	Horizontal		Capacity, approx.	2,000 Nominal	gal
Diameter (ID/OD)	4'-8""	Ft	Type Heads	Flat	
St. Side Length	16'	Ft	Corrosion Allow.		in.

See American Heating Company Drawing #403-A8-6A for details on the original tank details.

Per ChemTech Drawing #6526-P005 the following modifications are required:

1. **Install a 2" 150# RF Flanged connection on the top of the tank**
2. **Install a 4" blind flange on the un-used bottom nozzle.**
3. **Install a plug in the un-used bottom 1 1/2" coupling.**
4. **Install one grounding boss, as shown on drawing for T-240**

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SPECIFICATION FOR BURNER REPLACEMENT FOR E-270 & OTHER INFORMATION

The hot oil heater, E-270 is an American Heating Company (Clifton, NJ) model AHE-1000-1P (10 mm Btu/hr absorption). Per American Heating Company's (AHC) drawing 403-1, the burner system supplied was an Industrial Combustion Model MPLG 125S. This natural gas fired burner is reported to have a heat release of 12.6 mm Btu/hr.

The current air pollution permit requires that the burner be replaced with a burner that limits the heat release to 8 mm Btu/hr. The specifications for this replacement natural gas fired burner are:

1. Heat release rated for 8 mm Btu/hr.
2. Minimum turndown ratio of 10 to 1. Prefer 15 to 1. Vendor to state turndown provided.
3. Non-cycling with heat absorption of 700,000 Btu/hr while maintaining a hot oil exit temperature of 525°F, while circulating 410 gpm of Exxon's Caloria HT-43 heat treansfer media at a return temperature of 450 °F for a hot oil absorption of 6.87 mm Btu/hr.
4. Integrate with the burner controls and flame safeguards originally provided.
5. Attach burner to the existing mounting plate on the heater.
6. Mount controls in a NEMA 4 new or existing junction box. Complete system is to be designed for outdoor operation.
7. The blower motor, and any other motors, shall be 480 volt, TEFC motor.
8. The burner controls include transformer, etc, to operate off 480 volt power supply to system.
9. Utilize as much of the gas train safety valves as practical.
10. The burner and burner system and controls shall be suitable for outdoor use
11. The replacement burner shall have all of the same features as the originally provided burner.
12. Comply with NFPA, FM and UL.
13. The heater controls shall be operable from a local mounted control panel at the heater as well as remotely. The local panel shall include a terminal strip for connection to a remote controls by others.

Hot Oil Pumps P-260 and P-265

The hot oil heater system shall include two (2) Dean 3 x 4 x 8.5 Model 3141 pumps that require the motors to be changed from 575 volt to 480 volt, 3 phase, 60 cycle, TEFC, 50 hp, 3600 rpm motors. The pumps and motors are on separate baseplates and not piped to the skid mounted hot oil heater. The interconnecting piping, 4", is by others.

Pressure Relief Valve PSV 2104

The safety relief valve is not supplied by the E-270 vendor. This PRV will be purchased per ChemTech Spec # 6526RVHO.

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6562AS04

LIQUID NITROGEN STORAGE & EVAPORATOR SYSTEM

Applicable Equipment Numbers

E-300 Liquid Nitrogen Storage
E-310 Liquid Nitrogen Evaporator

E-300	Capacity	3,000 gallons of liquid nitrogen	
	Style	Vertical with 3 anchor pads	
E-310	Capacity	3,000 SCFH	Delivery of gas at 130 psig.

Piping for delivery, interconnection between E-300 and E-310, and nitrogen gas connetion all by supplier of system, Air Liquide. This piping and equipment shall include relief valves, liquid level indication and pressure control valves.

Connection for supply of nitrogen gas to be a Mueller 4 bolt for client to extend piping.

Air Liquide to deliver, set, anchor, pipe, and test system. Air Liquide to install fencing and gate around system.

Work by others will include the installation of a concrete foundation pad. Air Liquide shall provide foundation drawings.

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6562AS05

PITCH TANK HOT OIL HEATERS E-201 and E-202

Refer to ChemTech drawing 6526-A003 for arrangement and installation details.

The finned piping is being supplied by American Heating Company (AHC), Cliftion, NJ per their drawing #403-A8-4, dated 7/98.

The pipe is 3" schedule 40 with 3/4" high fins, 0.05" thick with 3 fins per inch, 28' long. Each length of pipe contains 27'-6" of finned surface. Six of these 28' sections are joined with short radius return bends to form a bundle. This configuration is referred to as a 3" x 6 x 28' bundle. AHC is supplying 4 finned pipe supports for each bundle. There are 8 of these heater bundles in the Pitch Tank, T-200, arranged in two hot oil loops. Each hot oil loop contains 4,000 ft^2 of heat transfer surface. Therefore, the total heat transfer surface in T-200 is 8,000 ft^2.

Through each loop will circulate 60 gpm of hot oil, Exxon's Caloria HT-43 heat transfer media (HTM).

	Temperature	Pressure	Flow
Rated Heat Input Based on:			
HTM inlet	550°F	50 psig	60 gpm
HTM discharge	500°F	15 psig	
Normal Operation			
HTM inlet	450°F	50 psig	60 gpm
HTM discharge	500°F	15 psig	

Pitch Temperature to Maintain 450°F

Heat Transferred per loop 700,000 Btu/hr.

The heat loss from the pitch tank, T-200 is 700,000 Btu/hr

Design basis One of the hot oil loops is sufficient to maintain the pitch temperature. The second hot oil loop is for recovery when the Hot Oil Heater may be shut down.

The design basis is a 72°F LMDT and a conservative U of 2.4 Btu/Ft^2/°F.

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Koppers010712

CONFIDENTIAL

STRAINER, PITCH

Item	**S-221 & S-226** = 6" **S-236 & S-239** = 2"	Pipe line basket strainer suitable for 550°F service at 130 psig.
Manufacturer	Viking Pump, Inc. c/o Power Equipment Company 1651 Sunflower Road New Brighton, PA 15066	Or approved equal Phone 724-452-5227 Fax 724-452-7298 Att: Ed Fickess
Process	Fluid Temperature Pressure	Coal Tar Pitch Maximum - 550°F Normal - 450°F Maximum - 30 psig Normal - 25 psig
Construction	Materials Seal Connections Basket Mesh Lid Removal	Ductile Iron Encapsulated Teflon 150# RF Flanged No Mesh, Stainless steel Basket Lid Ease® Design
Viking Model #	S-221 & S-226 S-236 & S-239	F-1 060-F DUC-03 0 For 6" piping Flowrate 300 gpm of 400 cp coal tar pitch F-1 020-F DUC-03 0 For 2" piping Flowrate 13 gpm of 400 cp coal tar pitch

SPECIAL ADDED HEATING JACKETS - Each Strainer shall be fitted and shipped with a plate-type clamp-on heater suitable for heat transfer media at 570°F and 150 psig.

Heating Jacket supplied by

Paul Mueller Company
c/o Thermoflow Equipment
3233 Babcock Boulevard
Pittsburgh, PA 15237-2886

Thomas Korenich
412-366-2012 - Voice
412-367-0842 - Fax

Construction	18 gauge on 18 gauge 304 SS throughout
Connections	Side inlet - 1" NPS, 3000# SW coupling Side outlet - 1" NPS, 3000# SW coupling
Code	ASME, not code stamped

STRAINER, HEAT TRANSFER MEDIA

for pipe 3" and smaller

Item	**S-246** @ P-245 = 3" **S-256** @ P-255 = 3" **S-276** @ P-275 = 3" **S-281** @ P-281 = 3" **S-286** @ P-285 = 3"	Pipe line basket strainer suitable for 575°F service at 130 psig.
Manufacturer	Armstrong International c/o Thermatics P.O. Box 606 Mayview & Baker Lawrence, PA 15055	Or approved equal Phone 724-746-2660 fax 724-746-5705
Process	Fluid HTM Temperature	Exxon's Caloric HT-43 Maximum - 575°F Normal - 550/500°F
	Pressure	Maximum - 115 psig Normal - 18 psig
Construction	Materials Connections Basket Mesh Screen Retainer Type	Cast Steel 600# socket weld 40 x 40 Mesh, Monel Bolted Design with gasket
Armstrong Model #		3-B6SW600 with Bolted Screen Retainer For 3" piping Maximum Flowrate 120 gpm of 1 cp HTM

CONFIDENTIAL Koppers010714

STRAINER, HEAT TRANSFER MEDIA

for pipe 4" and larger

Item	**S-261** @ P-260 = 4" **S-266** @ P-265 = 4"	Pipe line basket strainer suitable for 575°F service at 130 psig.
Manufacturer	Armstrong International c/o Thermatics P.O. Box 606 Mayview & Baker Lawrence, PA 15055	Or approved equal Phone 724-746-2660 fax 724-746-5705
Process	Fluid HTM Temperature	Exxon's Caloric HT-43 Maximum - 575°F Normal - 550/500°F
	Pressure	Maximum - 25 psig Normal - 18 psig
Construction	Materials Connections Basket Mesh Screen Retainer Type	Cast Steel 150# RF Flanged 40 x 40 Mesh, Monel Bolted Design with gasket
Armstrong Model #		4-B6FL 150 with Bolted Screen Retainer For 4" piping Flowrate 410 gpm of 1 cp

CONFIDENTIAL Koppers010715

6562AS08

PRESSURE SAFETY VALVES

PITCH SERVICE

Item	**PSV-2041**	@ P-220	Pitch Transfer Pump
	PSV-2051	@ P-225	Pitch Transfer Pump

Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26JA20L-121	With **"J"** orifice of 1.135 in^2 area
Number Required	Two	At discharge of Pump P-220 and P-225

Service	Fluid	Coal Tar Pitch, Liquid
	Temperature	Max 550°F
	Specific Gravity	1.19
	Viscosity	400 cp
	Capacity	312 gpm
	Set Pressure	130 psig
	Back Pressure	7 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	1.287 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	353 gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	2" 150# RF Flanged
	Outlet	3" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

Remarks: Include plate-type clamp-on heating jacket with 1" socket weld connections.

CONFIDENTIAL Koppers010717

PRESSURE SAFETY VALVE HEATING JACKET for PITCH PRV's

Item	**Warmer for PSV-2041** **Warmer for PSV-2051**	Plate-Type clamp-on heater suitable for HTM service to 600°F and 150 psig.
Purpose	Maintain relief valve temperature by heating with heat transfer media (HTM)	
Manufacturer	Paul Mueller Company c/o Thermoflow Equipment 3223 Babcock Boulevard Pittsburgh, PA 15237-2886	Thomas Korenich (412) 366-2012 fax (412) 367-0842
Process	Heating Fluid	Exxon's Caloria HT 43
	Temperature	Maximum - 575°F Normal 480/520 °F
	Pressure	Maximum - 200 psig Normal - 175 psig
Construction	Materials	18 gauge, 304 stainless steel
	Connections	Side Inlet - 1" NPS, 3000# SW Coupling Side Outlet - 1" NPS, 3000# SW Coupling
	Code	ASTM, Not code stamped

Remarks: Heating Jacket to be supplied with PRV above.

PRESSURE SAFETY VALVES

CONFIDENTIAL Koppers010718

PITCH SERVICE

Item	**PSV-2071** @ P-238 **PSV-2086** @ P-235		Pitch Evacutator Pump Dock Pitch Evacutator Pump
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044		Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26DA20L-121		With **"D"** orifice of 0.11 in^2 area
Number Required	Two	One @ discharge of Pump P-238 One @ discharge of Pump P-235	
Service	Fluid		Coal Tar Pitch, Liquid
	Temperature		Max 550°F
	Specific Gravity		1.19
	Viscosity		400 cp
	Capacity		13 gpm
	Set Pressure		130 psig
	Back Pressure		7 psig (maximum)
	Over Pressure		10%
	Calc. Orifice Area		0.11 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity		26 gpm
Construction	Valve Type		Conventional
	Bonnet Type		Closed
	Cap		Screwed Cap
Connections	Inlet		1" 150# RF Flanged
	Outlet		2" 150 # RF Flanged
Materials	Body		Carbon Steel
	Sleeve Guide		Stainless Steel
	Bonnet & Cap		Carbon Steel
	Spring		Chrome Alloy
	Disc		Stainless Steel
	Nozzles		Stainless Steel

Remarks: Include plate-type clamp-on heating jacket with 1" socket weld connections.

CONFIDENTIAL Koppers010719

PRESSURE SAFETY VALVE HEATING JACKET for PITCH PRV's

Item	**Warmer for PSV-2071** **Warmer for PSV-2086**	Plate-Type clamp-on heater suitable for HTM service to 600°F and 150 psig.

Purpose: Maintain relief valve temperature by heating with heat transfer media (HTM)

Manufacturer: Paul Mueller Company
c/o Thermoflow Equipment
3223 Babcock Boulevard
Pittsburgh, PA 15237-2886

Thomas Korenich
(412) 366-2012
fax (412) 367-0842

Process	Heating Fluid	Exxon's Caloria HT 43
	Temperature	Maximum - 575°F Normal 480/520 °F
	Pressure	Maximum - 200 psig Normal - 175 psig

Construction	Materials	18 gauge, 304 stainless steel
	Connections	Side Inlet - 1" NPS, 3000# SW Coupling Side Outlet - 1" NPS, 3000# SW Coupling
	Code	ASTM, Not code stamped

Remarks: Heating Jacket to be supplied with PRV above.

CONFIDENTIAL Koppers010720

PRESSURE SAFETY VALVES

NITROGEN

Item	**PSV-2206** @ E-310 Exit (Nitrogen Evaporator)	
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26**D**20L-121	With **"D"** orifice of 0.11 in^2 area
Number Required	One	At discharge of Nitrogen Evaporator, E310
Service	Fluid	Nitrogen Gas
	Temperature	Ambient, 30 °F
	Specific Gravity	0.967
	Capacity	4,000 SCFH
	Set Pressure	150 psig
	Back Pressure	0 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	0.0200 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	22,000 acfh
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	1" 150# RF Flanged
	Outlet	2" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

CONFIDENTIAL Koppers010721

PRESSURE SAFETY VALVES

Item	**PSV-2104**	**Hot Oil Heater E-270 (Blocked Flow)**	
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044		Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26MA20L-121		With **"M"** orifice of 3.60 in^2 area
Number Required	One	At discharge of E-270	
Service	Fluid		Exxon Caloria HT-43
	Temperature		Max 575°F
	Specific Gravity		0.73
	Viscosity		1 cp
	Capacity		950 gpm of Hot Oil to satisfy P-260's Pump Curve
	Set Pressure		120 psig
	Back Pressure		34 psig (maximum)
	Over Pressure		10%
	Calc. Orifice Area		2.980 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity		1148 gpm
Construction	Valve Type		Conventional
	Bonnet Type		Closed
	Cap		Screwed Cap
Connections	Inlet		4" 150# RF Flanged
	Outlet		6" 150 # RF Flanged
Materials	Body		Carbon Steel
	Sleeve Guide		Stainless Steel
	Bonnet & Cap		Carbon Steel
	Spring		Chrome Alloy
	Disc		Stainless Steel
	Nozzles		Stainless Steel

CONFIDENTIAL Koppers010722

PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item **PSV-2193** **Hot Oil Thermal Relief to Expansion Tank, T-240**

Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26NA20L-121	With "N orifice of 4.34 in^2 area
Number Required	One	Hot Oil Suction Header Relief to T-240 via Existing 12" Header
Service	Fluid	Exxon Caloria HT-43
	Temperature	Max 575°F
	Specific Gravity	0.73
	Viscosity	1 cp
	Capacity	400 gpm
	Set Pressure	40 psig
	Back Pressure	34 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	3.928 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	441.955 gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	4" 150# RF Flanged
	Outlet	6" 150# RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

CONFIDENTIAL Koppers010723

PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item	**PSV-2127**	**Hot Oil Expansion Tank, T-240 Nitrogen Vent**
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26**H**A20-121 Lowest Cost 7000 or 28xx series OK	With **"H"** orifice of 0.785 in^2 area
Number Required	One	Pressure Relief of Nitrogen from T-240 Designed for Fire-Gas Expansion, ½ tank exposed.

Service	Fluid	Nitrogen gas
	Temperature	Max 500°F
	Specific Gravity	0.97 (Air=1.0)
	Viscosity	n/a
	Capacity	435 gpm displacement rate (3500 ft3/hr)
	Set Pressure	27.5 psig
	Back Pressure	0 psig (maximum)
	Over Pressure	11
	Calc. Orifice Area	0.563 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	40169 ft3/hr
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	1.5" 150# RF Flanged
	Outlet	3" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

CONFIDENTIAL Koppers010724

PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item	**PSV-2173** **PSV-2183**	**Hot Oil Pump P-285 Relief** **(Future) Hot Oil Pump P-290 Relief**
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26**HA**20L-121	With **"H"** orifice of 0.785 in^2 area
Number Required	One (Tag as PSV-2173)	Pressure & Thermal Relief of Hot Oil
Service	Fluid	Exxon Caloria HT-43
	Temperature	Max 575°F
	Specific Gravity	0.73
	Viscosity	1 cp
	Capacity	120 gpm
	Set Pressure	135 psig
	Back Pressure	120 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	0.6980 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	134.957gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	1.5" 150# RF Flanged
	Outlet	3" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

CONFIDENTIAL Koppers010725

PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item **PSV-2163** **Hot Oil Pump P-280 Relief**

Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26EA20L-121	With **"E"** orifice of 0.196 in^2 area
Number Required	One	Pressure & Thermal Relief of Hot Oil - P-280
Service	Fluid	Exxon Caloria HT-43
	Temperature	Max 575°F
	Specific Gravity	0.73
	Viscosity	1 cp
	Capacity	32 gpm
	Set Pressure	135 psig
	Back Pressure	120 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	0.186 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	33.720 gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	1" 150# RF Flanged
	Outlet	2" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

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PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item **PSV-2153** **Hot Oil Pump P-275 Relief**

Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26GA20L-121	With **"G"** orifice of 0.503 in^2 area
Number Required	One	Pressure & Thermal Relief of Hot Oil - P-275
Service	Fluid	Exxon Caloria HT-43
	Temperature	Max 575°F
	Specific Gravity	0.73
	Viscosity	1 cp
	Capacity	150 gpm (To Satisfy Pump Curve)
	Set Pressure	145 psig
	Back Pressure	34 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	0.416 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	181.370 gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	2" 150# RF Flanged
	Outlet	3" 150 # RF Flanged
	Note: Valve Body sized larger than required for "G" orifice.	
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

CONFIDENTIAL Koppers010727

VACCUM BREAKER SPECIFICATION

Tag PSV-2128 for T-240

GENERAL	MANUFACTURER	**Protectoseal** c/o A. Blair Powell Company 210 Riverview Dr (724) 684-0100 Monessen, PA 15062
	MODEL NUMBER	Protectoseal C6242V
	ADD'L MODEL NUMBER	NONE
ELEMENT	MEASUREMENT TYPE	NONE
	BASE MATERIAL	DUCTILE IRON BODY
	COVER MATERIAL	DUCTILE IRON
	INSERT MATERIAL	316 SS INTERNALS
	VACUUM TRIM MATERIAL	TEFLON
	INLET CONNECTION	2" CLASS 150 FLANGE
	OUTLET CONNECTION	NONE
VESSEL DATA	CAPACITY	2000 gallons
	DIAMETER	6 feet
	HEIGHT	10 feet
	RATED VACUUM	5.7 In H^2O
	PRESSURE RELIEF SET AT	27.5 psig.
PROCESS CONDITIONS	FLUID	Air
	TEMPERATURE (min / max)	Ambient
	SPECIFIC GRAVITY	1
	FLASH POINT	N/A
	OPERATING PRESSURE	24 psig.
SIZING CRITERIA		FILLING EMPTYING
	FLOW RATE	820 gpm (two HTM Pumps at 410 gpm each)
	PIPE DIAMETER	2" 150# flanged
	MATERIAL BREATHING	
	THERMAL BREATHING	
	DISCHARGE TO ATMOSPHERE	
	ALLOWABLE ΔP	
ACCESSORIES	INTEGRAL FLAME ARRESTER	No

Rev	Tag Number	Equipment & Service	Set Points oz. / in²	Operating Pressure	Tank Hght	P & I Diagram
1	PSV-2128	Vacuum Breaker for T-240 (Hot Oil Expansion Tank)	2	24 psig		D005

CONFIDENTIAL Koppers010728

6562AS09

API STANDARD 650
STORAGE TANK
DATA SHEET

DATE "November 18, 1998
BY Lawrence A. Mack, ChemTech Consultants
FILE NO. P-CA6526
PAGE 1 OF 3

GENERAL INFORMATION (TO BE COMPLETED BY PURCHASER)

1. PURCHASER/AGENT: KOPPERS Industries, Inc. Att: Jack Stevenson
   ADDRESS: 1005 William Pitt Way
   CITY: Pittsburgh STATE: PA ZIP CODE: 15238-1312 PHONE: 412-826-3962
2. USER: KOPPERS - Liquid Pitch Ship Unloading
3. ERECTION SITE: NAME OF PLANT: KOPPERS - Liquid Pitch Unloading
   LOCATION: Portland Oregon Zip Code 97210-3663 Phone 503-286-3681
4. TANK NO.: T-200 NOMINAL CAPACITY: 2,000,000 gal NET WORKING CAPACITY: 2,017,000 gal
5. PUMPING RATES: IN 1325 gpm OUT 300 gpm
6. MAXIMUM OPERATING TEMPERATURE: 500 F 1.2 @ 390°F See Notes # 2
7. PRODUCT STORED: Coal tar pitch DESIGN SPECIFIC GRAVITY: 1.34 AT 15 °C
   DESIGN METAL TEMPERATURE: Max 500 Min. 20 F VAPOR PRESSURE: 5.8×10^{-2} psi @ 480°F
8. CORROSION ALLOWANCE: SHELL 1/16" INCHES ROOF 1/16" INCHES
   BOTTOM 1/16" INCHES STRUCTURALS 0 INCHES
9. SHELL DESIGN: X BASIC STANDARD 650 ___ APPENDIX A X APPENDIX F
   DESIGN PRESSURE: Minus 2" to Plus 4" WC gage
10. ROOF DESIGN: X BASIC STANDARD 650 ___ APPENDIX C (EXTERNAL FLOATING)
    ___ APPENDIX G (ALLUMINUM DOME) See Note #4. ___ APPENDIX H (INTERNAL FLOATING)
    FRANGIBLE ROOF JOINT? See Note #1. X YES ___ NO
11. ROOF DESIGN INFORMATION
    UNIFORM LIVE LOAD: PONUDS/SQUARE FOOT
    SPECIAL LOADS (PROVIDE SKETCH): POUNDS/SQUARE FOOT
    INSULATION LOAD 6" mineral wool with corrugated aluminum jacket (2 1/2" by 5/8" corrugations) on shell and flat aluminum jacket on roof. POUNDS/SQUARE FOOT Insulation & jacket - 4 #/ft²
    MAXIMUM DESIGN ROOF TEMPERATURE: 400 F
    GASES IN THE VAPOR SPACE: air, N2, pitch fumes
12. EARTHQUAKE DESIGN? X Yes ___ NO (APPENDIX E) ROOF TIE RODS (3.10.4.5) ___ YES X NO
    SEISMIC ZONE: 3 IMPORTANCE FACTOR: 1
    ZONE FACTOR (TABLE E-2): 0.30 SITE COEFFICIENT (TABLE E-3): S4 - Note that the 1997 Uniform
13. WIND LOAD: VELOCITY: 90 MILES/HOUR Building Code, Table 16J, Section 2-30
    PROVIDE INTERMEDIATE WIND GIRDER (3.9.7)? ___ YES X NO specifies a Classification of S_e.
14. ENVIRONMENTAL EFFECTS: MAXIMUM RAINFALL: 2 INCHES/HOUR
    TOTAL SNOW ACCUMULATION: To be determined by the Portland Building Official per UBC 2-390 (UBC is the Uniform Building Code, 1997 Issue)
15. SIZE RESTRICTIONS: MAXIMUM DIAMETER: 79 FEET MAXIMUM HEIGHT: 57 feet shell height FEET
16. FOUNDATION TYPE: ___ EARTH X CONCRETE RINGWALL See Note #3. ___ OTHER

REMARKS

Note #1. Weak shell to roof connection as allowed by API-650. Typical detail of shell to roof joint is shown on drawing 6526-A002, detail #2.
Note #2. Design Sp.G. is to allow contents to cool to 15°C.
Note #3. Foundations by others.
Note #4. Deleted

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API STANDARD 650
STORAGE TANK
DATA SHEET

DATE "November 18, 1998
BY Lawrence A. Mack, ChemTech Consultants
FILE NO. P-CA6526
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OPTION 1

CONSTRUCTION DETAILS (TO BE COMPLETED BY MANUFACTURER AND/OR PURCHASER)

1. MANUFACTURER
   ADDRESS
   CITY STATE ZIP CODE PHONE
   SERIAL NO.
2. FABRICATOR
   ADDRESS
   CITY STATE ZIP CODE PHONE
   SERIAL NO.
3. MATERIAL SPECIFICATIONS: SHELL A-36 minimum
   ROOF A-36 minimum
   BOTTOM A-36 minimum
   STRUCTURALS A-36 minimum
4. NO. OF SHELL COURSES 8
5. PLATE WIDTHS AND THICKNESS (INCLUDING CORROSION ALLOWANCE), IN INCHES: Bottom up — TO BE CONFIRMED BY VENDOR

1	8' x 0.8750"		4	8' x 0.5625"		7	8' x 0.2500"
2	8' x 0.8125"		5	8' x 0.5000"		8	0.2500"
3	8' x 0.6875"		6	8' x 0.3750"		9	

6. TANK BOTTOM: PLATE THICKNESS 3/8 INCHES ___ LAP X BUTT SEAMS
   SLOPE See drawing 5626-A001, Plan of Floor Slope INCH PER FOOT ___ TO ___ FROM CENTER
7. MINIMUM WIDTH AND THICKNESS OF BOTTOM ANNULAR PLATES (3.5) INCHES:
8. ROOF-TO-SHELL DETAIL (FIGURE F-1) 6" minimum overhang to cover insulation. See Notes # 1 and 4
9. INTERMEDIATE WIND GIRDER? ___ YES X NO TOP WIND GIRDER FOR USE AS WALKWAY? ___ YES ___ NO
10. ROOF TYPE: X SUPPORTED ___ SELF SUPPORTED ___ FLOATING
    SLOPE OR RADIUS Cone , 3/4 in 12 INCHES
11. ROOF PLATE: THICKNESS To be determined by Tank manufacturer. INCHES ___ LAP ___ BUTT ___ JOINT
12. PAINT:
    SHELL– EXTERIOR? ___ YES X NO INTERIOR? ___ YES X NO
    SURFACE PREPARATION
    BOTTOM– UNDERSIDE? ___ YES X NO INTERIOR? ___ YES X NO
    SURFACE PREPARATION
    STRUCTURAL STEEL– EXTERIOR? ___ YES X NO INTERIOR? ___ YES X NO
    SPECIFICATION Hot Dipped Galvanized. Handrail painted per OSHA. See Note #9.
13. TANK BOTTOM COATING: INTERIOR? ___ YES X NO MATERIAL
    APPLICATION SPECIFICATION
14. INSPECTION BY: SHOP FIELD X
15. WELD EXAMINATION: RADIOGRAPH X
    SUPPLEMENTARY LIQUID PENETRANT OR ULTRASONIC X
16. FILMS PROPERTY OF Purchaser
17. LEAK TESTING: BOTTOM hydro-test - See Note # 5 and 7 ROOF None
    SHELL hydro-test - See Note # 5 and 7
18. MILLTEST REPORTS: REQUIRED? X YES ___NO
    PLATE STRUCTURAL SHAPES
19. PURCHASER'S REFERENCE DRAWING Drawings 6526-A001, A002, A003 and A006
20. TANK SIZE: DIAMETER 79 FEET HEIGHT 57' Shell Height FEET
21. DATE OF STANDARD 650 EDITION/REVISION Latest

REMARKS

Note #5. Supply all blanks and gaskets for hydro-test. Shell nozzles E-1 and E-2 internal piping shall be connected to tank heating piping by others.

Note #6. Tank heating coil support pads by tank manufacturer.

Note #7. Cost of water for testing by Purchaser. Source of water may be: pumped by tank manufacturer from river, fire hydrant , or city water. Source and scope of work by tank manufacture to be determined at site visit.

Note #8. Insulation by others. Tank manufacture to supply all insulation support rings. Bottom plates shall extend at least 5" beyond shell to accommodate bottom insulation course.

Note #9. All external structural steel to be hot dipped galvanized, ASTM A-123. Galvanized handrail shall be painted yellow per OSHA.

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API STANDARD 650
STORAGE TANK
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APPURTENANCES (TO BE COMPLETED BY MANUFACTURER AND/OR PURCHASER)

1. STAIRWAY STYLE: See Note #10. X CIRCULAR ___ STRAIGHT ANGLE TO HORIZONTAL By Tank Desig DEGREES
   LADDER Not required.
2. WALKWAY: WIDTH See drawing 6526-A001 See Note #10 INCHES LENGTH See drawing 6526-A001 FEET
3. DRAWOFF SUMP: None STANDARD SPECIAL
4. BOLTED DOOR SHEET ___ YES X NO (APPENDIX A TANKS ONLY) ___ RAISED ___ FLUSH
5. SCAFFOLD HITCH
6. INTERNAL PIPING: Only as required per drawings. SWING LINE SUCTION LINE
   See Note #11 & 14 HEATING COIL SURFACE AREA 6,000 SQ. FEET By Others
7. ROOF DRAIN: None required. HOSE JOINTED
   SIPHON
8. NO. AND SIZE OF SHELL MANHOLES 1 36" x 48" As shown on drawings
9. NO. AND SIZE OF ROOF MANHOLES 1 24" Manway also used as Emergency Relief.
10. SHELL NOZZLES (SEE FIGURES 3-4B,3-5, AND 3-7 AND TABLES 3-8,3-9, AND 3-10):

MARK	Number	SIZE	FLANGED			THREADED					ORIENTATION	HEIGHT FROM	SERVICE
			SGL	DBL	SPL	A	B	C	D	E	N = 0	BOTTOM	
A	1	See Note # 12, 14,											Manway
C	2	15 and 16											Outl
E1	2												Heater Inlet
E2	2												Heater Outlet
F	4												Circulation Pipe
G	1												Spare
H	4												Thermometer
J	2												Grounding Boss
K	1												Overflow

11. ROOF NOZZLES, INCLUDING VENTING CONNECTION (SEE FIGURES 3-14 AND 3-15 AND TABLES 3-16 AND 3-17):

MARK	Number	SIZE	FLANGED	THREADED	REINFORCEMENT	ORIENTATION N = 0	DISTANCE FROM CENTER	SERVICE
B	1	See Note # 12, 14						Vent
D	1	15 and 16						Inlet
M	1							Spare
N	1							Manhole & Emergency Relief
P	1							Nitrogen
R	1							High Level
S	1							Level
T	1							Gage Hatch
W	1							PT

NOTE: SKETCHES AND/OR SEPARATE SHEETS MAY BE ATTACHED TO COVER SPECIAL REQUIREMENTS.

REMARKS

Note #10. Spiral stairs, landings and platform designed and installed by tank manufacturer. However, the spiral walkway shall be bolted to clips welded to the shell and extending beyond the insulation.
Allow 1/8" gap between spiral walkway steel and corrugated aluminum jacket.
Bolts and nuts shall be galvanized per ASTM A-153.) The maximum distance between stair supports is 10 raisers.
Handrail, treads, toe plates and landings shall conform to OSHA, including painting.
Note #11 See Note #5 for connection of hot oil heater piping. Tank manufacturer to detail and install all Hot Oil heating support pads.
Note #12. See drawings 6526-A001, A002 and A003 for nozzles sizes and dimensions from shell and roof.. Tables to be completed by tank manufacturer.
Note #13. Outlet nozzle, "C", detail #5, and "F" have been strengthened for external seismic load. Use only full strength welds for these nozzles.
Note #14. All pipe, gaskets, bolts and pipe fittings used for nozzles, or internal piping, shall conform to ASME B31.3, latest addition. Tank manufacturer shall install all
internal piping and pipe supports shown on drawings, except the "heater inlet and outlet piping". Nozzles E-1 & 2 shall terminate with a beveled pipe for welding attachment by others.
Note #15. All nozzles 8" and larger shall be Standard Wall pipe unless specified otherwise on the drawings.
Note #16. Nozzles 6" and under shall be schedule 80 pipe
Note #17. Nozzles marked "C", "F" and "M" shall have a 2 foot square smooth clearance for Purchaser to attach dimpled plate coil type heating jacket.
Note #18. Anchor chairs are not shown on the drawings, but required. Space anchor chairs to avoid nozzles. Refer to drawing 6526-A006.
Anchor chair design must be coordinated with the foundation designer and minimize the Insulator's effort and maximize the effectiveness.
Note # 19. Tank Manufacturer to broom clean tank bottom after hydrostatic testing.

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KOPPERS
INDUSTRIES

ENGINEERING SPECIFICATIONS FOR LIQUID PITCH UNLOADING PORTLAND TERMINAL

November 18, 1998

PROJECT NO. P-6526

ChemTech

ChemTech Consultants, Inc.
1370 Washington Pike
Bridgeville, PA 15017
412-221-1360
FAX: 412-221-5685
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CONSTRUCTION SPECIFICATIONS

For

LIQUID PITCH UNLOADING

Portland Terminal

Project # 6526

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   - 6526AS03 **Hot Oil System** Modifications to Hot Oil Heater E-270; T-240 Expansion Tank Spec.; T-250 Oil Storage Modifications; Clamp-On Heat Transfer Surfaces Specs
   - 6526AS04 **Liquid Nitrogen** Storage & Evaporator Spec #E300/310
   - 6526AS05 **Pitch Tank Hot Oil Heaters** Spec # E-201/202
   - 6526AS06 Not Used
   - 6526AS07 **Strainers** Pitch S-221/226 & S236/239; Hot Oil S-261/266 & S-246/256/276/281/286
   - 6526AS08 **Pressure Relief Valves** Pitch PSV-2041/2051, PSV-2071/2086 Including Hot Oil Warmers; Nitrogen PSV-2206; Hot Oil PSV-2104, PSV-2193, PSV-2127, PSV-2173/2183 PSV-2153 & PSV-2163
   - 6526AS09 **Pitch Tank T-200** API-650 Spec.

MECHANICAL SPECIFICATIONS
LIQUID PITCH UNLOADING
KOPPERS INDUSTRIES
PORTLAND, OR

BY

CHEMTECH CONSULTANTS, INC.

PROJECT P-6526

NOVEMBER 18, 1998

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Appendix B Pitch Tank Civil Work

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1. PROJECT INTRODUCTION

1.1. The purpose of this project is to unload, store and transfer for shipment liquid pitch that has been delivered by ship. This includes (1) new pitch tank, foundations for (2) tanks, pumps, associated piping, hot oil heating system with piping and nitrogen blanketing system.

1.2. Location and Contacts

1.2.1. All work is to be done at the Koppers Industries Plant located at
7540 NW Saint Helens Road
Portland, OR 97210

1.2.2. The Project Manager is Mr. William A. Meisinger, PE
1001 William Pitt Way
Pittsburgh, PA 15238-1362
Telephone 412-826-3962, Fax 412-826-3999
E-mail: bill_meisinger@koppers.com

1.2.3. The Purchasing Manager is Mr. Jack Stephenson
1001 William Pitt Way
Pittsburgh, PA 15238-1362
Telephone 412-826-3907, Fax 412-826-3905
E-mail: jack_stephenson@koppers.com

1.2.4. The Plant Manager is Mr. Amos Kamerer
7540 NW Saint Helens Road
Portland, OR 97210
Telephone 503-286-3681, Fax 503-285-2831
E-mail: amos_kamerer@koppers.com

1.2.5. ChemTech Consultants Project Manager is Dr. Ted Andersen
Fourth Floor
1370 Washington Pike
Bridgeville, PA 15017
Telephone 412-220-4555, Fax 412-220-5685
E-mail: ts_andersen @ chemtech88.com

1.3. Definitions

1.3.1. Koppers Industries, Inc. will be referred to as the Purchaser or Koppers

1.3.2. ChemTech Consultants, Inc. has design responsibility for the phases of the project covered by this specification., and will be referred to as the Engineer or ChemTech.

1.4. All work will be done at the direction of the Koppers' Field Construction Supervisor. The Contractor is expected to supply his own field supervisor to work with Koppers' representative.

1.5. General Requirements and Conditions

1.5.1. It is understood and agreed that the Contractor has, by careful examination, fully satisfied himself as to the nature and location of the work; quality and quantity of material required; and kind of equipment and facilities needed preliminary to and during the performance of the work. The Contractor is aware of the general and local conditions and all other matters which can in any way affect the work.

1.5.2. Work on this project shall commence immediately after the Contractor has received notice from the Purchaser to proceed. The work shall be prosecuted with sufficient personnel, tools, equipment, and material for as many hours per shift and as many shifts per week as may be required to complete the work on or before the specified completion date (Refer to Paragraph 2.3.1)

1.5.3. The Contractor must realize that ChemTech has made every effort to assure that the dimensions given on the drawings are as accurate as possible. However, it is the contractor's responsibility to verify these dimensions before beginning the installation.

1.5.4. The Contractor understands that the final connection of pipelines into existing lines shall be Contractor's responsibility and shall be scheduled with the Construction Superintendent.

1.5.5. It will be the Contractor's responsibility to coordinate his work activities with the Construction Superintendent so as not to interfere with any of the Purchaser's production activities.

1.5.6. The Contractor shall comply with all applicable sections of ASME B31.3 (Normal Fluid Conditions) code for pressure piping and any applicable state and local codes. In case of any conflict with codes, the most stringent requirements shall govern.

1.5.7. The Contractor is expected to perform in a professional, workmanlike manner during the installation of this equipment. He and his personnel will be required to follow the Koppers Safety Rules while in the plant (obtain copies when visiting the plant).

1.5.8. Koppers will designate a laydown area for the Contractor's use during the duration of the project. The Contractor will be responsible for maintaining and working within this area so as not to interfere with Plant activities.

1.5.9. Contractor shall maintain the work site in an orderly condition and provide personnel and supervision to continuously clean up the work area.

1.5.10. The contractor must be aware of the fact that an insulation contractor will be covering equipment and piping runs as they are completed. It will be the mechanical contractor's responsibility to inform the insulation contractor when these items will be available for covering.

1.6. Utilities

1.6.1.1. Koppers will not furnish any utilities for the Contractor's use during this project.

1.6.2. Contractor will furnish

1.6.2.1. All of the electricity required for the job.

1.6.2.2. All fuel used in construction equipment.

1.6.2.3. Compressed air required for power tools and pressure testing.

1.6.2.4. All telephone services or any other communication devices or services required.

1.7. Safety

1.7.1. Contractor should obtain copies of Koppers' Safety Regulations when visiting the plant. These regulations are to be followed by all personnel while working in the plant.

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2. BID AND CONTRACT REQUIREMENTS

2.1. The Contractor is to firm bid all equipment, material, labor and anything else required for a complete installation of all phases of this project as defined by these drawings and specifications.

2.2. Form of bid

2.2.1. The bid is to list separate costs for each of the following work sections.

2.2.1.1. Demolition and Relocation

2.2.1.2. Civil Work

2.2.1.3. Piping & Mechanical

2.2.1.4. Structural Steel

2.2.1.5. Painting

2.2.2. Labor and Material are to be listed separately for each of the above cost centers.

2.2.3. The Contractor is requested to list the following sub-contract information.

2.2.3.1. The number and type of sub-contract expected to be let to complete the job.

2.2.3.2. The names of the sub-contractors which will be used on the job.

2.2.3.3. The value of each sub-contract included in the bid.

2.2.4. The Contractor will submit a construction schedule with his bid. The schedule will be in the form of a Gantt Chart including the staffing requirements required to achieve the completion date.

2.3. Reporting

2.3.1. The Contractor will submit weekly updates to the Purchaser to this schedule detailing the progress achieved.

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2.4. Contract Extra Costs

2.4.1. Once the contract has been let, extra costs will be approved ONLY as follows:

2.4.1.1. In the event the contractor feels an item is an extra cost not covered by the original scope of the contract, he must obtain the agreement, in writing, of the Koppers Field Construction Supervisor.

2.4.1.2. The contractor is to then submit an estimate of the cost required to perform the extra work.

2.4.1.3. An additional sheet to the original purchase order will be issued to cover the extra cost.

2.4.1.4. No extra costs will be honored which have not been first authorized in this manner.

3. SCOPE OF WORK

3.1. This Construction Specification is intended to provide for the supply and installation of all civil, mechanical and painting to complete the project. In general the following work is included:

3.1.1. Demolition

3.1.1.1. The site must be cleared of all buildings, structures or any other obstructions before construction can begin.

3.1.2. Civil Work

3.1.2.1. Supply all labor and material for foundations and concrete work in the pitch storage area including foundations for the following:

3.1.2.1.1. Pitch Pumps P-220, 225, 230, 235

3.1.2.1.2. Hot Oil Pumps P-255, 275, 280, 285, 290

3.1.2.1.3. Liquid Pitch Tanks T-200, 210

3.1.2.1.4. Hot Oil Heater E-270

3.1.2.1.5. Primary Hot Oil Pumps P-260, 265

3.1.2.1.6. Hot Oil Drain & Charging Tank T-250

3.1.2.1.7. Nitrogen Storage Pad

3.1.2.1.8. Pipe supports

3.1.2.1.9. Pipe "sleepers"

3.1.2.1.10. Pitch area floor & curb

3.1.2.1.11. Pipe bridges #1 & #2

3.1.2.1.12. Trench and Collection Sump

3.1.2.1.13. MCC/ Control Room extension

3.1.2.1.14. Pitch Pump Shed

3.1.2.1.15. Hot Oil Pump Shed

3.1.2.1.16. Foundations in the Pitch Unloading Line Area

3.1.3. Piping & Equipment Installation

3.1.3.1.Supply and install the following pipe lines.

3.1.3.1.1.Pitch unloading line

3.1.3.1.2.Pitch circulating lines

3.1.3.1.3.Pitch evacuation lines

3.1.3.1.4.Hot oil supply and return lines

3.1.3.1.5.Hot oil tracing

3.1.3.1.6.Fume line

3.1.3.1.7.Natural gas line

3.1.3.1.8.Nitrogen lines

3.1.3.1.9.Steam lines

3.1.3.1.10.Steam tracing

3.1.3.1.11.Condensate lines

3.1.3.1.12.Sump discharge line

3.1.3.2.Install the following equipment

3.1.3.2.1.Four (4) pitch pumps P-220, 225, 235, 238

3.1.3.2.2.Four (4) pitch pump strainers S-221, 226, 236,239

3.1.3.2.3.Four (4) hot oil pumps P-255, 275, 280, 285

3.1.3.2.4.One (1) hot oil heater, stack and control panel E-270

3.1.3.2.5.Eight (8) pitch tank hot oil heaters. Four (4) each on E-201, 202

3.1.3.2.6.Two (2) hot oil transfer pumps P-260, 265

3.1.3.2.7.One (1) hot oil fill and drain pump P-245

3.1.3.2.8.One (1) hot oil expansion tank T-240

3.1.3.2.9.One (1) hot oil drain and charging tank T-250

3.1.3.2.10.One (1) sump pump P-320

3.1.3.2.11.Tank shell plate coils and tank nozzle plate coils

3.1.4. Structures

3.1.4.1.Supply and install structural pipe supports in the liquid pitch storage area.

3.1.4.2.Supply and install MCC/Control Room extension

3.1.4.3.Supply and install Pitch Pump Shed

3.1.4.4.Supply and install Hot Oil Pump Shed

3.1.4.5.Supply and install Pipe Bridges #1 & #2

3.1.5. Painting

3.1.5.1.All exposed steel will be Hot Dipped Galvanized

3.1.5.2.Paint all bare pipe (nitrogen and natural gas). Exclude galvanized sump discharge pipe

3.1.5.3.Paint all hand rail and toe plates over galvanized surface.

3.2. Equipment and Materials

3.2.1. In general, Koppers will furnish all major equipment and instruments. It will be the contractor's responsibility to unload store, safe-keep and install these items. The contractor is to provide a lockable trailer for this purpose.

3.2.2. Koppers will furnish

3.2.2.1.Four (4) pitch pumps P-220, 225, 235, 238

3.2.2.2.Four (4) pitch pump strainers S-221, 226, 236, 239

3.2.2.3.Four (4) hot oil pumps P-255, 275, 280, 285

3.2.2.4.One (1) hot oil heater and stack E-270

3.2.2.5.Eight (8) pitch tank hot oil heaters. Four each on E-201, 202

3.2.2.6.Two (2) hot oil transfer pumps P-260, 265

3.2.2.7.One (1) hot oil fill and drain pump P-245

3.2.2.8.One (1) hot oil expansion tank T-240

3.2.2.9.One (1) hot oil drain and charging tank T-250

3.2.2.10.One (1) sump pump P-320 (relocate existing)

3.2.2.11.All instruments, control valves, transmitters, indicators, thermocouples and thermal wells

3.2.2.12.All permits

3.2.3. Liquid pitch storage tank T-200 will be installed by others and is not part of this contract.

3.2.4. The nitrogen storage equipment will be furnished by the nitrogen supplier. The contractor is responsible for the pad.

3.2.5. In general, the Contractor is responsible for all labor, materials, tools, and supervision necessary to complete the installation of the entire project. The Contractor is to supply all materials necessary for the complete installation of the entire project with the exception of those items specifically noted as being supplied by Koppers.

3.2.6. The Contractor is responsible for, but not limited to, the supply of the following items:

3.2.6.1.All structural steel, pipe supports and bridges.

3.2.6.2.All piping, valves, fittings, flanges, gaskets, studs and nuts.

3.2.6.3.Stainless steel tracing, fittings and silver solder.

3.2.6.4.All field supplies, weld rod, industrial gases, grout etc.

3.2.6.5.All tools and construction materials.

3.2.6.6.All temporary construction service facilities for field labor including field labor.

3.3. Storage

3.3.1. The contractor will be responsible for unloading, storing and safe-keeping all equipment and material pertaining to the mechanical part of this project.

3.3.2. A locked trailer and or area is to be provided at a site designated by Koppers for storage

3.3.3. Contractor must have personnel available to unload and store equipment purchased and received by Koppers as well as material he has purchased and received.

3.4. Standard Specifications and Codes:

3.4.1. All work performed at Koppers, Portland, OR is to be accomplished within, but not limited to the adherence of the following codes and standards:

3.4.1.1. National codes

3.4.1.2. All work and equipment covered herein shall conform to current editions of all applicable national codes and standards of the following organizations.

ACI American Concrete Institute

AISC American Institute of Steel Construction

ASME American Society for Mechanical Engineers.

ASCE American Society for Civil Engineers.

ASTM American Society for Testing Materials

AWS American Welding Society

NEC National Electric Code

OSHA Occupational Safety and Health Act

SSPC Steel Structures Painting Council

UBC Unified Building Code (Oregon Amendments)

3.4.1.3. All applicable requirements of pertinent federal, state, and municipal laws, regulations, codes, standards or ordinances.

3.4.2. Reference herein and in other attached documents to these and other standards and codes is to the editions thereof in effect as of the date of the Contract.

3.4.3. Where compliance with two or more industry standards or sets of requirements are specified and overlapping of those different standards or requirements establish different or conflicting minimums, the most stringent requirement is intended and will be enforced, unless specifically detailed language written into the Specification clearly indicates that a less stringent requirement is to be fulfilled.

3.4.4. The Contractor is to report any conflict between the various codes or between any code and Specification to the Koppers Project Manager for interpretation and decision.

3.5. General

3.5.1. The Contractor is to follow the guidelines listed within the drawings.

3.5.2. All piping work shall be done in accordance with the ASME Power Piping Code B 31.3 for Chemical Plants and Process Piping. All fluids are considered as "Normal Fluid Service".

3.5.3. All repairs and/or replacements thereof are to be made with equal or better materials.

3.5.4. All piping repairs to be made with appropriate materials for the service intended. Contractor shall coordinate with Purchaser for material specifications.

3.5.5. All Hot Work permits required for the project are the joint responsibility of the Purchaser and the Contractor.

4. DEMOLITION AND RELOCATION

4.1. The Liquid Pitch Storage Area must be cleared of all obstructions before construction can proceed.

4.2. The following drawing applies to work in this area.

6526-G002 Liquid Pitch Unloading General Arrangement

4.3. The Contractor is responsible for supplying all labor, material and equipment for completing all work in this area.

4.4. There is no specific material or equipment that will be supplied by the Purchaser in this section.

4.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

4.6. The Contractor is to dismantle and remove or relocate all obstructions in the Liquid Pitch Storage Area.

4.6.1. The locations of these obstructions are indicated on drawing 6526-G002 General Arrangement.

4.6.2. The Contractor is responsible for, but not limited to, removing the following obstructions.

4.6.2.1. Weigh shed

4.6.2.2. Two (2) horizontal tanks

4.6.2.3. One (1) vertical column

4.6.2.4. Four (4) pipe supports

4.6.2.5. One (1) tank car loading station

4.6.2.6. One (1) truck loading gangway

4.6.2.7. One (1) pitch pipe manifold

4.6.2.8. Maintenance building

4.6.2.9. All piping , electrical conduit and foundations associated with the equipment and structures

4.6.3. Relocate one (1) sump pump and remove discharge line to post tower

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4.6.3.1.Note: Relocated sump pump P-320 will connect to this line. Do not remove any more pipe than necessary.

4.6.4. Relocate tank car heating station. This will require relocating heating panels and associated electrical equipment, conduit and wiring.

4.6.4.1.A support structure and foundation must be supplied for the panels at a new location. See drawing 6526-G002

4.6.5. The Contractor will be responsible for removing any other above ground obstructions with associated foundations in this area that is not listed here or indicated on the drawing.

4.6.6. For special requirements for subsurface conditions, refer to Appendices B & D

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5. CIVIL WORK

5.1. This section covers the foundations and concrete work for the Liquid Pitch Storage Area of this project. The installation of a grounding loop is also in this section.

5.2. The following drawings apply to work in this section.

6526-C001	Hot Oil Pump Shed - Foundation Plan & Sections
6526-C002	Hot Oil Heater E-270 - Plan, Section & Details
6526-C003	Pipe Support Foundations - Plan, Section & Details
6526-C004	Pump Foundation Plan & Sections
6526-C005	Storage Tank Ares - Foundation Location Plan
6526-C006	Storage Tank Area - Foundation Sections & Details
6526-E006	Grounding Plan
6526-E007	Grounding Details
6526-E012	Conduit Routing & MCC Grounding
6526-G002	General Arrangement

Topographical Survey Map

Nitrogen Pad

5.3. The Contractor is responsible for supplying all labor, material and equipment for all work in this section. This includes, but is not limited to the following:

5.3.1. All materials necessary for site preparations, excavations, ground leveling, final yard dressings, etc. necessary for the installation.

5.3.2. All concrete, concrete reinforcements, anchor bolts, cinch anchors etc. necessary for the installation.

5.3.3. All electrical wiring, cable, grounding rods and any other material necessary for the grounding loop.

5.3.4. All necessary safety equipment required by any and all Federal, State, and Local Codes.

5.4. There is no specific material or equipment that will be supplied by the Purchaser in this section.

5.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

5.6. The foundations and piling for the Liquid Pitch Tank is not included in this specification. Refer to Appendix B. Note: Two (2) Liquid Pitch Tank foundations will be included even though only one (1) tank will be installed at this time.

5.7. Any civil work associated with the pitch unloading line from the dock to the Liquid Pitch Storage Tank is not included in this specification. Refer to Appendix C.

5.8. The existing railroad track at the Liquid Pitch Unloading Area must remain open during construction. This is not part of this specification. For construction methods, refer to Appendix B.

5.9. The relocated heating station will require a foundation for the support structure.

5.10. Electrical grounding loop

5.10.1. The Contractor is to supply and install an electrical grounding loop around the Liquid Pitch Storage Area and the Hot Oil Heating Area as shown on drawings 6526-E006, 6526-E007 & 6526-E012

5.10.2. The grounding system shall be installed in strict compliance with Article 250 of the National Electric Code.

5.10.3. Refer to drawings 6526-E0006 and 6526-E0012 for location of stub-ups.

5.10.3.1. At stub ups around the process perimeter, pigtails are to be of length adjustable to reach final termination point. They are to be coiled, wrapped in plastic and taped to make ready for final installation.

5.10.4. See drawing notes for materials and connection techniques.

5.10.5. The Contractor shall be responsible for testing the installed grounding loops and inspecting that the installation is in accordance with the drawings and specifications. Tests to be included, witnessed and reported are listed below.

5.10.5.1. Continuity tests to establish grounding system integrity.

5.10.5.2. Three point Fall-of-Potential tests to establish grounding system resistance to earth. Tests are to be taken at wells in opposite corners of the process.

5.10.5.3. The construction superintendent shall be notified of upcoming tests to witness.

5.10.5.4. A brief written report shall be submitted to the Engineer within one week of tests stating the results of the tests.

5.11. Equipment and structural foundations

5.11.1. The Contractor is to supply all labor and material necessary to install concrete foundations for the following equipment and structures.

5.11.1.1.Pitch Pumps P-220, 225, 230 Refer to drawing 6526-C005 for details. Note: Pump P-230 will not be purchased at this time.

5.11.1.2.Pitch Pump P-238 Refer to drawing 6526-C004 for details.

5.11.1.3.Hot Oil Pumps P-255, 275, 280, 285, 290 Refer to drawing 6526-C004 for details. Note: Pump P-290 will not be purchased at this time.

5.11.1.4.Hot Oil Heater E-270 & Stack Refer to drawing 6526-C002 for details.

5.11.1.5.Hot Oil Pumps P-260, 265 Refer to drawing 6526-C002 for details.

5.11.1.6.Hot Oil Drain & Charging Tank T-250 Refer to drawing 6526-C002 for details.

5.11.1.7.Hot Oil Pump P-245 Refer to drawing 6526-C002 for details.

5.11.1.8.Control/MCC Building extension Refer to drawing 6526-C002 for details.

5.11.1.9.Hot Oil Pump Shed Refer to drawing 6526-C001 for details.

5.11.1.10.Pitch Pump Shed Refer to drawing 6526-C005 for details.

5.11.1.11.Pipe supports & bridge Refer to drawing 6526-C005 for details.

5.11.1.12.Pipe support "sleepers". Refer to drawing 6526-C005 for details. Note: Cinch anchors are to be included on these structures to permit installation of structural steel beams.

5.11.1.13.Nitrogen pad Refer to vendor PE Stamped drawing for details.

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5.12. Liquid Pitch Storage Area concrete floor and curb

5.12.1. A concrete floor with a curb will be installed at the Liquid Pitch Storage Area. Refer to Appendix B

5.12.2. A trench and sump will be installed in the floor for drainage. Refer to Appendix B

5.13. Asphalt Repairs

5.13.1. The Contractor will be responsible for repairing existing asphalt. Refer to drawing 6526-G002 for repair or replacement procedure.

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6. PIPING AND EQUIPMENT INSTALLATION

6.1. This section covers the installation of all pipe lines in the Liquid Pitch Storage Area. The instruments that are installed in the pipe lines are included. Also included is the installation of the equipment.

6.2. The following drawings apply to work in this section.

6526-A001	Pitch Storage Tank T-200, Plan, Elev., Section & Details
6526-A002	Pitch Tank T-200 Details
6526-A003	Pitch Tank Hot Oil Heaters E-201, 202 Plan & Details
6526-D002	Mechanical Legend Sheet P & I Diagram
6526-D003	Instrument Legend Sheet P & I Diagram
6526-D004	Pitch Tanks T-200 & T-210 P & I Diagram
6526-D005	Hot Oil System P & I Diagram
6526-D006	Hot Oil Distribution P & I Diagram
6526-D007	Bulk Nitrogen System P & I Diagram
6526-D008	Miscellaneous Utilities P & I Diagram
6526-D009	Existing Hot Oil Distribution Modifications P & I Diagram
6526-G002	General Arrangement
6526-P001	Piping Plan
6526-P002	Pitch Piping at Tk Outlet to Pumps, Hot Oil, N_2, Stm Trac.
6526-P003	Pitch Tank Piping - Section
6526-P004	Pitch Tank Area - Piping _ Sections
6526-P005	Hot Oil Expansion Tank - Plan & Sections
6526-P006	Hot Oil Shed Piping - Plan & Sections
6526-P007	Hot Oil Shed Piping - Sections
6526-P008	Hot Oil Sections & Details 1/3
6526-P009	Hot Oil Sections & Details 2/3

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6526-P010	Hot Oil Sections & Details 3/3
6526-P011	Existing Hot Oil System - Piping Isometric - Revisions
6526-P012	Hot Oil System Tracing Details
6526-P013	Hot Oil Tracing Isometrics
6526-P014	Tie Point Details
6526-P015	Pipe Supports/Anchors - Sheet 1 of 2
6526-P016	Pipe Supports/Anchors - Sheet 2 of 2
6526-P017	Plan Steam to Maintenance Building
6526-P018	Steam to Maintenance Building - Sections & Details
6526-A006	Hot Oil Drain & Charging Tank T-250

6.3. The Contractor is responsible for supplying all labor , equipment and material in this section with the exception of those items specifically listed as supplier by the Purchaser. The Contractor will supply but not be limited to the following items.

6.3.1. All piping, valves and fittings.

6.3.2. All miscellaneous piping items such as flanges, nuts, studs, bolts, gaskets, etc..

6.3.3. All materials necessary for the complete installation of all pipe supports, hangers, pipe anchors, guides etc.

6.3.4. All gaskets for piping, as specified on the above drawings.

6.3.5. All studs and nuts for pipe assembly shall be Alloy Studs ASTM A-193 Grade B-7 with American Standard Heavy Hex Nuts A-194 Class 2H, as specified on the above drawings.

6.3.6. All tracing, fittings and soldering materials.

6.3.7. All mobile equipment, cranes, welding machines, pipe threaders, etc..

6.4. The Purchaser will provide the following equipment and material.

6.4.1. Four (4) pitch pumps P-220, 225, 235, 238

6.4.2. Four (4) pitch pump strainers S-221, 226, 236, 239

6.4.3. Four (4) hot oil pumps P-255, 275, 280, 285

6.4.4. One (1) hot oil heater, stack and control panel E-270

6.4.5. Eight (4) pitch tank hot oil heaters, four (4) each for E-201, 202

6.4.6. Two (2) hot oil transfer pumps P-260, 265

6.4.7. One (1) hot oil fill and drain pump P-245

6.4.8. One (1) hot oil expansion tank T-240

6.4.9. One (1) hot oil drain and charging tank T-250

6.4.10. One (1) sump pump P-320 (relocate existing sump pump)

6.4.11. All instruments, control valves, transmitters, indicators, thermocouples and thermal wells

6.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

6.6. The Pitch Storage Tank T-200 will be installed by the tank fabricator and is not the Contractor's responsibility.

6.7. The liquid pitch unloading line that runs from the dock to inlet connection on Tank T-201 is not part of this specification. This includes any associated supports and Pitch Pump P-235. Refer to Appendix C

6.8. Equipment installation

6.8.1. Purchaser furnished equipment shall be handled and installed strictly in accordance with the manufacturers' recommendations.

6.8.2. The Contractor shall locate, assemble as required, erect, orient, align, shim to required elevation, grout in place and shall perform all other work including lubrication and checking rotation and instrumentation necessary to install Purchaser-furnished equipment complete and ready to operate.

6.8.3. The following equipment is to be set and piped up as shown on the drawings. Refer to General Arrangement Drawing 6526-G002 for general equipment location..

6.8.3.1. Pitch Pumps P-220, 225 are gear pumps 312 gpm @ 130 psid, 50 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P220

6.8.3.2. Pitch Pump P-238 is a gear pump 13 gpm @ 120 psid, 3 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P235

6.8.3.3. Hot Oil Pump P-255 is a centrifugal pump 25 gpm @ 75' head, 2 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P255

6.8.3.4. Hot Oil Pump P-275 is a centrifugal pump 32 gpm @ 320' head, 15 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P275

6.8.3.5. Hot Oil Pump P-280 is a centrifugal pump 30 gpm @ 82' head, 3 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P280

6.8.3.6. Hot Oil Pump P-285 is a centrifugal pump 120 gpm @ 95' head, 5 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P285

6.8.3.7. Hot Oil Pumps P-260, 265 are centrifugal pumps 410 gpm @ 290' head, 50 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P260

6.8.3.8. Hot Oil Pump P-245 is a centrifugal pump 25 gpm @ 75' head, 2 HP. The pump and motor are delivered mounted to a common baseplate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526P245

6.8.3.9. Hot Oil Heater E-270 is a natural gas fired heater with a rating of 8 million BTU/Hr. It includes a 2 HP blower all mounted on a common base plate. They will be bolted to anchor bolts on a foundation installed in the civil part of this project. Refer to specification 6526E270

6.8.3.10.Pitch Heaters E-201, 202 (4 heaters each) are fin tube heaters and are installed inside Pitch Tank T-200. Refer to drawing 6526-A003 for details on the installation and specification 6526E201 for details on the heaters.

6.8.3.11.Hot Oil Expansion Tank T-240 is a horizontal carbon steel tank that will be located on top of an existing structure (24' height). There is an existing tank on this structure that will have to be removed before the new tank can be installed. Refer to specification 6526T240.

6.8.3.12.Hot Oil Drain & Charging Tank T-250 is a horizontal carbon steel tank that will be attached to anchor bolts on a foundation installed in the civil part of this project. See specification 6526T250.

6.8.3.12.1.The Contractor will be required to install a new nozzle on this tank. See specification 6526T250 for details and drawing 6526-A004 for the location.

6.8.3.12.2.This tank should be installed before the installation of Tank T-250. The existing tank that Tank T-250 is to replace is full of oil. This oil can be drained into the new Tank T-240 prior to removal.

6.8.3.13.Sump Pump P-320 is the existing sump pump that will be relocated to the new Rain Water Collection Sump. This pump must be revamped to fit the new sump.

6.9. Piping installation

6.9.1. The Contractor will be responsible for supplying and installing all piping in the Pitch Storage Area. This includes but is not limited to the following pipe lines.

6.9.1.1.Pitch circulating lines

6.9.1.2.Pitch evacuation line

6.9.1.3.Hot oil supply and return lines

6.9.1.4.Hot oil tracing

6.9.1.5.Fume line

6.9.1.6.Nitrogen lines

6.9.1.7.Natural gas line

6.9.1.8.Steam lines

6.9.1.9.Steam tracing

6.9.1.10.Condensate lines

6.9.1.11. Sump line

6.9.1.12. Drip Pan drain line.

6.9.1.13. Heavy Oil line.

6.9.1.14. Reroute PVC Sewer (T-250 Area)

6.9.2. Refer to pipeline commodity list in Appendix A for list of required lines.

6.9.3. The details for this piping are shown on piping drawings 6526-P001 through 6526-P018.

6.9.4. Refer to Pipeline Specification and Material of Construction 6526-PS01 for details on the piping materials of construction.

6.9.5. The Contractor's work shall include but not be limited to the following:

6.9.5.1. Purchase all materials according to the specifications and drawings provided. Should the Piping Contractor, after a through review of the drawings provided, have questions regarding details or material specifications, or be uncertain of any details or intent of the drawings, they shall contact ChemTech's project manager as soon as possible for resolution.

6.9.5.2. The Piping Contractor shall attend all project planning, scheduling and safety meetings held by Koppers, or other on-site contractors that interface with the piping. Part of this responsibility is to assure that water is not injected into any piping that will contain pitch, pitch vapor or hot oil.

6.9.5.3. All pressure testing of this piping shall be done using compressed air that has passed through a pressure receiver sized by the compressor manufacturer for moisture removal, including a automatic water removal device. This supply of air for pressure testing shall be supplied by the Piping Contractor. Pressure testing shall be performed at 110% of the design pressure of the pipe as specified on specification 6526-PS01. Water shall not enter, in any way, pitch or hot oil piping since it has the potential to cause an explosion during heatup of the system.

6.9.5.4. Purchase secure, store, handle, install and pressure test all piping, fittings, valves, pipe anchors, guides and rests, etc., for the project, including all blanks and gaskets for pressure testing.

6.9.5.5. Coordinate all insulation work. Most of the pitch and vent piping require that the pipe be installed and tested, then insulation applied, followed with heat up under pressure with final tightening of flanges, before final insulation. It is the responsibility of the Piping Contractor to coordinate and turn over to the Insulation Contractor sections of pipe as soon as possible so that the Insulation Contractor can maintain schedule. This must be done by clearly marking and recording completed piping work, including testing, so that there is no re-work of insulation or metal jacketing.

6.9.5.6. Dismantle existing piping manifold as per section CC on drawing 6526-P003. Rebuild plug valves for new manifold

6.9.5.7. Install the hot oil traced pitch and steam traced vent piping, and the hot oil piping per drawing 6526-P001 and pressure test per ASME 31.3. All tracing connections are silver soldered using Eutectic Xuper XFC rod, Eutectic-Silweld 1618 flux.

6.9.5.7.1. All steam tracing will be 1/2" stainless steel tubing. Hot oil tracing will be 1" or 1-1/2" piping. All pitch lines & vent lines will be traced. Refer to drawing 6526-P003 for steam tracing and drawings 6526-P012 and 6526-P013 for hot oil tracing details.

6.9.5.8. Install and pressure test the hot oil supply and return piping.

6.9.5.9. Install and pressure test the nitrogen piping. Since the nitrogen will be used to purge the pitch tanks, and the hot oil expansion tank and supply all instruments that require it, this piping shall be pressure tested with compressed air, or nitrogen, as previously specified. Refer to drawing 6526-P001

6.9.5.10. Install and pressure test natural gas piping to Hot Oil Heater E-270. Refer to drawing 6526-P005.

6.9.5.11. Install and pressure test steam line to Maintenance Shop. Refer to drawing 6526-P017.

6.9.5.12. Install sump line from sump pump P-320 to existing line. This is the line that connected to the original sump pump that was removed at the beginning of construction on this project. Refer to drawing 6526-P001

6.9.5.13. Install condensate lines. Refer to drawing 6526-P002

6.9.5.14. After the pitch tank is hydrostatically tested with water (the only water injected into any vessel or pipe that will contain pitch or hot oil) it will be turned over to Koppers who will remove all water before turning it over to the Piping Contractor for connecting the piping. The Piping Contractor shall remove and dispose of the blanks on the tank prior to making the piping connections. Where necessary, these blanks or new blanks shall be installed for pressure testing and then removed after elimination of all leaks. Where

valves are on the tank nozzles, they may be used in the shut-off position for pressure testing, or blanks installed prior to the valves.

6.9.5.15. The Contractor shall install the thermocouples and wells in the piping as shown on the drawings, but will not be responsible for wiring.

6.9.5.16. Install all instruments in the piping as shown on the piping and P&ID drawings. Note: The pipelines must be pressure tested using by-passes before installation of the instruments.

6.9.5.17. Install the instruments, relief valves, nitrogen purge devices, etc., as shown on the P&ID's and Tank drawings.

6.10. Revisions are required to the existing hot oil system. Refer to drawing 6526-P011 for details.

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7. STRUCTURES

7.1. This section includes the structural steel pipe supports, and building structures in the Liquid Pitch Storage Area.

7.2. The following drawings apply to work in this section.

6526-E010	Lighting Enlarged Plans
6526-G002	General Arrangement
6526-S001	Hot Oil Pump Shed & General Steel Notes
6526-S002	Pitch Pump Shed & Pipe Bridge #2 - Plans,, Detail & Sect.
6526-S003	Pitch Pump Shed & Pipe Bridge #2 - Sections & Details
6526-S004	Pipe Bridge #1 - Plan, Elevations & Details
6526-S005	Pipe Supports Elevations & Details
6526- S006	Pipe Support Location & Plan

7.3. The Contractor is responsible for supplying all labor, equipment and material in this section. The Contractor will supply but not be limited to the following items.

7.3.1. All structural steel necessary for the installation of all pipe and yard supports as shown on the drawings. This includes structural "attachments" to the concrete pipe "sleepers"

7.3.2. All miscellaneous hardware and small parts, nuts, bolts, washers, etc. necessary for the installation. For structural steel assembly use American Standard Regular Hex Head bolts with American Standard Heavy Cold Pressed Hex Nuts.

7.3.3. All lumber, plaster board siding and roofing materials required for the extension to the MCC/Control Room.

7.3.4. All structural steel, siding and roofing materials required for the construction of the Pitch Pump & Hot Oil Pump Sheds.

7.4. There is no specific material or equipment that will be supplied by the Purchaser in this section.

7.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

7.6. All structural pipe supports for the pitch unloading line between the dock and Pitch Tank T-200 are not part of this specification. Refer to Appendix C

7.7. All exposed structural steel will be galvanized before installation.

7.7.1. After installation of equipment and appurtenances, all damaged and abraded areas of galvanized surfaces shall be cleaned and re-coated using cold galvanizing compound, applied as per manufacturer's instructions.

7.8. The Contractor is to supply all material and labor required for the erection of the following structures.

7.8.1. Pitch Pump Shed is an open sided steel structure with a roof. Refer to drawing 6526-S002 & 6526-S003 for details.

7.8.1.1. All steel and hardware (nuts, bolts, washers etc.) is to be galvanized.

7.8.2. Hot Oil Pump Shed is a steel structure with two (2) open sides, Two (2) closed sides and a roof. Refer to drawing 6526-S001 for details.

7.8.2.1. All steel and hardware is to be galvanized.

7.8.3. MCC//Control Building is an existing wooden structure that will be extended to accommodate additional equipment. South end of the existing building is to be removed. The addition is to be 12'x14' and match the existing structure

7.8.3.1. The roof to be 22 gage steel

7.8.3.2. Wood siding to match existing structure. Provide 8'-0' side walls (2x4's @ 16" c/c), 1/2" thick plasterboard, (2x6's roof framing 16" c/c) with R-19 insulation @ walls & roof

7.8.3.3. Ceiling tile is to be 2'x4' with suspension grid to match to match the existing

7.8.3.4. Paint to match the existing. Roof to be blue. Siding to be white. Paint the entire interior.

7.8.3.5. Refer to drawing 6526-E010 for lighting details

7.9. Structural steel pipe supports

7.9.1. Contractor will fabricate and install all structural steel pipe supports in the Liquid Pitch Loading Area. Refer to drawing 6526-S005 for details.

7.9.2. Fabricate and install pipe bridge #1 and pipe bridge #2 tower. Refer to drawings 6526-S002 through 6526-S004.

7.9.3. This steel and hardware is all to be galvanized.

8. PAINT

8.1. This section is for the painting of all noninsulated (bare) carbon steel pipe not including the galvanized sump line. It also includes safety painting of all handrail and toe plate. All other steel is galvanized and does not require painting.

8.2. Refer to Koppers for painting specifications.

8.3. The Contractor is responsible for all labor, material and equipment required in this section.

8.4. There is no specific material or equipment that will be supplied by the purchaser in this section.

8.5. Items to be painted

8.5.1. All bare carbon steel pipe not including galvanized sump line.

8.5.1.1. The pipelines requiring painting are all nitrogen and natural gas piping.

8.5.2. All hand rail and toe plates are to be painted safety yellow over the galvanized surface. This includes all handrail and toe plate associated with Pitch Tank T-200

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9. COMMISSIONING AND GENERAL INSTALLATION NOTES

9.1. It is the intent of this Contract that the Contractor commission all installations that are their responsibility. The following is required of the Contractor.

9.2. Pipeline testing procedures

9.2.1. All pipelines shall be pressure tested in accordance with ASME Code for Pressure Piping, B31.3. Additionally, all welds over water are to be x-rayed, with the boundry as detailed on the piping drawings.

9.2.2. All pipelines and tracers are to be pneumatically tested. Use no water.

9.2.3. Piping sections are to be isolated using blind flanges or slip blanks as required. Valves may be used for isolation, but they shall be tested for leaks as part of the piping system.

9.2.3.1. Do not include process vessels, or tanks in the pressurized testing.

9.2.3.2. The Contractor is responsible for supply of all slip blanks and/or blind flanges and gaskets required for the testing.

9.2.3.3. The Contractor is responsible for replacement of gaskets destroyed during the tests.

9.2.4. Pipeline valves shall be installed and in the open position during the test, except where they are used to isolate a section or piping system.

9.2.5. All pipe and tracing is to be pneumatically tested to 110% of the design pressure listed on specification 6526-PS01

9.2.5.1. The compressor hookup to the piping system is to include a shutoff valve. On the piping side of the shutoff valve is to be installed a pressure gauge, a vent valve, and a relief valve set to the test pressure.

9.2.5.2. Pressurize the piping system to 25 psig, then shut the valve to the compressor. Perform a preliminary check for leaks in the piping system.

9.2.5.3. If no leaks are found at 25 psig, pressurize the piping system to the test pressure in increments of 10 psig. After each increase in pressure, shut the valve at the connection and wait 3-5 minutes to permit piping stresses to equalize. During these periods inspect the piping for leaks. All steam traced lines are to be additionally hot tested with steam before insulation is applied.

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9.2.5.4. Once the test pressure is reached, shut the valve at the connection and hold the system at the test pressure long enough to equalize piping strains. Then reduce the pressure to the design pressure before examining the piping system for leakage.

9.2.5.5. Proceed with the leak detection at the design pressure. Leak detection and inspection shall consist of thoroughly wetting every weld, flange, threaded connection, soldered connection, packing gland, or other possible source of leak including any welded attachment to the piping with "Snoop" or other suitable leak testing non-corrosive fluid, or inspected using an ultrasonic leak detection device, on all of the possible leak sources.

9.2.6. The Contractor is responsible for any repairs required:

9.2.6.1. Any leaking welds are to be ground out and re-welded at the leak point after pressure has been relieved.

9.2.6.2. Any leaking packing glands are to be drawn up while under pressure and the pipeline pressure restored to the test pressure. If unable to stop the leaking, the gland is to be re-packed after pressure has been relieved.

9.2.6.3. Any leaking flanges are to be drawn up while under pressure and the pipeline pressure restored to the test pressure. If unable to stop the leaking, the gasket is to be replaced after pressure has been relieved.

9.2.6.4. Leaking threaded connections require tightening or, at the discretion of the Field Construction Superintendent, back-welding.

9.2.7. If repairs require relief of pressure, the system is to be re-tested after the repairs have been made, using the pressurization procedure outlined in paragraph 9.2.5, and re-testing, as specified above, those items which have been repaired.

9.2.8. After the piping system has been inspected and passed leak testing with "Snoop" or an ultrasonic tester, check the pressure gauge in the compressor hook-up for pressure loss.

9.2.8.1. Pressure loss of 5 psi or less can be attributed to line cooling during the testing procedure.

9.2.8.1.1. This assumes a temperature drop of 10° F while testing 100 ft. of 3" Schedule. 40 pipe.

9.2.8.1.2. Shorter piping systems or smaller line temperature drops allow for less acceptable pressure drop.

9.2.8.1.3. The test pressure shall be maintained for a minimum of 10 minutes before accepting the line as having been tested.

9.2.8.2. Pressure loss greater than 5 psi is probably due to undiscovered leakage.

9.2.8.2.1. Re-pressurize the piping system and retest.

9.2.8.2.2. Re-test all connections with "Snoop", or an ultrasonic leak detector.

9.2.8.3. All tests shall be recorded. Records shall include :

9.2.8.3.1. The date and time at the beginning of the test

9.2.8.3.2. The identification of the piping system tested, by line number

9.2.8.3.3. The test fluid used (air)

9.2.8.3.4. The testing process used (Snoop or ultrasonic, etc.)

9.2.8.3.5. The final test pressure and time of day along with a statement indicating that the test lasted at least 10 minutes and the loss of pressure was less than 5 psi.

9.2.8.3.6. Certification of results by the examiner

9.2.8.3.7. Examination procedures

9.2.8.3.8. Examination personnel qualifications

9.2.8.3.9. All testing records shall be retained and submitted to Koppers.

9.2.8.3.10. Per ASME 31.3, Koppers shall retain these records for at least 5 years.

9.3. Pipeline flange tightening after testing and process heat-up

9.3.1. If flanged connections are found to be leaking, the Contractor may re-tighten the flange bolts to stop the leak.

9.3.2. If the leak cannot be stopped, the Contractor shall replace the gasket. This procedure must be coordinated with Koppers to permit the required shutdown.

9.3.3. The Contractor shall also inspect all threaded connections to assure they exhibit no signs of leakage.

9.3.3.1. If threaded connections are found to be leaking, the Contractor may tighten the connection to stop the leak.

9.3.3.2. If the leak cannot be stopped, the Contractor shall disassemble the fitting, check for scarred threads, and, if the threads are in good condition, re-apply pipe thread sealant and assemble the connection. This procedure must be coordinated with Koppers to permit the required shutdown.

9.3.3.2.1. Thread sealant in pitch and hot oil service must be capable of 650° F. Do not use Teflon tape.

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10. PROJECT DRAWING LIST

10.1. The following lists all drawings that are part of this project.

6526-A001	Pitch Storage Tank T-200, Plan, Elev., Section & Details
6526-A002	Pitch Tank T-200 Details
6526-A003	Pitch Tank Hot Oil Heaters E-201, 202 Plan & Details
6526-A004	Hot Oil System - Expansion Tank T-240.
6526-A005	Hot Oil System - Storage Tank T-250.
6526-A006	T-200 Pitch Tank – Support Clip Details
6526-C001	Hot Oil Pump Shed - Foundation Plan & Sections
6526-C002	Hot Oil Heater E-270 - Plan, Section & Details
6526-C003	Pipe Support Foundations - Plan, Section & Details
6526-C004	Foundation Details & Sections (Hot Oil Heater E-270 Area).
6526-C005	Storage Tank Areas - Foundation Location Plan
6526-C006	Storage Tank Area - Foundation Sections & Details
6526-D002	Mechanical Legend Sheet P & I Diagram
6526-D003	Instrument Legend Sheet P & I Diagram
6526-D004	Pitch Tanks T-200 & T-210 P & I Diagram
6526-D005	Hot Oil System P & I Diagram
6526-D006	Hot Oil Distribution P & I Diagram
6526-D007	Bulk Nitrogen System P & I Diagram
6526-D008	Miscellaneous Utilities P & I Diagram
6526-D009	Existing Hot Oil Distribution Modifications P & I Diagram
6526-D010	Ship Unloading – P&I Diagram
6526-E006	Grounding Plan
6526-E007	Grounding Details

6526-E010	Lighting Enlarged Plans
6526-E011	Conduit Routing Sheet 1 of 2
6526-E012	Conduit Routing & MCC Grounding Sheet 2 of 2.
6526-G001	Drawing Index.
6526-G002	General Arrangement
6526-P001	Overall Piping Plan
6526-P002	Pitch Piping at Tk Outlet to Pumps, Hot Oil, N_2, Stm Trac.
6526-P003	Pitch Tank Piping - Section
6526-P004	Pitch Tank Area - Piping _ Sections
6526-P005	Hot Oil Expansion Tank - Plan & Sections
6526-P006	Hot Oil Shed Piping - Plan & Sections
6526-P007	Hot Oil Shed Piping - Sections
6526-P008	Hot Oil Expansion Tank Piping Sections & Details
6526-P009	Hot Oil Shed Piping Isometric
6526-P010	Micellaneous Sections & Details 3/3
6526-P011	Existing Hot Oil System - Piping Isometric - Revisions
6526-P012	Hot Oil System Tracing Details
6526-P013	Hot Oil Tracing Isometrics At Pitch Area
6526-P014	Modifications to Hot Oil Heating System – Piping Isometric
6526-P015	Pipe Supports/Anchors - Sheet 1 of 2
6526-P016	Pipe Supports/Anchors - Sheet 2 of 2
6526-P017	Plan Steam to Maintenance Building
6526-P018	Steam to Maintenance Building - Sections & Details
6526-S001	Hot Oil Pump Shed & General Steel Notes
6526-S002	Pitch Pump Shed & Pipe Bridge #2 - Plans,, Detail & Sect.

6526-S003	Pitch Pump Shed & Pipe Bridge #2 - Sections & Details
6526-S004	Pipe supports and Pipe Bridge #1 - Plan, Elevations & Details
6526-S005	Pipe Supports Elevations & Details
6256-S006	Pipe Support Location Plan
	Topographical Survey Map
	Nitrogen Pad

APPENDIX A

Koppers010771

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Koppers Industries
Portland Liquid Pitch Terminal

November 18, 1998

LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
101	2-101-1-12/40-S-F/3	Existing Vapor line From T-65 to Scrubber			150	881		
102	1-102-1-4/40-R-F/3	Existing Pitch Transfer line from T-65 / T-68 to Car Loading Manifold			400	265		
201	1-201-1-8/40-O-M/6	Pitch Ship Unloading Line, Dock to Shore	550	130	400	1,040	800	
202	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee	550	130	1607	6,583	3,214	
203	1-203-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-200 Top Nozzle	550	130	115	299	230	
204	1-204-1-6/40-O-M/4	T-200 Pitch Outlet, P-220 Suction & Disch to Reducer	550	75	30	45	60	
205	1-205-1-6/40-O-M/4	T-200 Pitch Outlet, P-225 Suction & Disch to Reducer	550	150	20	30	40	
206	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200	550	150	200	132	200	
207	1-207-1-4/40-O-M/3	T-200 Pitch Recirculation to Top Fill Riser	550	150	10	7	20	
208	2-208-1-8/40-S-F/3	T-200 Vent to Tee	400	25	40	104	160	
209	1-209-1-10/40-N	T-200 Internal Fill Tube	550	75				
210	1-210-1-6/40-O-M/3	P-225 Pitch Supply & Discharge to Reducer	550	150	12	18	24	
211	1-211-1-4/40-O-M/3	P-225 Pitch Discharge to Header	550	150	8	5	8	
212	1-212-1-16/30-O-M/4	T-200 to T-210 Pitch Overflow	550	75	16		32	
213	1-213-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-210 Top Nozzle	550	130	100	260	200	
214	1-214-1-6/40-O-M/4	T-210 Pitch Outlet, P-230 Suction & Disch to Reducer	550	75	30	45	60	
215	1-215-1-6/40-O-M/4	T-210 Pitch Outlet, P-225 Suction to Tee	550	150	20	30	40	
216	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210	550	150	200	132	200	
217	1-217-1-4/40-O-M/3	T-210 Pitch Recirculation to Top Fill Riser	550	150	10	7	20	
218	2-218-1-8/40-S-F/3	T-210 Vent to Tee	400	25	40	104	160	
219	1-219-1-10/40-N	T-210 Internal Fill Tube	550	75				
220	2-220-1-8/40-S-F/3	Combined Tank Vent, Tee to Exisiting Header TP-21	400	25	100	260	400	
221	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11	550	150	120	79	240	
222	1-222-1-2/40-O-M/3	Dock Evacuator Pump P-235 Suction	550	75	4	1	8	
223	1-223-1-2/40-O-M/3	Dock Evacuator Pump P-235 Discharge	550	75	4	1	8	
224	1-224-1-2/40-O-M/3	Evacuator Pump P-238 Suction	550	75	4	1	4	
225	1-225-1-2/40-O-M/3	Evacuator Pump P-238 Discharge	550	75	4	1	4	
226	0-226-0-0/0--/0	UNUSED						
227	5-227-3-2/40-N	Fuel Gas to E-270	100	50	12	2		
228	5-228-3-.75/40-N	Pilot Gas to E-270	100	50	12			
229	6-229-2-2/40-N	Nitrogen to Operate HO Valves	100	120	100	17		
230	6-230-2-2/40-N	Nitrogen to operate valves near T-200 & T-210	100	120	100	17		
231	6-231-2-2/40-N	Nitrogen Supply Header from E-310	100	120	320	56		
232	6-232-2-2/40-N	Nitrogen Supply to T-200 Reducer	100	120	80	14		
233	6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200	100	120	2	0		
234	6-234-2-1/40-N	Nitrogen Purge to PT on T-200 nozzle W	100	120	4	0		

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
235	6-235-2-2/40-N	Nitrogen Supply to T-210 Reducer	100	120	80	14		
236	6-236-2-2/40-N	Reduced Pressure Nitrogen Supply to T-210	100	120	2	0		
237	6-237-2-4/40-N	Low Pressure Nitrogen Blanket to T-210	100	120	4	3		
238	6-238-2-2/40-N	Nitrogen Supply to T-240 Reducer	100	120	30	5		
239	6-239-2-1/40-N	Reduced Pressure Nitrogen Blanket to T-240	100	120	6	0		
240	3-240-2-1/40-P-M/2	T-240 & T-250 HO Fill	575	150	20		20	1
241	3-241-2-1/40-P-M/2	T-240 HO Overflow	575	150	20		20	1
242	3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction	575	150	12		12	5
243	3-243-2-1/40-P-M/3	P-245 HO Discharge	575	150	16		16	1
244	3-244-1-4/40-P-M/3	Primary HO Suction Head From TP-31	575	150	48		48	32
245	3-245-1-4/40-P-M/3	Primary HO Pump Suction Header From TP-36	575	150	16		16	11
246	3-246-1-4/40-P-M/3	P-260 Suction	575	150	6		6	4
247	3-247-1-4/40-P-M/3	P-265 Suction	575	150	6		6	4
248	3-248-1-4/40-P-M/3	P-260 Discharge	575	150	6		6	4
249	3-249-1-4/40-P-M/3	P-265 Discharge	575	150	6		6	4
250	3-250-1-4/40-P-M/3	Primary HO Pump Discharge Header, Bypass to TP-32 Cross-Connect	575	150	24		24	16
251	3-251-1-4/40-P-M/3	HO Inlet to E-270 Fired Heater	575	150	6		6	4
252	3-252-1-4/40-P-M/3	E-270 Outlet to TP-33 Cross-Connect	575	150	18		18	12
253	3-253-1-3/40-P-M/3	Primary HO Supply Header	575	150	250		250	96
254	3-254-1-4/40-P-M/3	Primary HO Return Header	575	150	250		250	165
255	3-255-2-2/40-P-C/3	HO Drain Header	575	150	120		120	21
256	3-256-2-1/40-P-M/2	P-255 Drain Pump Discharge	575	150	24		24	1
257	3-257-1-4/40-P-M/3	PSV 2104 Discharge, E-270 to Return Header	575	150	10		10	7
258	3-258-2-3/40-N	PSV 2127 Discharge, T-240 to T-250	575	150	24		24	9
259	3-259-1-4/40-P-M/3	PSV 2193 Discharge	575	150	4		4	3
260	3-260-1-3/40-P-C/3	P-275 HO Supply	575	150	10		10	4
261	3-261-1-2/40-P-M/3	P-275 HO Discharge	575	150	1707		1,707	298
262	3-262-1-2/40-P-C/3	P-275 Pump Bypass	575	150	16		16	3
263	3-263-1-1.5/40-T	Main Unloading Line Supply Trace	575	150	450		450	41
264	3-264-1-1.5/40-T	Main Unloading Line Return Trace	575	150	450		450	41
265	3-265-1-2/40-P-M/3	P-275 HO Return	575	150	1707		1,707	298
266	3-266-1-2/40-P-C/3	P-275 HO Recirculation	575	150	16		16	3
267	3-267-2-1/40-P-C/2	P-275 Drain Connector	575	150	5		5	0
268	3-268-1-4/40-P-M/3	P-260 Startup Suction From T-240	575	150	25		25	17
269	3-269-1-3/40-P-M/3	PSV-2159 Discharge	575	150	10		10	4
270	3-270-1-3/40-P-C/3	P-280 HO Supply	575	150	10		10	4
271	3-271-1-2/40-P-M/3	P-280 HO Discharge	575	150	80		80	14
272	3-272-1-2/40-P-C/3	P-280 Pump Bypass	575	150	16		16	3

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
273	3-273-1-1.5/40-T	Tank Area Pitch Line Supply & Transfer Line Trace	575	150	120		120	11
274	3-274-1-1.5/40-T	Tank Area Pitch Line Return & Transfer Line Trace	575	150	120		120	11
275	3-275-1-2/40-P-M/3	P-280 HO Return	575	150	80		80	14
276	3-276-1-2/40-P-C/3	P-280 HO Recirculation	575	150	16		16	3
277	3-277-2-1/40-P-C/2	P-280 Drain Connector	575	150	5		5	0
278	0-278-0-0/0--/0							
279	3-279-1-2/40-P-M/3	PSV-2169 Discharge	575	150	10		10	2
280	3-280-1-3/40-P-C/3	P-285 HO Supply	575	150	10		10	4
281	0-281-0-0/0--/0	Replaced by 3" 283			30			
282	3-282-1-3/40-P-C/3	P-285 Pump Bypass	575	150	16		16	6
283	3-283-1-3/40-P-M/3	T-200 Heater HO Supply	575	150	12		12	5
284	3-284-1-3/40-P-M/3	T-200 Heater HO Return	575	150	12		12	5
285	0-285-0-0/0--/0	Replaced by 3" 284			30			
286	3-286-1-3/40-P-C/3	P-285 HO Recirculation	575	150	16		16	6
287	3-287-2-1/40-P-C/2	P-285 Drain Connector	575	150	5		5	0
288	3-288-2-1/40-P-M/2	T-200 HO Drain Connector	575	150	30		30	1
289	3-289-1-3/40-P-M/3	PSV-2179 Discharge	575	150	10		10	4
290	3-290-1-3/40-P-C/3	P-290 HO Supply	575	150	10		10	4
291	0-291-0-0/0--/0	Deleted			120			
292	3-292-1-3/40-P-C/3	P-290 Pump Bypass	575	150	16		16	6
293	3-293-1-3/40-P-M/3	T-210 Heater HO Supply	575	150	12		12	5
294	3-294-1-3/40-P-M/3	T-210 Heater HO Return	575	150	12		12	5
295	0-295-0-0/0--/0	Deleted			120			
296	3-296-1-3/40-P-C/3	P-290 HO Recirculation	575	150	16		16	6
297	3-297-2-1/40-P-C/2	P-290 Drain Connector	575	150	5		5	0
298	3-298-1-1/40-P-M/2	T-210 HO Drain Connector	575	150	120		120	5
299	3-299-1-3/40-P-M/3	PSV-2189 Discharge	575	150	10		10	4
300	0-300-0-0/0--/0	Deleted - Function by 273 / 274						
301	3-301-1-1/40-P-M/2	Dock Line Trace & HV2083 Jacket	575	150	800		800	36
302	3-302-1-1/40-P-M/2	Dock Line Trace & P-235 Jacket	575	150	800		800	36
303	3-303-1-1/40-P-M/2	Dock Line Trace & ZV2082 Jacket	575	150	800		800	36
304	3-304-1-1/40-P-M/2	Dock Line Trace & HV2081 Jacket	575	150	800		800	36
305	3-305-1-1/40-T	T-200 Outlet & P-225 Jacket	575	150	180		180	8
306	3-306-1-1/40-T	T-200 Unloading Riser & Roof Nozzle Trace	575	150	280		280	13
307	3-307-1-1/40-T	T-200 Recirculation Trace & P-220 Jacket	575	150	280		280	13
308	3-308-1-3/40-N	T-200 Internal Supply / Return to E201	575	150	100		100	38
309	3-309-1-3/40-N	T-200 Internal Supply / Return to E202	575	150	100		100	38
310	3-310-1-1/40-T	T-200 Shell Nozzle Jackets	575	150	300		300	13
311	3-311-1-1/40-T	T-210 Outlet & P-225 Jacket (hold)	575	150	180		180	8

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
312	3-312-1-1/40-T	T-210 Unloading Riser & Roof Nozzle Trace & Overflow to T-200	575	150	**280**		280	13
313	3-313-1-1/40-T	T-210 Recirculation Trace & P-230 Jacket	575	150	**280**		280	13
314	3-314-1-3/40-N	T-210 Internal Supply / Return to E211	575	150	**100**		100	38
315	3-315-1-3/40-N	T-210 Internal Supply / Return to E212	575	150	**100**		100	38
316	3-316-2-1/40-T	T-210 Shell Nozzle Jackets	575	150	**300**		300	13
317	0-317-0-0/0--/0	UNUSED						
318	0-318-0-0/0--/0	UNUSED						
319	0-319-0-0/0--/0	UNUSED						
320	3-320-1-4/40-P-M/3	FV2145 Flow Bypass on E-170 Outlet to Return	575	150	**10**		10	7
321	3-321-1-4/40-P-M/3	Pump P-1 Recirculation Line	575	150	**12**		12	8
322	0-322-0-0/0--/0	UNUSED						
323	3-323-1-4/40-P-M/3	Pump P-3 Recirculation Line	575	150	**12**		12	8
324	3-324-1-3/40-P-M/3	Pump P-4 Recirculation Line	575	150	**12**		12	5
325	3-325-1-2/40-P-M/3	Pump P-5 / 6 Recirculation Line	575	150	**12**		12	2
326	0-326-0-0/0--/0	UNUSED						
327	0-327-0-0/0--/0	UNUSED						
328	0-328-0-0/0--/0	UNUSED						
329	0-329-0-0/0--/0	UNUSED						
330	4-330-5-2/40-N	Tank Area Sump Discharge Piping to TP 41	100	50	**40**	7		
331	11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace	400	150				
332	11-332-4-.50/.035-T	Steam Tracers on Tank T-200 Fume Vent Line	400	150				
333	11-333-2-2/40-H-M/1.5	Steam Supply to Maintenance Building from TP-112	400	150				
2080	A-208	(FUTURE) Side Entering Agitator, Plenty Swivel Type 29P-STM 60 hp / 85 mm shaft	450	250				
2090	A-209	(FUTURE) Side Entering Agitator, Plenty Swivel Type 29P-STM 60 hp / 85 mm shaft	450	250				
2180	A-218	(FUTURE) Side Entering Agitator, Plenty Swivel Type 29P-STM 60 hp / 85 mm shaft	450	250				
2190	A-219	(FUTURE) Side Entering Agitator, Plenty Swivel Type 29P-STM 60 hp / 85 mm shaft	450	250				
1700	E-170	Existing AHE-700 Fired HTF Heater, 7 MMBtu/hr output	575	150				
2010	E-201	Finned Pipe Tank Heater, 4 x AH-3-6-28, 3000 ft2 total	575	150	**672**		672	258
2020	E-202	Finned Pipe Tank Heater, 4 x AH-3-6-28, 3000 ft2 total	575	150	**672**		672	258
2110	E-211	Finned Pipe Tank Heater, 4 x AH-3-6-28, 3000 ft2 total	575	150	**672**		672	258
2120	E-212	Finned Pipe Tank Heater, 4 x AH-3-6-28, 3000 ft2 total	575	150	**672**		672	258
2700	E-270	Fired HTF Heater AHE-1000 derated to 10MMBtu input, ~7hp blower, 2hp oil pump, etc ?	575	150	**627**		627	415

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
3100	E-310	Nitrogen Evaporator, 3000 SCFH	100	120				
2200	P-220	Pitch Transfer Pump, Viking 223 QS 300 gpm @ 130 psid / 350 rpm, 40 hp /1750 rpm Was Rotan size 152, 312 gpm @ 130 psid / 280 rpm, 50 hp / 1750 rpm	550	150				
2250	P-225	Pitch Transfer Pump, Viking 223 QS 300 gpm @ 130 psid / 350 rpm, 40 hp /1750 rpm Was Rotan size 152, 312 gpm @ 130 psid / 280 rpm, 50 hp / 1750 rpm	550	150				
2300	P-230	Pitch Transfer Pump, Viking 223 QS 300 gpm @ 130 psid / 350 rpm, 40 hp /1750 rpm Was Rotan size 152, 312 gpm @ 130 psid / 280 rpm, 50 hp / 1750 rpm	550	150				
2350	P-235	Dock Pitch Evacuator Pump, Viking 4223 K 25 gpm @ 120 psid / rpm Was Rotan size 33 13 gpm @ 120 psid, 3 hp / 1750 rpm	550	130				
2380	P-238	Tank Riser Pitch Evacuator Pump, Viking 4223 K 25 gpm @ 120 psid / rpm Was Rotan size 33 13 gpm @ 120 psid, 3 hp / 1750 rpm	550	130				
2450	P-245	HO Fill & Drain Pump 25 gpm @ 75' head, 1x3x8.5, 2hp / 1750 rpm	575	150				5
2550	P-255	HO Drain Transfer Pump 25 gpm @ 75' head, 1x3x8.5, 2hp / 1750 rpm	575	150				5
2600	P-260	Primary Hot Oil Pump 410 gpm @ 290' head, 3x4x8.5, 50 hp/ 3500 rpm	575	150				10
2650	P-265	Primary Hot Oil Pump 410 gpm @ 290' head, 3x4x8.5, 50 hp/ 3500 rpm	575	150				10
2750	P-275	Unload Line Hot Oil Pump 32 gpm @ 320' head, 2x3x9, 15hp / 3500 rpm	575	150				10
2800	P-280	Pitch Transfer Lines Hot Oil Pump 30 gpm @ 82' head, 2x3x9, 3hp / 1750 rpm	575	150				10
2850	P-285	E201, 202 Hot Oil Pump 235 gpm @ 53' head, 3x4x7.5, 5hp / 1750 rpm	575	150				10
2900	P-290	E211, 212 Hot Oil Pump 235 gpm @ 53' head, 3x4x7.5, 5hp / 1750 rpm	575	150				10
3200	P-320	Containment Sump Pump, 60 gpm@___ ' head, 2" discharge 2 hp	100	15				
2210	S-221	Pitch Pump Strainer - Viking	550	75	3		3	
2260	S-226	Pitch Pump Strainer - Viking	550	75	3		3	
2310	S-231	Pitch Pump Strainer - Viking	550	75	3		3	

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LINE #	Composite Line Tag	DESCRIPTION	Design Temperature, F	Design Pressure, PSIG	Est. Line Length, Ft.	4. Process Volume, gal	5. HTF Length	6. HTF Volume, gal
2360	S-236	Pitch Pump Strainer - Viking	550	75	3		3	
2390	S-239	Pitch Pump Strainer - Viking	550	75	3		3	
2000	T-200	Liquid Pitch Tank	550	2 / +4 " WC				
2100	T-210	Liquid Pitch Tank	550	2 / +4 " WC				
2400	T-240	HTF Expansion Tank, 2000 gal, 30 psig	575	30				
2500	T-250	HTF Drain & Charging Tank 2000 gal, atm.	575	atm				
3000	T-300	3000 gal, 400 MSCF Bulk Nitrogen Storage Tank	100					
	TOTAL Lengths & Volumes				19855	10,465	21,251	3,170

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VALVE LIST - Project # 6526	KOPPERS Industries, Inc. Portland, OR - LIQUID PITCH UNLOADING							
	Note: Valves with limit switches and/or operators are per Instrument Specifications							
	Note: Missing Valve Numbers indicate either "Future" or number not used.							
Valve #	**Valve Size**	**Line #**	**P&ID**	**Comm**	**Valve Type**	**Notes**	**Line Tag**	**Line Description**
	inches			Service				
V001	2	222	10	1	Gate		1-222-1-2/40-O-M/3	Dock Evacuator Pump P-235 Suction
V002	2	223	10	1	Gate		1-223-1-2/40-O-M/3	Dock Evacuator Pump P-235 Discharge
V003	1	201	10	1	HEX Sample	See Pipe Spec.	1-201-1-8/40-O-M/6	Pitch Ship Unloading Line, Dock to Shore
V004						Unused, duped V041	#N/A	#N/A
V005	8	203	4	1	Spectacle Blind		1-203-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-200 Top Nozzle
V006	3	270	6	3	Globe		3-270-1-3/40-P-C/3	P-280 HO Supply
V007	8	213	4	1	Spectacle Blind		1-213-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-210 Top Nozzle
V008	2	224	4	1	Gate		1-224-1-2/40-O-M/3	Evacuator Pump P-238 Suction
V009	2	213	4	1	Gate		1-213-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-210 Top Nozzle
V010	2	225	4	1	Gate		1-225-1-2/40-O-M/3	Evacuator Pump P-238 Discharge
V011	8	208	4	2	Butterfly	Teflon Lined	2-208-1-8/40-S-F/3	T-200 Vent to Tee
V012		218				RESERVED for FUTURE	2-218-1-8/40-S-F/3	T-210 Vent to Tee
V013						RESERVED for FUTURE	#N/A	#N/A
V014	2	233	4	6	Ball		6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V015	2	233	4	6	Ball		6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V016	6	204	4	1	Gate	w/Gear Operator	1-204-1-6/40-O-M/4	T-200 Pitch Outlet, P-220 Suction & Disch to Reducer
V017	6	214	4	1	Gate	RESERVED for FUTURE	1-214-1-6/40-O-M/4	T-210 Pitch Outlet, P-230 Suction & Disch to Reducer
V018	1	205	4	1	HEX Sample	See Pipe Spec.	1-205-1-6/40-O-M/4	T-200 Pitch Outlet, P-225 Suction & Disch to Reducer
V019						RESERVED for FUTURE	#N/A	#N/A
V020	6	205	4	1	Gate	w/Gear Operator	1-205-1-6/40-O-M/4	T-200 Pitch Outlet, P-225 Suction & Disch to Reducer
V021	6	215	4	1	Gate	RESERVED for FUTURE	1-215-1-6/40-O-M/4	T-210 Pitch Outlet, P-225 Suction to Tee
V022	6	205	4	1	Gate	w/Gear Operator	1-205-1-6/40-O-M/4	T-200 Pitch Outlet, P-225 Suction & Disch to Reducer
V023	6	215	4	1	Gate	w/Gear Operator	1-215-1-6/40-O-M/4	T-210 Pitch Outlet, P-225 Suction to Tee
V024	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V025	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V026	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V027	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V028	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V029	4	207	4	1	Gate	w/Hand Wheel	1-207-1-4/40-O-M/3	T-200 Pitch Recirculation to Top Fill Riser
V030	4	207	4	1	Gate	w/Hand Wheel	1-207-1-4/40-O-M/3	T-200 Pitch Recirculation to Top Fill Riser
V031	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V032	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V033	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V034	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V035	4	217	4	1	Gate	RESERVED for FUTURE	1-217-1-4/40-O-M/3	T-210 Pitch Recirculation to Top Fill Riser
V036	4	217	4	1	Gate	RESERVED for FUTURE	1-217-1-4/40-O-M/3	T-210 Pitch Recirculation to Top Fill Riser
V037	4	216	4	1	Gate	RESERVED for FUTURE	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V038	4	206	4	1	Gate	w/Hand Wheel	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V039	4	216	4	1	Gate	w/Hand Wheel	1-216-1-4/40-O-M/3	P-230 Pitch Discharge & Recirculation to T-210
V040	4	221	4	1	Gate	w/Hand Wheel	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V041	4	221	4	1	Wedge-Plug	w/Hand Wheel	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V042	3	221	4	1	Wedge-Plug	Existing-Recondition	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V043	3	221	4	1	Wedge-Plug	Existing-Recondition	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V044	3	221	4	1	Wedge-Plug	Existing-Recondition	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V045	3	221	4	1	Wedge-Plug	Existing-Recondition	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V046	4	221	4	1	Wedge-Plug	w/Hand Wheel	1-221-1-4/40-O-M/3	Pitch Transfer from Discharge Header to Exisiting Manifold TP-11
V047	1	242	5	3	Gate		3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction
V048	3	242	5	3	Gate		3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction

Valve #	Valve Size	Line #	P&ID	Comm	Valve Type	Notes	Line Tag	Line Description
	inches			Service				
V049	1	243	5	3	Globe	Throttling Valve for Drum Transfer	3-243-2-1/40-P-M/3	P-245 HO Discharge
V050	1	243	5	3	Gate		3-243-2-1/40-P-M/3	P-245 HO Discharge
V051	1	243	5	3	Check		3-243-2-1/40-P-M/3	P-245 HO Discharge
V052	1	240	5	3	Gate		3-240-2-1/40-P-M/2	T-240 & T-250 HO Fill
V053	1	240	5	3	Gate		3-240-2-1/40-P-M/2	T-240 & T-250 HO Fill
V054	3	242	5	3	Gate	Could be 3" with reducer on tank	3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction
V055	4	268	5	3	Gate	Was listed as in 244	3-268-1-4/40-P-M/3	P-260 Startup Suction From T-240
V056	4	245	5	3	Gate		3-245-1-4/40-P-M/3	Primary HO Pump Suction Header From TP-36
V057	4	246	5	3	Gate		3-246-1-4/40-P-M/3	P-260 Suction
V058	4	245	5	3	Gate		3-245-1-4/40-P-M/3	Primary HO Pump Suction Header From TP-36
V059	4	250	5	3	Gate		3-250-1-4/40-P-M/3	Primary HO Pump Discharge Header, Bypass to TP-32 Cross-Connect
V060	4	247	5	3	Gate		3-247-1-4/40-P-M/3	P-265 Suction
V061	4	254	5	3	Gate	Was 4" in 249	3-254-1-4/40-P-M/3	Primary HO Return Header
V062	4	248	5	3	Check	P-260 Backflow prevention	3-248-1-4/40-P-M/3	P-260 Discharge
V063	1	246	5	3	Gate	Can Eliminate - Use V194 On Stra	3-246-1-4/40-P-M/3	P-260 Suction
V064	4	249	5	3	Check	P-265 Backflow prevention	3-249-1-4/40-P-M/3	P-265 Discharge
V065	1	247	5	3	Gate	Can Eliminate - Use V198 On Stra	3-247-1-4/40-P-M/3	P-265 Suction
V066	4	248	5	3	Globe		3-248-1-4/40-P-M/3	P-260 Discharge
V067	4	249	5	3	Globe		3-249-1-4/40-P-M/3	P-265 Discharge
V068	4	250	5	3	Gate	Was listed as in 248	3-250-1-4/40-P-M/3	Primary HO Pump Discharge Header, Bypass to TP-32 Cross-Connect
V069	4	250	5	3	Gate	Was listed as in 248	3-250-1-4/40-P-M/3	Primary HO Pump Discharge Header, Bypass to TP-32 Cross-Connect
V070	4	251	5	3	Gate		3-251-1-4/40-P-M/3	HO Inlet to E-270 Fired Heater
V071	4	252	5	3	Globe	Was listed as 3" in 253	3-252-1-4/40-P-M/3	E-270 Outlet to TP-33 Cross-Connect
V072	4	244	5	3	Gate	PSV-2193 Bypass	3-244-1-4/40-P-M/3	Primary HO Suction Head From TP-31
V073	3	260	6	3	Gate		3-260-1-3/40-P-C/3	P-275 HO Supply
V074	3	260	6	3	Gate		3-260-1-3/40-P-C/3	P-275 HO Supply
V075	3	260	6	3	Globe		3-260-1-3/40-P-C/3	P-275 HO Supply
V076	3	260	6	3	Gate		3-260-1-3/40-P-C/3	P-275 HO Supply
V077	2	262	6	3	Globe		3-262-1-2/40-P-C/3	P-275 Pump Bypass
V078	2	261	6	3	Globe	300# Flanges	3-261-1-2/40-P-M/3	P-275 HO Discharge
V079	2	266	6	3	Gate		3-266-1-2/40-P-C/3	P-275 HO Recirculation
V080	2	266	6	3	Check		3-266-1-2/40-P-C/3	P-275 HO Recirculation
V081	1	267	6	3	Gate		3-267-2-1/40-P-C/2	P-275 Drain Connector
V082	2	265	6	3	Globe		3-265-1-2/40-P-M/3	P-275 HO Return
V083	1	264	6	3	Gate	Typical for Multiple Vents	3-264-1-1.5/40-T	Main Unloading Line Return Trace
V084	3	270	6	3	Gate		3-270-1-3/40-P-C/3	P-280 HO Supply
V085	3	270	6	3	Gate		3-270-1-3/40-P-C/3	P-280 HO Supply
V086	3	270	6	3	Gate		3-270-1-3/40-P-C/3	P-280 HO Supply
V087	2	272	6	3	Globe		3-272-1-2/40-P-C/3	P-280 Pump Bypass
V088	2	271	6	3	Globe	300# Flanges	3-271-1-2/40-P-M/3	P-280 HO Discharge
V089	2	276	6	3	Gate		3-276-1-2/40-P-C/3	P-280 HO Recirculation
V090	2	276	6	3	Check		3-276-1-2/40-P-C/3	P-280 HO Recirculation
V091	1	277	6	3	Gate		3-277-2-1/40-P-C/2	P-280 Drain Connector
V092	2	275	6	3	Globe		3-275-1-2/40-P-M/3	P-280 HO Return
V093	1	274	6	3	Gate	High Point Vent on T-200	3-274-1-1.5/40-T	Tank Area Pitch Line Return & Transfer Line Trace
V094	3	280	6	3	Gate		3-280-1-3/40-P-C/3	P-285 HO Supply
V095	3	280	6	3	Gate		3-280-1-3/40-P-C/3	P-285 HO Supply
V096	3	280	6	3	Gate		3-280-1-3/40-P-C/3	P-285 HO Supply
V097	3	282	6	3	Globe		3-282-1-3/40-P-C/3	P-285 Pump Bypass
V098	3	283	6	3	Globe	300# Flanges	3-283-1-3/40-P-M/3	T-200 Heater HO Supply
V099	3	283	6	3	Gate	Was Globe	3-283-1-3/40-P-M/3	T-200 Heater HO Supply
V100	3	308	6	3	Globe		3-308-1-3/40-N	T-200 Internal Supply / Return to E201
V101	3	309	6	3	Globe		3-309-1-3/40-N	T-200 Internal Supply / Return to E202
V102	3	283	6	3	Gate	Was Globe	3-283-1-3/40-P-M/3	T-200 Heater HO Supply
V103	1	288	6	3	Gate	Was Globe	3-288-2-1/40-P-M/2	T-200 HO Drain Connector

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Valve #	Valve Size	Line #	P&ID	Comm	Valve Type	Notes	Line Tag	Line Description
	inches			Service				
V104	1	284	6	3	Gate	High Point Vent	3-284-1-3/40-P-M/3	T-200 Heater HO Return
V105	3	286	6	3	Gate		3-286-1-3/40-P-C/3	P-285 HO Recirculation
V106	3	286	6	3	Check		3-286-1-3/40-P-C/3	P-285 HO Recirculation
V107	1	287	6	3	Gate		3-287-2-1/40-P-C/2	P-285 Drain Connector
V108	3	280	6	3	Globe		3-280-1-3/40-P-C/3	P-285 HO Supply
V109	3	284	6	3	Globe		3-284-1-3/40-P-M/3	T-200 Heater HO Return
V110	3	290	6	3	Gate	RESERVED for FUTURE	3-290-1-3/40-P-C/3	P-290 HO Supply
V111	3	290	6	3	Gate	RESERVED for FUTURE	3-290-1-3/40-P-C/3	P-290 HO Supply
V112	3	290	6	3	Globe	RESERVED for FUTURE	3-290-1-3/40-P-C/3	P-290 HO Supply
V113	3	290	6	3	Globe	RESERVED for FUTURE	3-290-1-3/40-P-C/3	P-290 HO Supply
V114	3	292	6	3	Globe	RESERVED for FUTURE	3-292-1-3/40-P-C/3	P-290 Pump Bypass
V115	3	293	6	3	Gate	RESERVED for FUTURE	3-293-1-3/40-P-M/3	T-210 Heater HO Supply
V116	3	314	6	3	Globe	RESERVED for FUTURE	3-314-1-3/40-N	T-210 Internal Supply / Return to E211
V117	3	314	6	3	Globe	RESERVED for FUTURE	3-314-1-3/40-N	T-210 Internal Supply / Return to E211
V118	3	314	6	3	Gate	RESERVED for FUTURE	3-314-1-3/40-N	T-210 Internal Supply / Return to E211
V119	3	315	6	3	Gate	RESERVED for FUTURE	3-315-1-3/40-N	T-210 Internal Supply / Return to E212
V120	1	298	6	3	Gate	Isolation for FUTURE	3-298-1-1/40-P-M/2	T-210 HO Drain Connector
V121	1	293	6	3	Gate	RESERVED for FUTURE Vent	3-293-1-3/40-P-M/3	T-210 Heater HO Supply
V122	3	296	6	3	Gate	RESERVED for FUTURE	3-296-1-3/40-P-C/3	P-290 HO Recirculation
V123	3	296	6	3	Check	RESERVED for FUTURE	3-296-1-3/40-P-C/3	P-290 HO Recirculation
V124	1	297	6	3	Gate	Isolation for FUTURE	3-297-2-1/40-P-C/2	P-290 Drain Connector
V125	3	294	6	3	Gate	Isolation for FUTURE	3-294-1-3/40-P-M/3	T-210 Heater HO Return
V126	3	253	6	3	Gate		3-253-1-3/40-P-M/3	Primary HO Supply Header
V127	3	253	6	3	Globe		3-253-1-3/40-P-M/3	Primary HO Supply Header
V128	3	253	6	3	Gate		3-253-1-3/40-P-M/3	Primary HO Supply Header
V129	4	254	6	3	Gate		3-254-1-4/40-P-M/3	Primary HO Return Header
V130			6	3		Chk Vlv Deleted 10/1/98		
V131	2	255	6	3	Gate		3-255-2-2/40-P-C/3	HO Drain Header
V132	1	256	6	3	Globe		3-256-2-1/40-P-M/2	P-255 Drain Pump Discharge
V133	1	283	6	3	Gate	Drain	3-283-1-3/40-P-M/3	T-200 Heater HO Supply
V134	3	290	6	3	Gate	Isol for Future Exp.	3-290-1-3/40-P-C/3	P-290 HO Supply
V135	2	232	7	6	Ball		6-232-2-2/40-N	Nitrogen Supply to T-200 Reducer
V136	2	229	7	6	Ball		6-229-2-2/40-N	Nitrogen to Operate HO Valves
V137	2	238	7	6	Ball		6-238-2-2/40-N	Nitrogen Supply to T-240 Reducer
V138	2	230	7	6	Ball		6-230-2-2/40-N	Nitrogen to operate valves near T-200 & T-210
V139	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V140	2	333	8	11	Gate		11-333-2-2/40-H-M/1.5	Steam Supply to Maintenance Building from TP-112
V141	2	330	8	4	Gate		4-330-5-2/40-N	Tank Area Sump Discharge Piping to TP 41
V142	2	330	8	4	Check		4-330-5-2/40-N	Tank Area Sump Discharge Piping to TP 41
V143	3	324	9	3	Globe		3-324-1-3/40-P-M/3	Pump P-4 Recirculation Line
V144	3	324	9	3	Check		3-324-1-3/40-P-M/3	Pump P-4 Recirculation Line
V145	4	321	9	3	Globe		3-321-1-4/40-P-M/3	Pump P-1 Recirculation Line
V146	4	321	9	3	Check		3-321-1-4/40-P-M/3	Pump P-1 Recirculation Line
V147	4	323	9	3	Check		3-323-1-4/40-P-M/3	Pump P-3 Recirculation Line
V148	1	255	6	3	Gate	Drain	3-255-2-2/40-P-C/3	HO Drain Header
V149	1	254	6	3	Gate	Vent	3-254-1-4/40-P-M/3	Primary HO Return Header
V150	1	253	6	3	Gate	Vent	3-253-1-3/40-P-M/3	Primary HO Supply Header
V151	1	254	6	3	Gate	Vent	3-254-1-4/40-P-M/3	Primary HO Return Header
V152						RESERVED for FUTURE	#N/A	#N/A
V153	1	233	4	6	Ball	Purge Flow	6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V154	2	233	4	6	Ball		6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V155						RESERVED for FUTURE	#N/A	#N/A
V156	1	234	4	6	Ball	Purge Flow	6-234-2-1/40-N	Nitrogen Purge to PT on T-200 nozzle W
V157						RESERVED for FUTURE	#N/A	#N/A
V158						RESERVED for FUTURE	#N/A	#N/A

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Valve #	Valve Size	Line #	P&ID	Comm	Valve Type	Notes	Line Tag	Line Description
	inches			Service				
V159	1	218	4	11		RESERVED for FUTURE	2-218-1-8/40-S-F/3	T-210 Vent to Tee
V160	1	236	4	6	Ball	RESERVED for FUTURE	6-236-2-2/40-N	Reduced Pressure Nitrogen Supply to T-210
V161	4	234	4	6	Ball	RESERVED for FUTURE	6-234-2-1/40-N	Nitrogen Purge to PT on T-200 nozzle W
V162	1	236	4	6	Ball	RESERVED for FUTURE	6-236-2-2/40-N	Reduced Pressure Nitrogen Supply to T-210
V163	1	239	5	6	Ball		6-239-2-1/40-N	Reduced Pressure Nitrogen Blanket to T-240
V164	1	241	5	3	Gate		3-241-2-1/40-P-M/2	T-240 HO Overflow
V165	2	227	5	5	Ball		5-227-3-2/40-N	Fuel Gas to E-270
V166	4	253	5	3	Gate		3-253-1-3/40-P-M/3	Primary HO Supply Header
V167	1	288	6	3	Gate	Was Globe	3-288-2-1/40-P-M/2	T-200 HO Drain Connector
V168	2	325	9	3	Globe		3-325-1-2/40-P-M/3	Pump P-5 / 6 Recirculation Line
V169	2	325	9	3	Check		3-325-1-2/40-P-M/3	Pump P-5 / 6 Recirculation Line
V170						RESERVED for FUTURE	#N/A	#N/A
V171						RESERVED for FUTURE	#N/A	#N/A
V172	1	202	10	1	Gate	Plugged Vent	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V173	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V174	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V175	1	202	10	1	Gate	Plugged Vent	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V176	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V177	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V178	1	202	10	1	Gate	Plugged Vent	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V179	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V180	1	202	10	1	Gate	Plugged Drain	1-202-1-10/40-O-M/6	Pitch Ship Unloading Line, Shore to Tee
V181	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V182	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V183	1	331	8	11	Globe		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V184	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V185	1	331	8	11	Gate		11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V186	1	331	8	11	Gate	Isolation for FUTURE T-210	11-331-2-1/40-H-M/1.5	Steam from TP-111 to Tank Vent line S.O. and Trace
V187						RESERVED for FUTURE	#N/A	#N/A
V188						RESERVED for FUTURE	#N/A	#N/A
V189						RESERVED for FUTURE	#N/A	#N/A
V190	1	206	4	1	Gate	On PI-2046	1-206-1-4/40-O-M/3	P-220 Pitch Discharge & Recirculation to T-200
V191	1	211	4	1	Gate	On PI-2056	1-211-1-4/40-O-M/3	P-225 Pitch Discharge to Header
V192	1	2400	5	6	Gate	On PI-2125	T-240	HTF Expansion Tank, 2000 gal, 30 psig
V193	1	246	5	3	Gate	On PI-2101	3-246-1-4/40-P-M/3	P-260 Suction
V194	1	246	5	3	Gate	On S-261	3-246-1-4/40-P-M/3	P-260 Suction
V195	1	246	5	3	Gate	On PI-2102	3-246-1-4/40-P-M/3	P-260 Suction
V196	1	248	5	3	Gate	On P-2103	3-248-1-4/40-P-M/3	P-260 Discharge
V197	1	247	5	3	Gate	On PI-2111	3-247-1-4/40-P-M/3	P-265 Suction
V198	1	247	5	3	Gate	On S-266	3-247-1-4/40-P-M/3	P-265 Suction
V199	1	247	5	3	Gate	On PI-2112	3-247-1-4/40-P-M/3	P-265 Suction
V200	1	249	5	3	Gate	On PI-2113	3-249-1-4/40-P-M/3	P-265 Discharge
V201	1	242	5	3	Gate	On S-246	3-242-1-3/40-P-C/3	T-250 HO Outlet to P-245 Suction
V202	1	260	6	3	Gate	On PI-2151	3-260-1-3/40-P-C/3	P-275 HO Supply
V203	1	260	6	3	Gate	On S-276	3-260-1-3/40-P-C/3	P-275 HO Supply
V204	1	260	6	3	Gate	On PI-2152	3-260-1-3/40-P-C/3	P-275 HO Supply
V205	1	261	6	3	Gate	On PI-2153	3-261-1-2/40-P-M/3	P-275 HO Discharge
V206	1	265	6	3	Gate	On PI-2158	3-265-1-2/40-P-M/3	P-275 HO Return
V207	1	270	6	3	Gate	On PI-2161	3-270-1-3/40-P-C/3	P-280 HO Supply
V208	1	270	6	3	Gate	On S-281	3-270-1-3/40-P-C/3	P-280 HO Supply
V209	1	270	6	3	Gate	On PI-2162	3-270-1-3/40-P-C/3	P-280 HO Supply
V210	1	273	6	3	Gate	On PI-2163	3-273-1-1.5/40-T	Tank Area Pitch Line Supply & Transfer Line Trace
V211	1	275	6	3	Gate	On PI-2168	3-275-1-2/40-P-M/3	P-280 HO Return
V212	1	280	6	3	Gate	On PI-2171	3-280-1-3/40-P-C/3	P-285 HO Supply
V213	1	280	6	3	Gate	On S-286	3-280-1-3/40-P-C/3	P-285 HO Supply

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Valve #	Valve Size	Line #	P&ID	Comm	Valve Type	Notes	Line Tag	Line Description
	inches			Service				
V214	1	280	6	3	Gate	On PI-2172	3-280-1-3/40-P-C/3	P-285 HO Supply
V215	1	281	6	3	Gate	On PI-2173	0-281-0-0/0--/0	Replaced by 3" 283
V216	1	285	6	3	Gate	On PI-2178	0-285-0-0/0--/0	Replaced by 3" 284
V217	1	253	6	3	Gate	On PI-2107	3-253-1-3/40-P-M/3	Primary HO Supply Header
V218	1	254	6	3	Gate	On PI-2190	3-254-1-4/40-P-M/3	Primary HO Return Header
V219	1	255	6	3	Gate	On S-256	3-255-2-2/40-P-C/3	HO Drain Header
V220	1	255	6	3	Gate	On PI-2191	3-255-2-2/40-P-C/3	HO Drain Header
V221	1	256	6	3	Gate	On PI-2192	3-256-2-1/40-P-M/2	P-255 Drain Pump Discharge
V222	1	305	6	3	Gate		3-305-1-1/40-T	T-200 Outlet & P-225 Jacket
V223	1	306	6	3	Gate		3-306-1-1/40-T	T-200 Unloading Riser & Roof Nozzle Trace
V224	1	307	6	3	Gate		3-307-1-1/40-T	T-200 Recirculation Trace & P-220 Jacket
V225	1	310	6	3	Gate		3-310-1-1/40-T	T-200 Shell Nozzle Jackets
V226	1.5	273	6	3	Gate		3-273-1-1.5/40-T	Tank Area Pitch Line Supply & Transfer Line Trace
V227	1.5	274	6	3	Gate		3-274-1-1.5/40-T	Tank Area Pitch Line Return & Transfer Line Trace
V228	1	310	6	3	Globe		3-310-1-1/40-T	T-200 Shell Nozzle Jackets
V229	1	307	6	3	Globe		3-307-1-1/40-T	T-200 Recirculation Trace & P-220 Jacket
V230	1	306	6	3	Globe		3-306-1-1/40-T	T-200 Unloading Riser & Roof Nozzle Trace
V231	1	305	6	3	Globe		3-305-1-1/40-T	T-200 Outlet & P-225 Jacket
V232	1	233	4	6	Gate	On PI-2013	6-233-2-2/40-N	Reduced Pressure Nitrogen Supply to T-200
V233	1	222	10	1	Gate	On S-236	1-222-1-2/40-O-M/3	Dock Evacuator Pump P-235 Suction
V234	8	203	4	1	Gate	Riser Block Valve, Lock Open	1-203-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-200 Top Nozzle
V235	8	213	4	1	Gate	FUTURE Riser Block Valve, Lock	1-213-1-8/40-O-M/6	Pitch Ship Unloading Riser, Tee to T-210 Top Nozzle
V236	4	151	9	3	Check	P-2 Backflow prevention	#N/A	#N/A
V237	1	2500	5	3	Gate	LT-2124 Isolation	T-250	HTF Drain & Charging Tank 2000 gal, atm.
V238	1	2500	5	3	Gate	LT-2124 Isolation	T-250	HTF Drain & Charging Tank 2000 gal, atm.
V239						UNUSED	#N/A	#N/A
V240	2	333	8	11	Gate		11-333-2-2/40-H-M/1.5	Steam Supply to Maintenance Building from TP-112
V241	1	225	4	1	Gate	PI Isolation	1-225-1-2/40-O-M/3	Evacuator Pump P-238 Discharge
V242	1	223	10	1	Gate	PI Isolation	1-223-1-2/40-O-M/3	Dock Evacuator Pump P-235 Discharge
Relief, Control, and Remote Operated Valves, and Hand Valves with Position Indication, Listed in the Instrumet List, are in addtioton to those listed here.								
Additional valves are required for Standard Configuration Steamouts and Component Drains but are not numbered or Listed. See P&ID and Piping Drawings for Locations.								

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No.	ChemTech Line or Equipment	Interfacing Line or Equipment	Service	Existing System	New System	Piping Dwg.No.	P&ID Dwg. No.	Comments
TP-11	221 / V046	Header to T-65 & T-68	Pitch	Header to T-65 & T-68	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-12	221 / V045	Rail car loading thru mass flow meter	Pitch	Rail car loading thru mass flow meter	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-13	221 / V044	Flow meter bypass	Pitch	Flow meter bypass	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-14	221 / V043	Rail car unloading pump discharge	Pitch	Rail car unloading pump discharge	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-15	221 / V042	Spare	Pitch	Spare	New manifold at rail car loading station		6526-D004	New manifold w/refurbished valves
TP-16	T-200 Nozzle D	203	Pitch		Inlet nozzle @ tank T-200	JCMC 97010-36	6526-D004	Chemtech's Tie-Point with marine engineer's piping
TP-17	207	203	Pitch		Top Pitch Recirc to T-200	JCMC 97010-36	6526-D004	Chemtech's Tie-Point with marine engineer's piping
TP-18	224	203	Pitch		Pitch unload line Drain	JCMC 97010-37	6526-D004	Chemtech's Tie-Point with marine engineer's piping
TP-21	220	Fume header to scrubber	Coal Tar Vent Fumes	Fume header to scrubber	Tank T-200 & T-210		6526-D004	
TP-31	257	E-170 Heater PRV Discharge	Hot Oil	E-170 Heater PRV Discharge	E-270 Heater PRV Discharge		6526-D005	Provides parallel operation of Existing and New Hot Oil Systems
TP-32	250	E-170 hot oil heater inlet	Hot Oil	Existing hot oil heater inlet	New hot oil heater inlet		6526-D005	Provides parallel operation of Existing and New Hot Oil Systems
TP-33	252	E-170 Outlet	Hot Oil	Existing hot oil heater outlet	New hot oil heater outlet		6526-D005	Provides parallel operation of Existing and New Hot Oil Systems
TP-34	T-240 Nozzle C	Existing 4" from 12" Return Header	Hot Oil	Existing expansion tank inlet	T-240 Nozzle C		6526-D005	
TP-35	T-240 Nozzle A	Existing Startup Outlet Line	Hot Oil	Existing expansion tank Startup outlet	T-240 Nozzle A		6526-D005	
TP-36	268	Existing Startup Outlet Line	Hot Oil	Existing Startup Circulation at P-2 suction	New primary pump return header		6526-D005	
TP-37 (was TP-321)	245	Existing HO Return Header	Hot Oil	New 4" Flange on Existing 12" hot oil Return Header end cap	New hot oil return header		6526-D005 / 6526-D009	Common HO Supply to New and Existing Ssytems
TP-38	261	263	Hot Oil		Ship unloading trace line		6526-D006	Chemtech's Tie-Point with marine engineer's piping
TP-39	265	264	Hot Oil		Ship unloading trace line		6526-D006	Chemtech's Tie-Point with marine engineer's piping
TP-41	330	Existing storm water header	Rain Water	Existing storm water header	Dike area sump pump P-320		6526-D008	
TP-51	227	Existing natural gas header	Natural Gas	Existing natural gas header downstream of gas meter	Natural gas supply to new hot oil heater		6526-D005	
TP-111	331	Existing steam header adjacent to fume header	Steam	Existing steam header adjacent to fume header	Steam trace for new fume header		6526-D008	
TP-112	333	Existing steam header at pitch storage building	Steam	Existing steam header at pitch storage building	Steam line to new maintenance building		6526-D008	
TP-311	TV-2141	Pump P-1 suction	Hot Oil	Pump P-1 suction	New control valve		6526-D009	New temperature control valve @ P-1 suction
TP-312	321	Pump P-1 suction	Hot Oil	Pump P-1 suction	New bypass line		6526-D009	New bypass line around Pump P-1
TP-313	321	T-65 coils hot oil return	Hot Oil	T-65 coils hot oil return	New bypass line		6526-D009	New bypass line around Pump P-1
TP-314	TE-2141	Pump P-1 suction	Hot Oil	Pump P-1 suction	New temperature transmitter		6526-D009	New temperature transmitter @ P-1 suction

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No.	ChemTech Line or Equipment	Interfacing Line or Equipment	Service	Existing System	New System	Piping Dwg.No.	P&ID Dwg. No.	Comments
TP-321 (Now TP-37)	245	Existing HO Return Header	Hot Oil	New 4" Flange on Existing 12" hot oil Return Header end cap	New hot oil return header		6526-D009	Control modifications to existing hot oil system
TP-323	FE-2145	Existing hot oil heater inlet pipe	Hot Oil	Existing hot oil heater inlet pipe	New flow meter		6526-D005	New vortex flowmeter on existing hot oil heater inlet pipe
TP-331	TV-2143	Pump P-3 suction	Hot Oil	Pump P-3 suction	New control valve		6526-D009	New temperature control valve @ P-3 suction
TP-332	V147	Pump P-3 bypass line	Hot Oil	Pump P-3 bypass line	New check valve		6526-D009	New check valve in bypass line around Pump P-3
TP-334	TE-2143	Pump P-3 suction	Hot Oil	Pump P-3 suction	New temperature transmitter		6526-D009	New temperature transmitter @ P-3 suction
TP-341	TV-2144	Pump P-4 suction	Hot Oil	Pump P-4 suction	New control valve		6526-D009	New temperature control valve @ P-4 suction
TP-342	324	Pump P-4 suction	Hot Oil	Pump P-4 suction	New bypass line		6526-D009	New bypass line around Pump P-4
TP-343	324	T-68 heaters hot oil return	Hot Oil	T-68 heaters hot oil return	New bypass line		6526-D009	New bypass line around Pump P-4
TP-344	TE-2144	Pump P-4 suction	Hot Oil	Pump P-4 suction	New temperature transmitter		6526-D009	New temperature transmitter @ P-4 suction
TP-351	TV-2146	Pump P-5 / P-6 suction	Hot Oil	Pump P-5 suction	New control valve		6526-D009	New temperature control valve @ P-5 suction
TP-352	325	Pump P-5 / P-6 suction	Hot Oil	Pump P-5 suction	New bypass line		6526-D009	New bypass line around Pumps P-5 & P-6
TP-353	325	Hot oil return line to existing 12" header	Hot Oil	Hot oil return line to existing 12" header	New bypass line		6526-D009	New bypass line around Pumps P-5 & P-6
TP-354	TE-2146	Pump P-5 / P-6 suction	Hot Oil	Hot oil return line to existing 12" header	New bypass line		6526-D009	New bypass line around Pumps P-5 & P-6
TP-355	V236	Pump P-2 Discharge	Hot Oil	Prevent Back Flow in Parallel Opn.			6526-D005	

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PIPELINE SPECIFICAITON AND MATERIALS OF CONSTRUCTION

Per drawing 6526-D002, code "C" on the P&ID's specifies the following

1 = Carbon Steel, Butt Welded
2 = Carbon Steel Socket Welded
3 = Carbon Steel, Threaded
4 = Stainless Steel Tubing
5 = Galvanized, threaded

This specifications further defines these piping code "C""s.

1 = CARBON STEEL, BUTT WELDED

This specification generally applies to the **Pitch, Fume and the Hot Oil** piping that is 2" IPS and larger. This specification also applies to the **Hot Oil Tracer** piping **attached** to a Pitch pipe and **inside** the insulation.

Design Criteria	Max Temperature	Max Pressure
Pitch Piping	550°F	130 psig
Hot Oil Piping	575°F	130 psig
Fume Piping	400°F	30 psig

Pipe		Seamless ASTM A-106,Grade "B"	
Fittings		Butt weld	A-234, Grade "B"
Flanges		150# ANSI B-16.5, ASTM A-150.	
Gaskets		Flexitallic style CG Filler, Flexite/Metal -304L gaskets	
Flange Bolts		Alloy studs, ASTM A-193 Gr. B-7 & American Std. Heavy Duty Hex Nuts, A-194, class 2H.	
Valves	2" and above		150# Flanged Gate or Globe with Stellite Trim For Pitch service, see the Piping drawings for valve selection.
	8" Fume	Butterfly	All wetted parts - Teflon - Garlock's "Gar-Seal 100 Series"
	Pitch Sample Valve		Use HEX Sample Valve, 316 SS construction, graphite packing, Model HS311U5141213 made by Richards Industries and supplied by Gilson Engineering Sales Voice 412-369-0100 or fax 412-369-1728

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	Pitch	4"	Pacific Wedge Plug Model HA-71-S (Hand Operator w/Steam Jacket.
	Pitch	6 & 8"	Pacific Wedge Plug Model GA-71-S (Gear Operator w/Steam Jacket
Control Valves			150# Flanged Globe Valves For Pitch service, see the Piping drawings for valve selection.
	8" Fume	Butterfly	All wetted parts - Teflon - Garlock "Gar-Seal 100 Series"
Pitch Strainers			Ductile iron, 150# flanged, strainer with no wire mesh in basket.
Hot Oil Strainers			Forged Steel, Socket Weld in Piping, Bolted Flange cover for strainer removal. Strainer 40 mesh.
Flexible Metal Hose for Pump Suction			150# S.O., R/F, Flanged Microflex, MSS 301, 321 stainless Steel wetted surfaces

Tracers - Hot Oil Piping attached to Pitch Piping.

Pitch Piping 4" and smaller

One or two 1" pipe tracers, banded on 18" centers with stainless steel bands, 3/4" wide. Butt welded inside insulation and socket welded outside insulation. See drawing 6526-P013 for the number of tracers.

Pitch Piping 6" and larger.

One or two 1 1/2" pipe tracers banded on 18" centers with stainless steel bands, 3/4" wide. Butt welded inside insulation and socket welded outside insulation. See drawing 6526-P013 for the number of tracers.

Every effort shall be made to fit the tracer piping to the contour of the pitch pipe. Welds shall be made with the minimum excess surface bead. The weld area of the surface of the tracer pipe that contacts the pitch pipe shall be ground flush to the tracer OD so that the tracer contacts the full length of the pitch pipe along straight runs. Pipe bends may be used and are preferred rather than welded fittings.

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2 = CARBON STEEL SOCKET WELD

In general this specification applies to the **Hot Oil** piping, **Hot oil Tracer** Piping that is **not** attached to the pitch pipe and is **outside** the insulation, **steam supply, condensate** and **nitrogen** piping.

Design Criteria	Max Temperature	Max Pressure
Hot Oil Piping	575°F	130 psig
Steam & Condensate Piping	380°F	150 psig
Nitrogen Piping	Ambient	150 psig

Pipe	Seamless ASTM A-106,Grade "B"
Fittings	Socket Weld, 3000# forged steel
Flanges	150# ANSI B-16.5, ASTM A-150 Used only at equipment or control valves.
Gaskets	Flexitallic style CG Filler, Flexite/Metal -304L gaskets
Flange Bolts	Alloy studs, ASTM A-193 Gr. B-7 & American Std. Heavy Duty Hex Nuts, A-194, class 2H.
Valves	Socket Weld Gate or Globe with Stellite Trim Nitrogen Service – Threaded Ball valves with Teflon Seats and Stainless Steel ball.
Control Valves	150# Flanged Globe Valves

3 = CARBON STEEL, THREADED

In general, this specification is for **Natural Gas** piping.

Design Criteria	Max Temperature	Max Pressure
Natural Gas Piping	100°F	75 psig

Pipe	Seamless ASTM A-53, Grade "A"
Fittings	Threaded, 3000# forged steel
Flanges	150# ANSI B-16.5, ASTM A-150 Used only at equipment or control valves.

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Gaskets	Flexitallic style CG Filler, Flexite/Metal -304L gaskets
Flange Bolts	Alloy studs, ASTM A-193 Gr. B-7 & American Std. Heavy Duty Hex Nuts, A-194, class 2H.
Valves	Threaded Gate or Globe with Stellite Trim
Control Valves	150# Flanged Globe Valves, 1" and larger. Smaller than 1", threaded

4 = STAINLESS STEELTUBING

In general this specifiation applies to the **Steam Tracing** Specification for the PITCH FUME PIPING. Steam Tracing meaning only the pipe that is attached to the Pitch Fume Line and inside the insulation. The steam supply and condensate piping shall be socket welded, per Code "2".

Design Criteria	Max Temperature	Max Pressure
Steam & Condensate Piping	380°F	150 psig

Tracers Tubing Four 1/2" OD with 0.049" wall (18 gauge)
ASTM 269, 304 Stainless Steel

Tracers <u>Inside</u> Insulation

Join lengths of tubing using Cajon stainless steel tube socket weld unions as manufactured by "Swagelok", using Silver Brazing materials as manufactured by:

Eulectic Corporation Att: Chuck Foye
40-40 172nd Street 1-800-323-4845 ext. 2811
Flushing, NY 11358-9981
Rod: XUPER 1020XFC, Precoated
Paste: Eulectic Silweld #1618
Follow Manufacturer's instructions and assure tubing and fittings are clean.

Secure tracer to pipe being heated with stainless steel bands, 3/4" wide, on 18" centers. Where unions are used, the bands shall be secured about 6" on either side of the union in order to keep as much of the tracer tubing in contact with the Fume pipe. Bands shall be tight, but shall not deform the tubing.

Tubing shall be bent around Fume piping fittings to conform to the contour of the Fume piping.

Tracers <u>Outside</u> Insulation

Compression type, stainless steel, "Swagelok" or equal. The use of comperssion fittings shall be used primarily for the transion from the stainless steel tubing to the carbon steel supply and condensate piping.

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5 = GALVANIZED THREADED

This specification applies to the **Sump Discharge Water.**

Design Criteria	Max Temperature	Max Pressure
Sump Discharge Water Piping	Ambient	150 psig

Pipe	Seamless ASTM A-53, Grade "A", hot dipped galvanized
Fittings	Malleable Iron, Class 150, hot dipped galvanized
Flanges	150# ANSI B-16.5, ASTM A-150 Used only at equipment or control valves when required. Use threaded joints where possible.
Gaskets	Flexitallic style CG Filler, Flexite/Metal -304L gaskets
Flange Bolts	Alloy studs, ASTM A-193 Gr. B-7 & American Std. Heavy Duty Hex Nuts, A-194, class 2H.
Valves	Threaded Gate or Globe with Stellite Trim
Control Valves	150# Flanged Globe Valves, 4" and larger. 3" and smaller threaded

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APPENDIX B

APPENDIX "B"

T-200 - Pitch Tank Piling & Foundation

Design Drawings and Specifications to be Provided by

GeoEngineers, Inc.

7504 SW Bridgport Road

Portland, OR 97224

(503) 624-9274

&

KPFF Consulting Engineers

111 SW 5Th Ave.

Suite 2500

Portland, OR 97204-3628

(503) 227-3251

SECTION _____

DRIVEN PILES

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Furnish all plans, labor, materials, equipment, and supervision, tools, apparatus and other incidentals required to construct all driven piles in strict accordance with the Drawings and Specifications, and as reasonably inferable therefrom.

B. The piles are 16.00-inch-diameter, nominal outside diameter, steel pipe pile with a wall thickness of 0.625 inch, driven closed-ended, then filled with portland cement concrete after driving.

1.2 REFERENCE STANDARDS:

A. Use current editions of the following reference standards.

1. American Society for Testing and Materials (ASTM) A 615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

2. ASTM E 329 Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction.

3. ASTM A 252 Standard Specification for Welded and Seamless Steel Pipe Piles.

4. ASTM C 39 Standard Specification for Compressive Strength of Cylindrical Concrete Specimens.

5. ASTM E 329 Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction.

6. ASTM C 94 Standard Specification for Ready-Mixed Concrete.

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7. ACI 301 Standard Specifications for Structural Concrete for Buildings.

8. ACI 318 Building Code Requirements of Reinforced Concrete.

9. American Welding Society (AWS) Structural Welding Code.

B. Geotechnical engineering reports prepared by GeoEngineers, Inc., titled "Report, Geotechnical Engineering Study, Proposed Coal Tar Pitch Storage Tanks, 7540 Northwest Saint Helens Road, Portland, Oregon," dated May 9, 1997 and "Report Addendum, Tank Foundation Design/Construction Considerations, Proposed Coal Tar Pitch Storage Tanks, Portland, Oregon" dated September 18, 1998.

1.3 SUBMITTALS:

A. Provide the following submittals.

1. Submit installation procedures for driving piles at least 1 week prior to mobilization to the site. The submittal shall fully describe all proposed pile installation equipment including hammer, ram, driving cushion, pile cap and cap block.

2. Provide certification of yield strength and weldability of steel products by AWS processes acceptable to the Structural Engineer.

3. Provide mill certificates of chemical and physical properties, or equivalent.

4. Provide concrete compressive strength and mix design.

B. Driving activities shall not commence prior to completing submittals.

1.4 QUALITY ASSURANCE:

A. Contractor will provide special inspection for piling as required by Chapter 17 of the 1997 Uniform Building Code as adopted by the City of Portland.

B. Welder Qualifications: Qualify welders, welding processes and procedures in accordance with AWS Structural Welding Code and requirements of the City of Portland.

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C. Concrete

1. A minimum of three concrete test cylinders shall be provided for each 100 cubic yards or each day of pour for each concrete strength. Cylinders shall be tested as follow.
   a. One at 7 days
   b. Two at 28 days

2. Mixing shall comply with ASTM C 94

C. Pile Driving

1. Owner will retain the geotechnical engineer who will be onsite to monitor and record pile driving records. Contractor is to maintain communication with Geotechnical Engineer to assure that the engineer has sufficient notice to be on site when all driving is scheduled to occur.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to the project site in such quantities and at such times to assure the continuity of pile driving operations to the project schedule.

B. Store piles in orderly groups above ground and blocked during storage to minimize possible distortion or damage of members. Piles damaged or exhibiting variations beyond tolerance limits shall not be used in the work.

1.6 PROJECT CONDITIONS:

A. Subsurface Information:

1. The geotechnical engineering reports for this project are provided in the Appendix. This information does not necessarily reflect soil types, strata thicknesses or water level variations that may exist between explorations and is not be construed as warranty of the subsurface conditions. Neither the Owner, Engineer, nor the Geotechnical Engineer will be responsible for interpretations or conclusions drawn therefrom by the Contractor.

2. Additional explorations may be performed by the Contractor at no additional cost to the Owner, provided such explorations are acceptable and approved in writing by the Owner.

B. Protect structures, underground utilities and other construction from damage caused by pile driving operations. Excavate for piles as required and as specified on Drawings.

PART 2 - PRODUCTS

2.1 STEEL PILES:

A. Furnish 16-inch-diameter, nominal outside diameter, 0.625-inch wall thickness pipe piles.

B. Steel for Piling: Hot-rolled carbon steel structural pipe, complying with ASTM A 252, Grade 2 and minimum yield strength (f_y) of 35 kips per square inch (ksi).

C. Steel Reinforcing: ASTM A 615, grade 60.

D. Fabrication: Provide welded connections as shown in Drawings. Pile bottom shall be equipped with a base plate as shown in Drawings.

E. Concrete Pipe Fill:

1. Concrete shall conform to requirements of ACI 318, Parts 1, 2 and 3.
2. Concrete shall have a minimum 28-day compressive strength as shown on the Drawings.

2.2 DRIVING EQUIPMENT:

A. General: Furnish pile driving equipment of a type generally used in standard pile driving practice, operate hammer at manufacturer's specified rate to develop the required rated energy per blow. Drop hammers will not be allowed.

B. Equipment and Hammer:

1. Provide equipment of adequate size and capacity to handle, brace and hold the piles to the designed alignment. This equipment shall be able to maintain the alignment of pile and hammer without damage to either.
2. Maintain all pile driving equipment in safe operating condition at all times.
3. Driving hammers shall be in good repair and operating condition and shall be capable of being operated at the manufacturer's rated number of blows per minute.
4. Equipment or methods that result in regular or repeated damage to the piles during driving, or are detrimental to the bearing capacity of piling already driven, will be rejected.

5. The piles shall be driven with a steam, air or diesel hammer that develops a rated energy of at least 32,000 ft-lbs. per blow and as required to achieve the required pile capacity. The Contractor is responsible for selecting the driving equipment capable of installing the piling to the specified pile penetration and capacity and not causing damage to the piling during driving. Hammers may be single or double acting.
6. Pile cushion shall be used during the driving to limit stress during driving to 90 percent of the piling yield stress.

C. Driving Caps: Equip hammer with a driving cap capable of protecting pile head and providing uniform distribution of hammer energy to pile head.

D. Leads: Use fixed, rigid-type pile driver leads that will hold the pile firmly in position and alignment, and in axial alignment with the hammer. Free-swinging leads will not be permitted. Extend leads to within 2 feet of the elevation at which the pile enters the ground.

E. Geotechnical Engineer will evaluate pile installation equipment using Wave Equation analysis. Analysis will be completed to determine the suitability of the equipment for pile installation and to establish acceptable refusal criteria

PART 3 - EXECUTION

3.1 GENERAL:

A. Examine areas and conditions under which piles are to be installed, and correct conditions detrimental to the proper and timely completion of the work. Proceed with work only after unsatisfactory conditions have been corrected.

B. Pile Length Markings: Mark each pile with horizontal lines at 1'0" intervals, and the number of feet from pile point at 5'0" intervals.

C. Welding:

1. Perform manual arc-welding using shielded metal arc or submerged arc method, complying with American Welding Society (AWS) Standards and requirements of City of Portland.

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2. Use oxygen-gas or oxygen arc methods for field cutting of steel, complying with AWS recommendations.

D. Welded Splices: Clean surfaces to be welded of rust, scale, oil, paint and foreign material.

1. A maximum of one splice per pile is permitted, unless otherwise authorized by the Geotechnical Engineer. Make splices before starting driving operations wherever possible. If a welded splice is required during driving operation, make splice when top of drive pile portion is at least 3'0" above ground, to permit inspection of welded connection during welding and during subsequent driving.
2. Provide one straight pile alignment through splice and develop the full strength of pile in compression, tension and bending.

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3.2 DRIVING PILES:

A. General:

1. Each pile shall be driven to refusal into the dense to very dense gravel or bedrock formation that underlies the site. The surface of the bearing layer is expected to be at about Elevation – 25; however, variations of several feet may occur over the area of the tank foundations. The required penetration for individual piling will be established on the basis of the driving record during pile driving as approved by the Geotechnical Engineer.
2. Excessive driving shall be avoided. The minimum hammer energy is an estimated value required to drive the piles to bearing at a maximum blow count of 16 blows per inch. The hammer energy and blow count value represents the end of the driving condition, with the pile tip near the estimated tip elevation. More severe or restrictive driving conditions may occur before reaching the estimated tip elevation.
3. The Geotechnical Engineer can modify the final required blow count depending on the field conditions encountered and observations made during pile installation.
4. Maintain the center of gravity for each pile to conform to the locations shown in the Drawings.
5. Locate each pile accurately in accordance with the Drawings. Reference cut-off elevations of each pile to benchmarks established by the Engineer.
6. Plumb the leads and the pile before driving. Take care during driving to prevent and to correct any tendency of piles to twist or rotate.
7. Jetting for installation of piling will not be allowed.

B. Driving Tolerances: Drive piles within the following maximum tolerances:

1. Location: 2 inches from location indicated for center of gravity of each single pile or pile groups; 2 inches for piles under walls.
2. Plumbness: Maintain 1 inch in 10'0" from the vertical, or a maximum of 3 inches, measured when the pile is above ground, in the leads.

C. Heaved Piles: Compile recorded instrument observations made during pile driving to determine whether a driven pile has lifted from its original seat during the driving of adjacent piles. If uplift occurs, redrive the affected piles to a point elevation at least as deep as the original point elevation with a driving resistance at least as great as the original driving resistance.

D. Damaged or Misdriven Piles:

1. Damaged piles, and piles driven outside the required driving tolerances, will not be accepted.
2. Withdraw piles rejected after driving and replace with new piles.
3. Drive additional pile or piles where the centerline deviation exceeds 3 inches and an analytical determination indicates a load on any pile exceeding 110 percent of the design load.

E. Cutting-off:

1. Cut off tops of driven piles, square with pile axis and at elevations indicated.
2. Dispose of excess materials off site.

3.4 FIELD QUALITY CONTROL:

A. Survey: Employ independent Professional Land Surveyor or Registered Civil Engineer to make field survey of completed piling. Show actual pile locations with respect to planned pile locations, and plumbness.

"END OF SECTION"

APPENDIX C

APPENDIX "C"

Piping & Associated Foundations, etc.

For

Pitch Piping from Dock to Pitch Tank, T-200

Design Drawings and Specifications to be Provided by

J. Cameron McKernan

825 NE 20th Ave.

Suite 110

Portland, OR 97232

(503) 232-7211

APPENDIX D

APPENDIX "D"

Planning foundation Construction Procedures.

Design Drawings and Specifications to be Provided by

GeoEngineers, Inc.

7504 SW Bridgport Road

Portland, OR 97224

(503) 624-9274

&

KPFF Consulting Engineers

111 SW 5Th Ave.

Suite 2500

Portland, OR 97204-3628

(503) 227-3251

INSULATION

SPECIFICATION FOR FIELD APPLIED INSULATION

This specification covers the materials and workmanship for insulating the pitch tank, T-200, the pitch piping with heat transfer media (HTM) tracer piping attached, and HTM piping.

TANK (T-200) INSULATION MATERIALS

INSULATION

The insulating material shall be 6" of mineral wool applied in two layers of 3" each. Mineral wool insulation shall be manufactured by Rock Wool Manufacturing Company (Delta-8, Mineral Wool Lamella), Precision Fabricated Insulation, Owens Corning, or others making a mineral wool insulation suitable for a 850°F application and with a similar thermal conductivity and other physical properties as Rock Wool's Delta-8.

Per drawing 6526-A001, Detail 1, there is a section of the tank roof that is insulated with calcium silicate. See Roof Insulation for specifications.

METAL JACKETING

The mineral wool insulation shall be covered with 0.024" thick aluminum (ASTM B-209) with an interior moisture barrier consisting of one layer of one mil polyethylene film with a protective layer of 40 pound Kraft paper.

The shell jacketing shall be corrugated, 2 1/2" valley to valley lengthwise by 5/8" valley to hill deep. This specification supersedes the dimensions of the corrugated material on the tank drawing.

The roof jacketing shall be the same as the shell but non-corrugated, i.e., flat.

The junction between the roof to shell metal jacket (flashing) shall be the same as the non-corrugated material above, and extend at least 9" under the roof jacket and at least 12" down the shell over the corrugated sheets. Sections shall be overlapped at least 3". Sheet metal screws with neoprene washers shall be used to secure the flashing to the shell jacket.

The bottom of the corrugated shell covering shall be flashed with non-corrugated aluminum as above, per ChemTech Standard drawing 6000-A006, Detail "I".

OTHER MATERIALS

All sheet metal screws, as required to secure the metal jacketing, flashing, or the bands, the sheet metal screws shall be stainless steel with neoprene washers.

Bands to secure the insulation, or the metal jacket, shall be 316 stainless steel, 3/4" wide by 0.023" thick.

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Childers 304 stainless steel pre-drilled "J" clips shall be used on the metal jacketing to hold the bands in place.

Childers "S" clips, pre-drilled or 304 stainless steel, shall be used to support the corrugates sheets.

Springs, used to tension the bands on the shell insulation, shall be 302 stainless steel Chil-Spring® as manufactured by Childers and installed according to Childers recommendations. Expansion of the circumference of the tank and the required number of springs, shall be based on a temperature change of 550°F. Springs shall be installed such that the springs are stretched 1/2" upon installation on the cold tank.

Springs, used to tension the bands on the shell metal jacketing, shall be 302 stainless steel Mity-Spring™ as manufactured by Childers and installed according to Childers recommendations. Expansion of the circumference of the tank and the required number of springs shall be based on a temperature change of 550°F. Springs shall be installed such that the springs are stretched 1/2" upon installation on the cold tank.

Bands and springs, and other band connections shall be joined with heavy duty T-304 annealed stainless steel Childers Wing Seals, 0.032" thick, or Childers Closed Seals, 0.025" thick.

Speed washers, of 302 stainless steel, approximately 2" by 2", shall be used to secure the roof insulation.

Where wire must be used, it shall be soft annealed T-304 stainless steel, 16 or 18 gauge.

Childers CP.-70 or 76, Gray, shall be used as sealant where the metal jacket sheets overlap.

A flexible elastomer weatherproof material suitable for 500°F service, such as "Silbond" RTV 6500 High Temperature Silicon sealant manufactured by Silco Inc, shall be used to seal all gaps between the metal jacket and the tank structural steel members, around nozzles, or other tank parts such as the anchor chairs.

The use of the neoprene washers on the sheet metal screws, the CP-70, 76 and the RTV is to prevent moisture from entering behind the metal jacketing.

Foamglas® insulation blocks shall be used as the bottom 6" high course of shell insulation. The Foamglas® shall be applied in two courses 3" thick with staggered joints. Each course shall be held in place with bands and springs as above.

Johns Manville #460 shall be used at tie rods as per ChemTech Standard drawing 6000-A006, accompanying this specification.

Versi-Foam® urethane foam (Standard) (Manufactured by "Universal Foam Systems, Inc) shall be used in the corrugations where the roof to shell flashing is installed. This foam shall be installed to prevent driving rain from entering the insulation.

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Any conflict between this specification and the ChemTech drawings as to the methods or materials used, this specification shall govern.

SHELL

Insulation

The bottom 6" course shall be Foamglas® as specified above. The rest of the shell insulation shall be mineral wool, 6" thick, applied in two 3" thick layers. Both the vertical and the horizontal joints shall be staggered. The only location for non-staggered joints shall be at the angle insulation support rings. The insulation shall be started with full blanket widths from the support rings up. Each layer shall be held in place with bands and springs on 9" centers. The springs shall be Chil-Spring® installed per the manufacturer's recommendations.

Banding to tie rods and around nozzles (Detail "N" and Section "X-X") shall be per ChemTech drawing 6000-A006.

Metal Jacketing

The metal jacketing shall be overlapped at least 2" going around the tank. The jacketing shall be stacked with the top sheet overlapping the lower sheet by at least 3". Childers "S" clips shall be used to support the sheets. "S" clips shall be spaced at least every 10'. Childers CP-70 shall be used under the overlaps to seal the jacketing.

The top course of jacketing shall be inserted under the 3" by 2" angle shown on drawing 6526-A002, detail 2.

The bottom of the corrugated sheeting shall be flashed with non-corrugated jacketing at least 10" under the corrugated material and extended over the concrete ringwall. This flashing shall be overlapped around the circumference of the tank by at least 3" and sealed with Childers CP-70.

Note Section "G-G" on drawing 6000-A006. The corrugated metal jacketing shall have an opening of about 12" at the tie rods to allow access to the insulation bands for tightening, should it be required after heatup of the tank. The corrugated jacketing shall cover this opening with an overlap of about 5" on either side.

The shell jacketing shall be held in place with bands, with springs, at least every 3'. The spring tension provided by the "Mity-Springs™" shall be the same as that on the insulation. The number of springs shall be per Childers recommendations.

Childers "J" clips shall be spaced at least every 10' around the tank to secure the bands. CP-70, or RTV, shall be used to seal the jacketing between the clip and the jacket.

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All gaps between the metal jacketing and any part of the tank, such as the spiral stairway supports, anchor chairs, and nozzles, shall be filled with RTV.

ROOF

Insulation

The insulation shall be 6" thick, installed in two 3" thick layers of mineral wool insulation with all joints staggered. The insulation shall be secured to the tank with 12 gauge stainless steel pins and clips on 12" centers. Pins shall be applied with a capacitor discharge welding gun (CD Welder). The courses shall be held in place with speed washers. Pins shall be approximately 7" long. The excess length shall be nipped off so as not to penetrate the aluminum jacketing. Pins shall not be installed closer than 3" from the edge of a sheet.

Drawing 6526-A001, Detail 1, shows a section of the roof, about 10 foot wide by about 20 feet long that calls for "Rigid Insulation". This "Rigid Insulation" shall be an asbestos free calcium silicate block insulation, such as Owens-Corning, or others that has a density of 15#/cu. ft. The calcium silicate block shall be applied in two 3" layers with staggered joints. The 10' by 20' area need not be cut on an arc, but the calcium silicate insulation shall be formed to a close fit against the mineral wool insulation. In order to prevent a seam at this juncture, the bottom 3" thick course of the calcium silicate shall extend about 6" under the top 3" thick mineral wool insulation. The calcium silicate block shall be secured to the roof as above. The calcium silicate block shall be covered with metal jacketing as below.

Metal Jacketing

The insulation shall be covered with non-corrugated aluminum, as specified above, overlapped at least 3" at the seams. All seams shall be sealed with Childers CP-70.

Where a seam occurs, a strip of 0.03" thick stainless steel, not less than 4" wide, shall be installed under the top speed washer. After the top of the pin is nipped off, the metal jacketing may be placed and overlapped. The metal jacketing shall be secured to the stainless steel strip with sheet metal screws (Stitching screws), with neoprene washers, placed on at least 6" intervals. The upper jacket shall overlap the lower section.

RTV shall be used to seal the gap between the jacketing and the tank nozzles, or other parts of the tank.

Per ChemTech drawing 6000-A006, "Elevation D", the roof to shell junction shall be flashed with 0.024" thick aluminum flashing with moisture barrier. The flashing shall extend down the shell at least 12". Care shall be exercised to insure that the sheet metal screw securing the flashing to the roof jacket is inserted through the bead of CP-70. The flashing shall be secured to the shell jacketing with sheet metal screws with neoprene washers on 7 1/2" centers, approximately 2" from the edge. The screws shall not be inserted into the roof support angle on the tank. The gap between the corrugations and the flashing shall be filled with Versi-Foam®.

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Special Connections

Around the nozzles for handling pitch, both the shell and the roof (4 "F"'s, 1 "M", 1 "C"), there will be installed 30" by 30" clamp-on heat transfer surface that is 1/2" thick attached to the tank shell or roof. Over these surfaces the insulation shall be reduced to 5 1/2", one course 3" and the inner layer 2 1/2 or a 2" thick layer and a third layer 1/2" thick so that the total thickness is 5 1/2" over the heat transfer surface. The outer 3" layer shall stagger the joints of the 2 1/2" thick layer, or layers. The clamp-on units have a cutout (of the nozzle size) to allow the clamp-on to be installed after the nozzle has been welded to the tank. This cutout shall be insulated with two layers of 3" of insulation.

On the following roof nozzles, "B", "D", "M", T" and "S", there will be clamp-on heat transfer surfaces clamped around the nozzle. The roof insulation and metal jacketing shall be brought up to the heat transfer surface and the joint between the jacket and the heat transfer surface sealed with RTV. The insulation contractor for the piping will insulate the piping from this junction.

Each or these heat transfer surfaces have two pipe connections (1 or 1 ½"IPS); one as hot oil feed and the other as return. Seal the jacketing around these pipes with RTV where they penetrate the jacketing. The insulation contractor for the piping will insulate the piping from this junction.

Around the roof nozzles there will be hot oil piping (3/4 or 1") looped to heat the roof around these nozzles. The insulation over this area shall be a layer 2" thick, covered with a 3" layer, with staggered joints.

The tank has a coned roof. The above aluminum jacketing shall be applied over the entire roof, but the peak of the cone shall be flashed with a cap extending about 3' around the peak. This cap shall overlap the above applied jacketing and consist of an aluminum sheet cut and bent to conform to the cone. This cap shall be sealed with Childers CP-70 and secured to the stainless steel strips with sheet metal screws (Stitching screws), with neoprene washers, placed on a minimum of 6" intervals. The upper jacket shall overlap the lower section.

PIPE INSULATION

INSULATION MATERIALS

Three types of insulation shall be used; calcium silicate, fiberglass and mineral wool. All forms of insulation shall be of the "Pre-Formed" Pipe Insulation type, similar to Rock Wool manufacturing Company's "Delta-PF" pre-formed mineral wool pipe insulation, Owens Corning Fiberglas and Ownens Corning Kaylo® calcium silicate Pipe Insulation, except the 8 and 10" pipe from the ship to the pitch tank, T-200. This piping, line #'s 201, 202 and 203, with its two 1 1/2" tracers, shall be insulated with mineral wool blanket insulation, specified below. The P&ID's shall specify the insulation type and thickness.

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Prior to the application of insulation, all pipe that is heat traced shall have all of the pipe and the tracer piping tightly wrapped with aluminum foil, 1/256" thick. The shining surface of the foil shall be against the pipes

The P&ID's specify the type of insulation by line number. This designation as to the insulating material is only a **reference as to the anticipated insulation type for the major portion** of the pipe. In general, it is intended that mineral wool insulation shall be used on all vertical piping runs. All **elevated** horizontal piping not accessible to Operating and Maintenance personnel shall be insulated with mineral wool, except line #201. Line #201, an 8" pitch fume, steam traced, pipe, shall be insulated with fiberglass insulation. Calcium silicate insulation shall be used for any horizontal piping at or near grade or near elevated walkways, where the horizontal piping could be stepped on by Operating or Maintenance personnel. In order to identify where calcium silicate insulation shall be used, the Insulation Contractor shall request the Koppers' General Foreman, T. J. Turner (503-286-3681), to mark the aluminum wrapped traced piping and any hot oil piping that is to be insulated with calcium silicate. This can be done with a spray paint. All unmarked piping shall be insulated with mineral wool.

The above paragraph does not apply to the ship to T-200 piping, lines 201, 202 and 203. The insulation system for this piping is specifically specified later in this specification.

Where pre-formed insulation pipe coverings are not commercially available, such as for reducers, the pipe shall be insulated with similar material in a blanket or block insulation. The blanket or block shall be shaped to fit the pipe and the pre-formed aluminum jacket, and banded or secured with wire.

Where there are flanges in the **hot oil and pitch** piping, the pre-formed pipe insulation shall extend up to the flange bolts, minus one and one-half times the length of the stud bolt length. This will allow access for bolt removal without damage to the insulation. In this void, place small sections of insulation that can be removed.

In **hot oil service**, all flanges shall be insulated and jacketed as per detail 1 on drawing 6526-P018. This detail shows a "weather jacket" that is used to protect the mineral wool insulation from oil that may leak when a flange is opened or the gasket leaks. This weather jacket shall be made from the same material as the metal jacketing and secured in place with stainless steel bands. Consider using Childers aluminum Cap-Jacs™ Reducing covers as the weather jacket. The insulation between the weather jackets shall be easily removable calcium silicate, a less absorbing insulation in comparison to mineral wool. The weather jacket and the calcium silicate insulation shall be covered with a Childers aluminum jacket cover, Flange-Jacs™ or Valve-Jacs™, specifying the appropriate "B" dimension to overlap the weather jacket. The system shall be secured with stainless steel bands.

JACKETING MATERIALS

All pipe insulation shall be covered with 0.024" thick aluminum pipe jacketing with a one mil polyethylene film on a 40 pound Kraft paper integrally bonded over the entire surface of the insulation. The jacketing shall be Childers' "Lock-On®" with a modified Pittsburg

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Z-lock on the longitudinal seam. A two inch wide butt strap with a CP-77 high temperature sealant and a Fabstrap shall be used to secure the jacketing around the insulation and provide a weatherproof system.

Where the pre-formed pipe insulation is cut short of the flange for bolt removal without damage to the insulation, the jacketing shall cover only the pre-formed insulation. The flange jacket covers shall include extends that overlap the pipe jacket by at least 2".

Elbows and 45's shall be covered with Childers' "Ell-Jacs®" Insulation Covers (preferably 2 piece, but 4 piece where sizes dictate), aluminum, 0.024" thick with a moisture barrier. Ell-Jacs® shall be installed per the manufacture's recommendation in order to provide a weatherproof joint.

Tees shall be covered with Childers' 2 piece or 4 piece "Tee-Jac™" and installed according to the manufactures' recommendations.

Flanges shall be covered with Childers; Flange-Jacs™" and installed according to the manufacture's recommendations.

Where piping changes sizes, the insulation shall be covered with Childers' "Bevelled-Jacs™" or "Reducer-Jacs™" aluminum jacketing and installed according to the manufacture's recommendations.

Should there be piping shapes or configurations where commercially available pre-formed aluminum jacketing are not produced, then the jacketing shall consist of the same aluminum with the moisture barrier as specified above, cut to fit with sufficient overlapping to seal the overlap with CP-70 or 76, or RTV and secured with stainless steel screws with neoprene washers and stainless steel bands.

Metal jacketing for the ship to T-200 piping will be specified below.

HOT OIL PIPING (Heat Transfer Media, HTM)

The hot oil piping, piping that is not attached as a tracer to pitch piping (designated with a "3" line number), shall be insulated with thickness as shown in the line number. In general, most of the hot oil piping is covered with 3" of insulation. There is some piping that contains hot oil, but are not normally used when the HTM is above 500oF, and this piping is covered with 2" of insulation.

PITCH PIPING (All pitch piping is traced with HTM)

ALUMINUM FOIL Prior to the application of insulation, the pipe and tracer piping shall be tightly wrapped with aluminum foil, 1/256" thick. The shining surface of the foil shall be against the pipes. This applies to all heat traced piping, both hot oil and steam traced.

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The Pitch piping is broken into the following sections:

Pitch Piping from T-200

There is 2" pitch pipe around P-235 and P-238 that will have two (2) 1" tracers attached to most of the pitch piping. Because of the layout and HTM loops, there may be some pitch pipe with only one (1) tracer. This piping shall be covered with 6" calcium silicate pipe covering, 3" thick.

There is 6" pitch piping to P-220 and P-225 suction will have two (2) 1" tracers attached to most of the pitch pipe. As above, some pitch pipe may have only one (1) tracer. This piping shall be covered with 8" calcium silicate pipe covering, 3" thick.

There is 4" pitch piping from P-220 and P-225 to distribution and tank circulation that will have one (1) 1" tracer attached to the pipe. This piping shall be covered with 6" calcium silicate pipe covering, 3" thick.

Ship to T-200 :

INSULATION This 8 and 10" pitch piping, line #'s 201, 202 and 203, is traced with two (2) HTM pipe tracers banded to the pitch pipe. Per the P&ID, this line is covered with 6" of **mineral wool** insulation. The first layer of insulation, placed over the aluminum foil, shall be 3" thick "Metal-Mesh" mineral wool blanket as supplied by Rock Wool or Fiberx. This layer shall be secured in place with either stainless steel bands or wire. The seam shall be at the bottom. . Where the pipe and tracers are supported with a clamp around the pipes, the insulation shall be cut out in the form of a slot, but only to the depth and length of the clamping bracket.

Over this 3" blanket shall be placed a 3" thick pre-formed mineral wool pipe insulation with the smallest standard size pipe diameter to fit over the blanket layer. The pre-formed pipe covering shall stagger the longitudinal blanket seams by at least 6". The two piece pre-formed pipe insulation shall be installed with its seams 90 degrees from the blanket seam. This outer layer of pre-formed pipe insulation shall be held in place with stainless steel bands placed at least every 3'. There may be locations, such as at pipe supports, where the total thickness of insulation prohibits the installation of the metal jacket over the insulation. At these locations, the outer surface of the pre-formed insulation may be shaved off to permit covering with the metal jacket, as long as no more than 1 1/2" of insulation is removed.

METAL JACKETING Aluminum jacketing shall be

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used to cover the pre-formed insulation. All pipe insulation shall be covered with 0.024" thick aluminum pipe jacketing with a one mil polyethylene film on a 40 pound Kraft paper integrally bonded over the entire surface of the insulation. The jacketing may be Childers' "Lock-On®" with a modified Pittsburg Z-lock on the longitudinal seam. A two inch wide butt strap with a CP-77 high temperature sealant and a Fabstrap shall be used to secure the jacketing around the insulation and provide a weatherproof system.

As an alternate, the 0.024" thick aluminum with a one mil polyethylene film on a 40 pound Kraft paper integrally bonded over the entire surface of the insulation, may be field cut from rolls to fit the insulation. This covering shall overlap at least 2" along the length of the pipe and 3" along the seam. These overlaps shall be sealed with Childer CP-70. Bands shall be placed over the longitudinal seams and be spaced at no less than 3' intervals. Sheet metal screws with neoprene washers shall be used to secure the longitudinal seam, spaces at least ever 6".

The metal jacket seams along the length of the pipe shall stagger the insulation joints by no less than 4".

All joints where tracers or supports penetrate the metal jacketing shall be sealed with RTV.

Elbows, tee's and other fittings shall be jacketed with Childers pre-formed metal jacketing as specified above.

Valves, Pumps, Relief Valves, Strainers and Other Devices

In pitch service, valves, relief valves and strainers will have plate-type clamp-on heat transfer heaters through which HTM will circulate. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of 19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

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In general, the Insulation Contractor shall specify, purchase and install the removable/reusable insulation covers for flanged control and block valves, the pressure relief valves, strainers, and flow elements. Note that in pitch service, these devices are supplied with plate-type clamp-on heat transfer surfaces and the removable/reusable insulation shall cover the assembled unit.

However, pumps will be purchased with the removable/reusable insulation blankets.

Steam & Steam Traced Piping

The 8" pitch fume line, line # 208, is steam traced with four (4) 1/2" OD stainless steel tubes. Prior to insulating this piping system it shall be tightly wrapped with aluminum foil, as specified above. This piping system shall then be insulated with 9" pipe diameter pre-formed pipe insulation, fiberglass, 3" thick.

This insulation shall be covered with aluminum jacketing as previously specified.

END

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ELECTRICAL

ELECTRICAL AND INSTRUMENTATION SPECIFICATIONS

LIQUID PITCH UNLOADING

KOPPERS INDUSTRIES

PORTLAND, OR

By

CHEMTECH CONSULTANTS, INC.

PROJECT P-6526

NOVEMBER 18, 1998

ELECTRICAL

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Specifications

Motor Control Center 6526ES01

Uninterruptible Power Supply 6526ES03

1. PROJECT INTRODUCTION

1.1. The purpose of this project is to unload, store and transfer for shipment liquid pitch that has been delivered by ship. This includes (1) new pitch tank, foundations for (2) tanks, pumps, associated piping, hot oil heating system with piping and nitrogen blanketing system.

1.2. Location and Contacts

1.2.1. All work is to be done at the Koppers Industries Plant located at
7540 NW Saint Helens Road
Portland, OR 97210

1.2.2. The Project Manager is Mr. William A. Meisinger, PE
1001 William Pitt Way
Pittsburgh, PA 15238-1362
Telephone 412-826-3962, Fax 412-826-3999
E-mail: bill_meisinger@koppers.com

1.2.3. The Purchasing Manager is Mr. Jack Stephenson
1001 William Pitt Way
Pittsburgh, PA 15238-1362
Telephone 412-826-3907, Fax 412-826-3905
E-mail: jack_stephenson@koppers.com

1.2.4. The Plant Manager is Mr. Amos Kamerer
7540 NW Saint Helens Road
Portland, OR 97210
Telephone 503-286-3681, Fax 503-285-2831
E-mail: amos_kamerer@koppers.com

1.2.5. ChemTech Consultants Project Manager is Dr. Ted Andersen
Fourth Floor
1370 Washington Pike
Bridgeville, PA 15017
Telephone 412-220-4555, Fax 412-220-5685

1.3. Definitions

1.3.1. Koppers Industries, Inc will be referred to as the Purchaser or Koppers

1.3.2. ChemTech Consultants, Inc has design responsibility for the phases of the project covered by this specification, and will be referred to as the Engineer or ChemTech.

1.4. All work will be done at the direction of the Koppers' Field Construction Supervisor. The Contractor is expected to supply his own field supervisor to work with Koppers' representative.

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1.5. General Requirements and Conditions

1.5.1. It is understood and agreed that the Contractor has, by careful examination, fully satisfied himself as to the nature and location of the work; quality and quantity of material required; and kind of equipment and facilities needed preliminary to and during the performance of the work. The Contractor is aware of the general and local conditions and all other matters which can in any way affect the work.

1.5.2. Work on this project shall commence immediately after the Contractor has received notice from the Purchaser to proceed. The work shall be prosecuted with sufficient personnel, tools, equipment, and material for as many hours per shift and as many shifts per week as may be required to complete the work on or before the specified completion date (Refer to Paragraph 2.3.1)

1.5.3. The Contractor must realize that ChemTech has made every effort to assure that the dimensions given on the drawings are as accurate as possible. However, it is the contractor's responsibility to verify these dimensions before beginning the installation.

1.5.4. The Contractor understands that the final connection of electrical lines into existing lines shall be Contractor's responsibility and shall be scheduled with the Construction Superintendent.

1.5.5. It will be the Contractor's responsibility to coordinate his work activities with the Construction Superintendent so as not to interfere with any of the Purchaser's production activities.

1.5.6. The Contractor shall comply with all applicable sections of NEC (National Electrical Code) and any applicable state and local codes. In case of any conflict with codes, the most stringent requirements shall govern.

1.5.7. The Contractor is expected to perform in a professional, workmanlike manner during the installation of this equipment. He and his personnel will be required to follow the Koppers Safety Rules while in the plant (obtain copies when visiting the plant).

1.5.8. Koppers will designate a laydown area for the Contractor's use during the duration of the project. The Contractor will be responsible for maintaining and working within this area so as not to interfere with Plant activities.

1.5.9. Contractor shall maintain the work site in an orderly condition and provide personnel and supervision to continuously clean up the work area.

1.5.10. The Contractor must be aware of the fact that contractors for other trades will be working on the same project and in the same area. It

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will be the electrical contractor's responsibility to coordinate with other trades for this installation.

1.6. Utilities

1.6.1.1. Koppers will not furnish any utilities for the Contractor's use during this project.

1.6.2. Contractor will furnish

1.6.2.1. All of the electricity required for the job.

1.6.2.2. All fuel used in construction equipment.

1.6.2.3. Compressed air required for power tools and pressure testing.

1.6.2.4. All telephone services or any other communication devices or services required.

1.7. Safety

1.7.1. Contractor should obtain copies of Koppers' Safety Regulations when visiting the plant. These regulations are to be followed by all personnel while working in the plant.

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2. BID AND CONTRACT REQUIREMENTS

2.1. The Contractor is to firm bid all equipment, material, labor and anything else required for a complete installation of all phases of this project as defined by these drawings and specifications.

2.2. Form of bid

2.2.1. The bid is to list separate costs for each of the following work sections.

2.2.1.1. Demolition and Relocation

2.2.1.2. Electrical Work

2.2.1.3. Instrumentation Work

2.2.2. Labor and Material are to be listed separately for each of the above cost centers.

2.2.3. The Contractor is requested to list the following sub-contract information.

2.2.3.1. The number and type of sub-contract expected to be let to complete the job.

2.2.3.2. The names of the sub-contractors which will be used on the job.

2.2.3.3. The value of each sub-contract included in the bid.

2.2.4. The Contractor will submit a construction schedule with his bid. The schedule will be in the form of a Gantt Chart including the staffing requirements required to achieve the completion date.

2.3. Reporting

2.3.1. The Contractor will submit weekly updates to the Purchaser to this schedule detailing the progress achieved.

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2.4. Contract Extra Costs

2.4.1. Once the contract has been let, extra costs will be approved ONLY as follows:

2.4.1.1. In the event the contractor feels an item is an extra cost not covered by the original scope of the contract, he must obtain the agreement, in writing, of the Koppers Field Construction Supervisor.

2.4.1.2. The contractor is to then submit an estimate of the cost required to perform the extra work.

2.4.1.3. An additional sheet to the original purchase order will be issued to cover the extra cost.

2.4.1.4. No extra costs will be honored which have not been first authorized in this manner.

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3. SCOPE OF WORK

3.1. This Construction Specification is intended to provide for the supply and installation of all electrical and instrumentation to complete the project. In general the following work is included:

3.1.1. Demolition

3.1.1.1. The site must be cleared of all electrical feeds to buildings, structures or any other obstructions being mechanically removed or relocated before construction can begin.

3.1.1.1.1. Relocate power feed and rack at south-west corner of new pitch tank installation

3.1.1.1.2. Relocate feed to service building from existing drop at shop to relocated rack in 3.1.1.1.1.

3.1.1.1.3. Remove overhead feed to existing shop.

3.1.2. Electrical Work

3.1.2.1. Supply all labor and material for work in the pitch storage area including power and controls for the following:

3.1.2.1.1. Pitch Pumps P-220, 225, 230, 235

3.1.2.1.2. Hot Oil Pumps P-255, 275, 280, 285, 290

3.1.2.1.3. Liquid Pitch Tanks T-200, 210

3.1.2.1.4. Hot Oil Heater E-270

3.1.2.1.5. Primary Hot Oil Pumps P-260, 265

3.1.2.1.6. Hot Oil Drain & Charging Tank T-250

3.1.2.1.7. Nitrogen storage pad

3.1.2.1.8. Pitch tank area lighting

3.1.2.1.9. Collection Sump

3.1.2.1.10. MCC/ Control Room extension lighting and receptacles.

3.1.2.1.11. Pitch Pump Shed lighting

3.1.2.1.12. Hot Oil Pump Shed lighting

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3.1.2.1.13.Pitch Unloading Line Area, including Dock, shore area, and parking

3.1.2.2 Provide feed for new shop from Upper Rack

3.1.2.3.Upgrade feed to existing Switchgear in MCC room to provide for MCC B. Provide breaker in existing switchgear for MCC B feed.

3.1.2.4.Grounding

3.1.3. Instrumentation Work

3.1.3.1.Supply and install the conduit and wiring for instrumentation work.

3.1.3.1.1.See Instrumentation Specification Index 6526IS00 for instruments to be installed.

3.1.3.1.2.The majority of instruments will be mounted and/or installed by others, except as noted in this specification. The contractor will be responsible for all wiring, conduit, pullboxes, junction boxes, and fittings for installation. Testing to be as noted.

3.1.3.1.3.Mount PLC Panel, IP1 Panel, and IP2 Panel.

3.1.3.1.4.The area classified in the liquid pitch tank farm, hot oil area and dock are Class I, Division 2. All other areas are non-hazardous

3.1.3.2.Koppers Industries will supply the instruments and PLC Panel.

3.2. Equipment and Materials

3.2.1. In general, Koppers will furnish all major equipment and instruments. It will be the contractor's responsibility to unload store, safe-keep and install these items. The contractor is to provide a lockable trailer for this purpose.

3.2.2. Koppers will furnish

3.2.2.1.Motor control center MCC B (Specification 6526ES01)

3.2.2.2.Instrumentation (Instrument Index 6526IR01)

3.2.2.3.All mechanical equipment by others including motors.

3.2.2.4.Pipe racks and supports are either existing or by others.

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3.2.2.5.Instrumentation air by others.

3.2.2.6.PLC cabinet (Drawings 6526I002, 6526I003 & 6526I004).

3.2.2.7.All permits.

3.2.3. The nitrogen storage equipment will be furnished by the nitrogen supplier. The contractor is responsible for area lighting receptacle.

3.2.4. In general, the Contractor is responsible for all labor, materials, tools, and supervision necessary to complete the installation of the electrical and instrumentation portions of the project, with the exception of those items specifically noted as being supplied by Koppers.

3.2.5. The Contractor is responsible for, but not limited to, the supply of the following items:

3.2.5.1.All related trades to accomplish the electrical instrumentation installation, including trenching and backfilling, concrete placement, metal work, etc.

3.2.5.2.All poles and hardware.

3.2.5.3.All field supplies, weld rod, industrial gases, grout etc.

3.2.5.4.All tools and construction materials.

3.2.5.5.All temporary construction service facilities for field labor including field labor.

3.3. Storage

3.3.1. The contractor will be responsible for unloading, storing and safekeeping all equipment and material pertaining to the electrical part of this project.

3.3.2. A locked trailer and or area is to be provided at a site designated by Koppers for storage

3.3.3. Contractor must have personnel available to unload and store equipment purchased and received by Koppers as well as material he has purchased and received.

3.4. Standard Specifications and Codes:

3.4.1. All work performed at Koppers, Portland, OR is to be accomplished within, but not limited to the adherence of the following codes and standards:

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3.4.1.1. National codes

3.4.1.2. All work and equipment covered herein shall conform to current editions of all applicable national codes and standards of the following organizations.

ACI American Concrete Institute

AISC American Institute of Steel Construction

ASME American Society for Mechanical Engineers.

ASCE American Society for Civil Engineers.

ASTM American Society for Testing Materials

AWS American Welding Society

NFPA National Fire Protection Association

NEC National Electric Code

OSHA Occupational Safety and Health Act

SSPC Steel Structures Painting Council

UBC Unified Building Code (Oregon Amendments)

3.4.1.3. All applicable requirements of pertinent federal, state, and municipal laws, regulations, codes, standards or ordinances.

3.4.2. Reference herein and in other attached documents to these and other standards and codes is to the editions thereof in effect as of the date of the Contract.

3.4.3. Where compliance with two or more industry standards or sets of requirements are specified and overlapping of those different standards or requirements establish different or conflicting minimums, the most stringent requirement is intended and will be enforced, unless specifically detailed language written into the Specification clearly indicates that a less stringent requirement is to be fulfilled.

3.4.4. The Contractor is to report any conflict between the various codes or between any code and Specification to the Koppers Project Manager for interpretation and decision.

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3.5. General

3.5.1. The Contractor is to follow the guidelines listed within the drawings.

3.5.2. All electrical work shall be done in accordance with the NFPA and its section 70, the NEC.

3.5.3. All repairs and/or replacements thereof are to be made with equal or better materials.

3.5.4. All repairs to be made with appropriate materials for the service intended. Contractor shall coordinate with Purchaser for material specifications.

3.5.5. All Hot Work permits required for the project are the joint responsibility of the Purchaser and the Contractor.

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4. DEMOLITION AND RELOCATION

4.1. The Liquid Pitch Storage Area must be cleared of all obstructions before construction can proceed.

4.2. The following drawing apply to work in this area.

6526-E001 Liquid Pitch Unloading General Arrangement

4.3. The Contractor is responsible for supplying all labor, material and equipment for completing all electrical work in this area.

4.4. There is no specific material or equipment that will be supplied by the Purchaser in this section except the tank car heater station.

4.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

4.6. The Contractor is to dismantle and remove or relocate all electrical feeds in the Liquid Pitch Storage Area.

4.6.1. The locations of these obstructions are indicated on drawing 6526-G002 General Arrangement.

4.6.2. The Contractor is responsible for, but not limited to, removing the power to the following areas.

4.6.2.1. Weigh shed

4.6.2.2. Two (2) horizontal tanks

4.6.2.3. One (1) vertical column

4.6.2.4. Area lighting in the liquid pitch storage area.

4.6.2.5. One (1) tank car loading station

4.6.2.6. One (1) truck loading gangway

4.6.2.7. One (1) pitch pipe manifold

4.6.2.8. Maintenance building

4.6.3. Relocate electrical feed for one (1) sump pump. Sump is to be reused in this project. The sump pump is to be re-wired from the relocated Track #5 Rack.

4.6.4. Relocate tank car heating station. This will require relocating heating panels and associated electrical equipment on track #5 Electrical Rack, conduit, and wiring.

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4.6.4.1. A support structure must be supplied for the panels at a new location. See drawing 6526-G002, and 6526-E001

4.6.5. Contractor to relocate feed to service building from relocated feeder and from track number five-rack overhead by existing poles on messenger cable.

5. Electrical Installation

5.1. This section covers the electrical work for the Liquid Pitch Storage Area of this project.

5.2. The following drawings apply to work in this section.

6526-E001	480V Power Feed 1 Single Line
6526-E002	MCC A Single Line & Arrangement
6526-E003	480V Power Feed 2 Single Line
6526-E004	MCC B Single Line & Arrangement
6526-E005	Motor Schematics
6526-E006	Grounding Plan
6526-E007	Grounding Details
6526-E008	Lighting Plan
6526-E009	Lighting Details Sh. 1 of 2
6526-E010	Lighting Enlarged Plans
6526-E011	Conduit Routing Sh. 1 of 2
6526-E012	Conduit Routing Sh. 2 of 2
6526-E013	Lighting Contactor Details
6526-E014	Lighting Details Sh. 2 of 2
6526-E015	Dock Area Conduit Routing
6526-E016	Dock Area Schematics & 1-Line
6526-E017	Conduit & Cable Schedule Sh. 1 of 2
6526-E018	Conduit & Cable Schedule Sh. 2 of 2
6526-E019	Power Routing

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Topographical Survey Map

Nitrogen Pad

5.3. The Contractor is responsible for supplying all labor, material and equipment for all work in this section. This includes, but is not limited to the following:

5.3.1. All materials necessary for preparations, etc, ground leveling, final yard dressings, etc. necessary for the installation.

5.3.2. All concrete, concrete placement, anchor bolts, cinch anchors etc. necessary for the installation.

5.3.3. All minor support steel, clamps, anchors, and other mounting devices.

5.3.4. All electrical wiring, cable, grounding rods, control stations, pull boxes and any other material necessary for the complete installation.

5.3.5. All necessary safety equipment required by any and all Federal, State, and Local Codes.

5.4. Purchaser will supply the motor control center (see specification 6526ES01). There is no other specific material or equipment that will be supplied by the Purchaser in this section.

5.5. The Contractor is responsible for scheduling all work with the Purchaser so as to minimize disruption to Plant activities.

5.6. Electrical rack #5 is to be relocated, and will require a new foundation and galvanized support structure. The existing tank car heating panel will be converted to a portable unit by Koppers.

5.7. Electrical grounding loop

5.7.1. The ground loop underground is by others in the Liquid Pitch Storage Area and the Hot Oil Heating Area as shown on drawings 6526-E006, 6526-E007 & 6526-E012.

5.7.2. At stub ups around the process perimeter, others are to leave pigtails of length adjustable to reach final termination point. They are to be coiled, wrapped in plastic and taped to make ready for final installation. Electrical contractor is to terminate the ground cables per the above drawings and Article 250 of the National Electric Code.

5.7.3. See drawing notes for materials and connection techniques.

5.7.4. The Contractor shall be responsible for testing the installed grounding loops and inspecting that the installation is in

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accordance with the drawings and specifications. Tests to be included, witnessed and reported are listed below.

5.7.4.1. Continuity tests to establish grounding system integrity.

5.7.4.2. The construction superintendent shall be notified of upcoming tests to witness.

5.7.4.3. A brief written report shall be submitted to the Engineer within one week of tests stating the results of the tests.

5.8. Power System Modifications

5.8.1. The Contractor is to supply all labor and material necessary to install modifications to the power system to accommodate the additional electrical needs for the Liquid Pitch Project.

5.8.1.1. Upgrade Power feed to MCC room. Existing feed to switchboard is to be increased to provide service for new MCC B. Contractor to run (2) 350 MCM on existing pipe rack from the secondary of the upgraded transformers through weatherheads, to the switchboard in the MCC room. Transformer upgrade by others. Refer to drawings 6526E019 and 6526E001.

5.8.1.2. Provide for feeder for Service Building. Present Service Building feed is a sub-feeder from the shop. The Service Building feeder is to be # 8 cable run from the relocated Track #5 Electrical Rack and fed overhead to the existing weatherhead. Refer to drawings 6526E019 and 6526E001.

5.8.1.3. Install new feeder for new shop. Power to be obtained at the Main Upper Rack. Contractor to provide 150 Amp fused disconnect at the Upper Rack. Routing of #2 cable to be overhead following existing pipe supports to the east and pipe rack to the north. The feeder will cross to the new shop via 2 new 50' poles to a weatherhead at the new shop. Refer to drawings 6526E019, 6526E001, and 6526E003.

5.8.2. All power work to be coordinated with Koppers Industries for scheduling with plant production, construction schedules, and power company work.

5.9. Electrical Power Feeds and Controls

5.9.1. Contractor to install Motor Control Center.

5.9.1.1. Contractor to inspect MCC upon delivery and store. Any damage or deficiencies are to be reported to Koppers Industries Construction Manager.

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5.9.1.2. MCC B to be assembled from shipping sections and mounted per manufacturer's instructions.

5.9.1.3. Run power from existing switchboard to MCC B. Contractor to purchase and install 800 Amp breaker in switchboard and provide conduit and cable to MCC B main.

5.9.2. Contractor to run power and control feed for all loads associated with the Liquid Pitch Unloading Project.

5.9.2.1. For Single lines, Schemes, Routing and Schedules refer to drawings 6526E004, 6526E005, 6526E011, 6526E012, 6526E015, 6526E017, and 6526E018.

5.9.2.2. The following loads are included in this section.

5.9.2.2.1. Three (3) pitch pumps P-220, 225, 238

5.9.2.2.2. Four (4) hot oil pumps P-255, 275, 280, 285

5.9.2.2.3. One (1) hot oil heater, stack and control panel E-270

5.9.2.2.4. Two (2) hot oil transfer pumps P-260, 265

5.9.2.2.5. One (1) hot oil fill and drain pump P-245

5.9.2.2.6. One (1) sump pump P-320 (relocate existing sump pump)

5.9.2.3. One (1) 45KVA transformer and one (1) 30 circuit distribution panel for 120/208V power. Contractor to provide transformer and panel.

5.9.2.4. One (1) 30 circuit distribution panel for 277/480V power. Contractor to provide panel.

5.9.3. Lighting installation

5.9.3.1. Contractor to run power and Provide lighting for all areas associated with the Liquid Pitch Unloading Project.

5.9.3.2. For Routing Details, Schemes, and Schedules refer to drawings 6526E008, 6526E009, 6526E010, 6526E013, 6526E014, 6526E017, and 6526E018.

5.9.3.3. The following areas are in this section:

5.9.3.3.1. Control/MCC Building extension.

5.9.3.3.2. Hot Oil Pump Shed.

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5.9.3.3.3.Pitch Pump Shed.

5.9.3.3.4.Liquid Pitch Tank Yard Area and Nitrogen Pad.

5.9.3.3.5.Hot Oil heater area

5.9.3.3.6.Dock Area including access bridge, parking area, and pipeline road crossings.

5.9.3.4.Dock power and controls

5.9.3.4.1.Provide power and controls for the dock, shore side, and parking area

5.9.3.4.2.For Single lines, Schemes, Routing and Schedules refer to drawings 6526E015, 6526E016, 6526E017 and 6526E018.

5.9.3.4.3.The following loads are included in this section.

5.9.3.4.3.1.One (1) pitch pump P-225

5.9.3.4.3.2.One (1) motor operated valve

5.9.3.4.3.3.One 10KVA transformer and distribution panel.

6. Instrumentation Installation

6.1. This section covers the installation of all instrumentation in the Liquid Pitch Storage Project.

6.2. The following drawings apply to work in this section.

6526-I001	PLC Panel Layout
6526-I002	Power Ladder
6526-I003	Terminal Strips
6526-I004	N-200 Slot 0-0 & Slot 0-1
6526-I005	N-200 Slot 0-2 & Slot 0-3
6526-I006	N-200 Slot 0-4 & Slot 0-5
6526-I007	N-200 Slot 0-6 & Slot 0-7
6526-I008	N-200 Slot 1-0 & Slot 1-1
6526-I009	N-200 Slot 1-2 & Slot 1-3

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6526-I010	N-200 Slot 1-4 & Slot 1-5
6526-I011	N-200 Slot 1-6 & Slot 1-7
6526-I012	N-200 Slot 2-0 & Slot 2-1
6526-I013	N-200 Slot 2-2 & Slot 2-3
6526-I014	N-200 Slot 2-4 & Slot 2-5
6526-I015	N-200 Slot 2-6 & Slot 2-7
6526-I016	IP1 Panel
6526-I017	IP1 Power Ladder
6526-I018	IP2 Panel
6526-I019	IP2 Power Ladder
6526-I020	Conduit Routing
6526-I021	Conduit & Cable Schedule Sh. 1 of 3
6526-I022	Conduit & Cable Schedule Sh. 2 of 3
6526-I023	Conduit & Cable Schedule Sh. 3 of 3

6.3. The following documents apply to work in this section.

6.3.1. 6526IS00 Instrument Specification Index
And all Instrument Specifications 6526IS01 through 6526IS25

6.3.2. 6526IR01 Instrument List

6.3.3. 6526IR02 N-200 I/O List

6.4. The Contractor is responsible for supplying all labor, equipment and material in this instrumentation section with the exception of those items specifically listed as supplier by the Purchaser. The Contractor will supply but not be limited to the following items.

6.4.1. Contractor to run power, control and instrumentation feeds for all loads associated with the Liquid Pitch Unloading Project.

6.4.2. All wiring, cable, conduit, control stations, pull boxes and any other material necessary for the complete installation.

6.4.3. All minor galvanized support steel, clamps, anchors, and other mounting devices.

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6.4.4. Panel IP1 and Panel IP2. All mounting necessary for the installation.

6.4.5. All necessary safety equipment required by any and all Federal, State, and Local Codes.

6.4.6. The Liquid Pitch Unloading area is electrically rated Class I, Division 2 and all work to comply with this type of construction. The Dock area is also to comply with Class I, Division materials and construction techniques.

6.4.7. Purchaser will purchase and supply the PLC Panel. PLC Panel mounting by Contractor. Purchaser will supply the instruments. The instruments will be mounted in place by others.

6.5.

7. COMMISSIONING AND GENERAL INSTALLATION NOTES

7.1. It is the intent of this Contract that the Contractor commission all installations that are their responsibility. The following is required of the Contractor.

7.1.1. Testing will be performed on installed electrical material.

7.1.2. **The contractor is responsible for the installation of the electrical contract using good industry practices and standards. This testing scope in no way relieves the contractor from fulfilling his charge of installing a sound and safe electrical system.**

7.1.3. Inspection and testing will be documented. Test documentation at minimum, shall establish test equipment, test procedures, locations of tests (electrically and physically), and general weather conditions.

7.1.4. Contractor to make tests and inspections of finished grounding system.

7.1.5. Visually check that all equipment has proper ground cable, termination, and bonding point.

7.1.6. Verify resistance between any two points on the ground loop to earth. Test four randomly picked points agreed to and witnessed by Engineer to a well. Resistance to earth above five ohms will not be accepted.

7.1.7. Check all electrical and mechanical connections for tightness.

7.1.8. Testing and inspection of conduit system and installation shall be undertaken.

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7.1.9. Visually check all equipment for damage during installation. Repair or replace with agreement of owner.

7.1.10. Check all lamping and orientation of lightning fixtures.

7.1.11. Check cable and conduit seals for proper installation. Fill them after cable or wire going through them has been tested.

7.1.12. Check that all conduit, equipment, and boxes have been properly supported.

7.1.13. Testing and inspection of wire and cable before energizing.

7.1.14. Transformer to Switchboard and Switchboard to Motor Control Center – the insulation resistance of each circuit shall be measured from phase to phase and phase to ground. Test to be performed with a 500 V Megger.

Phase orientation shall be verified by ringing. Phases shall be maintained A-B-C, left-to-right, top-to-bottom, and front-to-back, facing front.

Motor Feeders – With motor disconnected, measure the insulation resistance from the load side of the contactors. Test to be performed with a 500 V Megger

Motors are to be "bumped" and rotation verified by Engineer.

Motor Control Circuits – Disconnect control transformer. With pushbuttons, interlocks, and hand switches connected, measure the insulation resistance to ground. Also verify control circuit continuity back to the motor control. Use volt-ohm meter to verify control circuit action.

Lighting and other features – Measure insulation resistance with feeder breakers open and panel boards connected but breakers or switches open. Then, measure insulation resistance of branch circuits.

Instrument circuits – Measure insulation resistance of each field or panel mounted instrument cable to the PLC.

Perform a point-by-point verification of the complete instrumentation system from field devices to PLC by ringing with a volt-ohm meter.

Contractor to provide a dedicated electrician and a dedicated helper for start-up services to be performed. This work will be done on a time and material basis, as the duration of start-up has not been determined. It is estimated that the start-up will last for two weeks.

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During the start-up, additional manpower may be requested, on an as needed basis.

8. PROJECT DRAWING LIST

8.1. The following lists reference drawings that are part of this project.

6526-D001	Index Sheet
6526-D002	Mechanical Legend Sheet P & I Diagram
6526-D003	Instrument Legend Sheet P & I Diagram
6526-D004	Pitch Tanks T-200 & T-210 P & I Diagram
6526-D005	Hot Oil System P & I Diagram
6526-D006	Hot Oil Distribution P & I Diagram
6526-D007	Bulk Nitrogen System P & I Diagram
6526-D008	Miscellaneous Utilities P & I Diagram
6526-D009	Existing Hot Oil Distribution Modifications P & I Diagram
6526-D010	Ship Unloading
6526-G002	General Arrangement - Plan

8.2. The following lists all drawings that are part of this project.

6526-E001	480V Power Feed 1 Single Line
6526-E002	MCC A Single Line & Arrangement
6526-E003	480V Power Feed 2 Single Line
6526-E004	MCC B Single Line & Arrangement
6526-E005	Motor Schematics
6526-E006	Grounding Plan
6526-E007	Grounding Details
6526-E008	Lighting Plan
6526-E009	Lighting Details Sh. 1 of 2
6526-E010	Lighting Enlarged Plans
6526-E011	Conduit Routing Sh. 1 of 2

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6526-E012	Conduit Routing Sh. 2 of 2
6526-E013	Lighting Contactor Details
6526-E014	Lighting Details Sh. 2 of 2
6526-E015	Dock Area Conduit Routing
6526-E016	Dock Area Schematics & 1-Line
6526-E017	Conduit & Cable Schedule Sh. 1 of 2
6526-E018	Conduit & Cable Schedule Sh. 2 of 2
6526-E019	Power Routing
Topographical Survey Map	
Nitrogen Pad	
6526-I001	PLC Panel Layout
6526-I002	Power Ladder
6526-I003	Terminal
6526-I004	N-200 Slot 0-0 & Slot 0-1
6526-I005	N-200 Slot 0-2 & Slot 0-3
6526-I006	N-200 Slot 0-4 & Slot 0-5
6526-I007	N-200 Slot 0-6 & Slot 0-7
6526-I008	N-200 Slot 1-0 & Slot 1-1
6526-I009	N-200 Slot 1-2 & Slot 1-3
6526-I010	N-200 Slot 1-4 & Slot 1-5
6526-I011	N-200 Slot 1-6 & Slot 1-7
6526-I012	N-200 Slot 2-0 & Slot 2-1
6526-I013	N-200 Slot 2-2 & Slot 2-3
6526-I014	N-200 Slot 2-4 & Slot 2-5
6526-I015	N-200 Slot 2-6 & Slot 2-7
6526-I016	IP1 Panel

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6526-I017	IP1 Power Ladder
6526-I018	IP2 Panel
6526-I019	IP2 Power Ladder
6526-I020	Conduit Routing
6526-I021	Conduit & Cable Schedule Sh. 1 of 3
6526-I022	Conduit & Cable Schedule Sh. 2 of 3
6526-I023	Conduit & Cable Schedule Sh. 3 of 3
6526-I024	Tank Level Control Diagram

End of Specification

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MOTOR CONTROL CENTER SPECIFICATION

1.0 SCOPE OF WORK

This Specification covers the Motor Control Center used to supply power to the Koppers Industries Liquid Pitch Unloading Facility, located at Portland Terminal. The Work is covered by Project #P-6526.

2.0 STANDARDS

All Work described by this Specification shall meet the requirements of the latest revisions of the applicable standards from the following organizations:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)
NATIONAL ELECTRICAL SAFETY CODE (NEC)
UNDERWRITERS LABORATORY (UL)

3.0 SITE AND SERVICE CONDITIONS

The equipment covered by this Specification shall be capable of continuous operation at rated capacity at an ambient temperature of 40°C. The equipment will be installed indoors at an altitude of not over 3300 feet.

4.0 DRAWINGS

The following Drawings are part of this Specification:

DRAWING	TITLE	REV	DATE
6526-E004	Liquid Pitch Unloading - MCCB Electrical Single Line & Arrangement	0	8/14/98
6526-E005	Liquid Pitch Unloading - Electrical Motor Schematics	0	8/18/98

5.0 CONSTRUCTION

5.1 Motor Control Center shall be of standard design from a single manufacturer, consisting of NEMA 1, gasketed, freestanding, totally enclosed, front access, individual sections joined together to form one complete structure.

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5.2 Each vertical section shall be complete with continuous vertical wireways with non-interfering doors. Wireways shall be isolated from starter components and terminal blocks.

5.3 Horizontal wireway shall be furnished at the top and bottom of the MCC.

5.4 Control wiring shall be NEMA Class 1, Type B, and shall be tin plated.

6.0 DESCRIPTION

Vendor to supply one (1) complete Motor Control Center as shown on Drawings listed in Section 4.0 above, and described as follows:

Manufacturer:	Square D Company or approved equal
Type:	Motor Control Center
Model:	Model 6

Incoming Power:

Line Volts:	480 VAC
No. of Phases:	3 Phase - 4 Wire (Neutral Lug)
Hertz:	60
Available Fault Current:	Less than 42,000 AIC

Structure:

NEMA Type:	1
Depth:	20 inches
Width:	20 inches - Main section 25 inches
Height:	90 inches (91-1/2 w/base channels)
Wire ways:	Top Horizontal 12 "
	Bottom Horizontal 6"
	Vertical 4" each section

Bus:

Power Bus Bracing:	42,000 AIC
Horizontal Power Bus:	
Material:	Copper
Plating:	Tin Plated
Rating:	800 Amp
Vertical Power Bus:	
Material:	Copper
Plating:	Tin Plated
Rating:	300 Amp
Barrier:	Full Bus
Ground Bus (Horiz.):	1/4" x 2" Copper
Ground Bus (Vert.):	1/4" x 1-1/4" Copper
Stab Openings:	Barrier Accessible
Options:	Ground fault protection to be provided per NEC.

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Incoming Line:

Main Breaker	800 Amp, 480Vac, 3-Ph., 60Hz.
Protection	Solid state unit to include overcurrent, short circuit, long time and short time delay, instantaneous, etc.

Combination Starter Units:

Type:	Full Voltage Magnetic
Wiring:	NEMA Class I NEMA Type B
MCP	Provided by manufacturer and sized to match horsepower.
Overloads:	3 Melting Alloy - to match HP.
Unit Name Plates:	Engraved phenolic
Color:	Black Letters on White
Contacts:	Seal-in contact - 1-N.O. Aux. contacts- 1 -N.O.& 2-N.C.
Options:	1) 480/120V Control transformer fused, standard capacity, each starter 2) Pilot lights as required. 3) Feeder lugs 4) Heaters to be provided by Manufacturer to match horsepower 5) Current Transformers per schematics.

Motor Control Center shall have six (6) vertical sections, and will include the following:

QUANTITY	DESCRIPTION
1	800 AMP MAIN - BREAKER
LOT	METERING SECTION (INCLUDED IN MAIN) - 3 PHASE SWITCH AND AMMETER & - 3 PHASE SWITCH AND VOLT METER - SOLID STATE UNIT FOR MAIN BKR. PROTECTION
8	SIZE 1 FVNR STARTERS - MCP
1	SIZE 2 FVNR STARTERS - MCP
3	SIZE 3 FVNR STARTERS - MCP
3	FEEDER BREAKERS - 100AF, 3-POLE
1	SPACE - SIZE 1 FVNR HARDWARE
6	SPACE - SIZE 3 FVNR HARDWARE
1	BLANK SPACE
3	0-75 AMP CURRENT SENSOR
3	75 / 5 CURRENT TRANSFORMER

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Motor Control Center to have phenolic name plate engraved as follows:

First line - MCC B MOTOR CONTROL CENTER

Second line - LIQUID PITCH UNLOADING

INFORMATION REQUIRED WITH BID

Bidder shall provide with his proposal four copies of the following information:

Catalog information and descriptive brochures giving typical dimensions.

Bidder to call out any exceptions to this Specification in Quotion for Buyer's review and consideration.

DRAWINGS AND ENGINEERING DATA AFTER AWARD OF CONTRACT

The vendor shall submit certified prints for approval prior to the start of manufacture and shall incorporate any changes in the approved drawings before the equipment is released for manufacture.

The following drawings and data shall be furnished preferably in the order listed:

Outline dimensions

Front view arrangements

Schematic diagrams

Internal wiring diagrams

Component parts list

Recommended spare parts list

Instruction bulletins

Renewal parts data

The Motor Control Center will have the associated wiring diagrams placed on the inside of each door or compartment.

REVISION	DATE	DESCRIPTION
0	09/16/98	Initial Release

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UNINTERRUPTIBLE POWER SUPPLY SPECIFICATION

1. PART 1 GENERAL

1.1. SCOPE OF WORK

This specification covers the manufacturing, testing and delivery of an Uninterruptible power supply used to supply the power to PLC and instrumentation loads within the Koppers Industries Liquid Pitch Unloading Facility, located at the Portland Terminal. The vendor shall provide the UPS unit complete with batteries in one common cabinet assembly. The vendor shall provide a wall mount bypass switch for use as the alternate line bypass feed. The distribution panels for the UPS are outside the vendor's scope of work for this project. The installer will anchor the UPS panel to the floor, install the conduit and install the cable to the UPS panel. The vendor shall provide battery installation services, and start-up services including test equipment, instruments, and load banks under a separate line item in the quotation.

1.2. STANDARDS

The list of standards identified here are considered only a minimum requirement and is not intended to limit the application of other important standards which the vendor is aware of. All work described by this specification shall meet the requirements of the latest revisions of the applicable standards from the following organizations:

1.2.1. American Society for Testing and Materials (ASTM)

1.2.2. American National Standards Institute (ANSI)

a	ANSI C37.20	Switchgear Assemblies Including Metal Enclosed Bus
b	ANSI C39.1	Requirements for Electric Analog Indicating Instruments
c	ANSI C57.13	Requirements for Instrument Transformers

1.2.3. Institute of Electrical and Electronic Engineers (IEEE)

a	IEEE 241	Recommended Practice for Electrical Power Systems in Commercial Buildings
b	IEEE 242	Recommended Practices for Protection and Coordination of Industrial and Commercial Power Systems
c	IEEE 493	Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems
d	IEEE 519	Guide for Harmonic Control and Reactive Compensation of Static Power Converters

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1.2.4. National Electrical Manufacturers Association NEMA

a NEMA 250 Enclosures for Electrical Equipment

b NEMA PE 1 Uninterruptible Power Systems

1.2.5. National Fire Protection Association (NFPA)

1.2.6. Occupational Safety and Health Administration (OSHA)

1.2.7. National Electrical Safety Code (NESC)

1.2.8. Underwriter's Laboratory (UL)

a UL 486A Wire Connections and Soldering Lugs for Use with Copper Conductors

b UL 891 Dead Front Electrical Switchboards

1.3. DEFINITIONS

a Bolted Fault
Describes what would be an otherwise ideal fault where the fault has zero impedance. Although an ideal fault is rare the bolted fault concept will identify the worst possible fault current at the selected equipment.

b Breaker Frame Size
Identifies the maximum continuous current rating permitted for that particular breaker design, but also identifies a range of available trip settings as determined by the manufacturer.

c Breaker Trip
Identifies the maximum continuous current plus 10% that the breaker will not trip at.

d Compression Lugs
The type of electrical connection where prefabricated lugs such as Burndy Hi-Lugs will be permanently crimped onto the cable then affixed to the breaker or bus bar by a through bolt and nut assembly.

e Electronic Trips
Denotes the breaker has electronic circuits that monitor the current through the breaker and will trip the breaker through an integral trip coil. Unless otherwise noted the trip unit will be self powered which means it derives its control power from the sensed current. The electronic trip unit is field adjustable for short term, long term and instantaneous trips.

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f Engineer
The engineer responsible for the design of the equipment and associated systems. In this case the engineer is:

Mark Banda
ChemTech Consultants, Inc.
Fourth Floor
1370 Washington Pike
Bridgeville, PA 15017
Phone: 412-220-4619
Fax: 412-221-5685

g Feeder
When used in connection with switchgear, switchboards, and/or panel boards this refers to the branch circuits or power distribution leaving the load center. To clarify, this refers to the smaller subdivided circuits, which has been originated from a larger incoming source.

h Interrupting Capacity
The maximum expected fault current which the equipment will be expected to interrupt in a symmetrical bolted fault condition.

i Installer
The company or organization which will be installing the equipment into the facility.

j Shall
Confers the meaning of a mandatory requirement for which there are no other options.

k Should
Indicates the requirement is a suggested idea, which may have other acceptable options.

l Set Screw Lug
The type of electrical connection where the lug is a part of the breaker or bus bar and a bare conductor is inserted into the lug and the set screw then clamps onto the cable to make the connection.

m Supply
When used in connection with switchgear, switchboards, and/or panel boards this refers to the incoming power line to the load center from a larger load center or from a transformer or from the utility.

n Symmetrical Fault
The case of analyzing a fault as if it occurred equally on all three phases.

o UPS
Uninterruptible Power Supply - Refers to a unit incorporating a set of batteries, battery charger and inverter which will supply battery backed AC power, to power sensitive loads.

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p Vendor
The Company and their representative(s), which will be awarded the contract to supply the equipment, described in this specification.

1.4. DOCUMENTATION SUBMITTALS

1.4.1. The following documentation shall be presented by the vendor with the bid.

a Single line drawing, plan view, elevation, and weights.

b Two sets of Product Descriptive Bulletins.

c The following performance data:

- Input Voltage, Frequency Range
- Battery Type and Life expectancy
- Output Voltage, Frequency Range
- Overload Capability
- Sound Level in dB
- Temperature Range
- System Reserve - @ Full Load and 1/2 Load

1.4.2. The following drawings are to be submitted by the vendor for approval by the engineer prior to construction: (Three prints of each)

a Plan view, elevations, and sections, complete with weights, clearances, mounting details, cable entry locations, anchorage details, installation requirements and locations of all accessories.

b Single line diagram

c Three line diagram

d Elementary diagram

e Wiring and interconnection diagram

f Mimic plate layout

g Shipping section breakdown

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1.4.3. The following are to be submitted by the vendor to the engineer four weeks prior to shipment: (Four certified prints of each)

a All items in 8.2 along with one reproducible of each.

b Instruction manuals, complete with descriptive bulletins and schematic diagrams of circuit boards, operating manuals, maintenance manuals, and instruction manuals for batteries, protective relays and meters.

c Spare parts lists.

d Breaker time current curves for all breaker types supplied plotted on log/log charts

e Recommended servicing procedures and frequencies.

1.4.4. A Certification of Conformance shall be provided to the engineer upon completion of the project and shall be signed by a licensed professional engineer.

1.5. REGULATORY REQUIREMENTS

1.5.1. OSHA 29CFR Code of Federal Regulations on Labor
The equipment supplied shall meet all safety criteria directed by 29CFR.

1.5.2. EPA 40CFR Code of Federal Regulations on Protection of Environment

a Material Safety Data Sheets shall accompany all hazardous materials.

b No PCB's shall be permitted

1.6. PRE-AWARD CONFERENCE
The client may require a conference with the vendor before awarding the contract. The engineer will contact the vendor at such a time to schedule a meeting.

1.7. DELIVERY, STORAGE, AND HANDLING

1.7.1. Delivery
The vendor shall ship the UPS as a whole unit except for the batteries and required splits. Batteries shall be supplied in the battery manufacturer's packaging material to the site and installed once the UPS is placed and ready to start-up. The equipment shall be mounted on a pallet or skid for bottom lifting. The vendor will be responsible for delivering the equipment to the plant site.

1.7.2. Storage
The equipment shall be packaged so as to protect against weather and construction traffic. If there are any special storage requirements for the equipment it shall be the vendor's responsibility to provide such requirements to the installer.

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1.7.3. Handling
If there are any special handling instructions the vendor shall provide these to the installer.

1.8. ENVIRONMENTAL, SITE AND SERVICE CONDITIONS

The equipment covered by this specification shall be capable of continuous operation at rated capacity at an ambient temperature of 40°C. The equipment will be installed indoors at an altitude of not over 3300 feet and will be mounted onto a concrete floor. The area will be isolated from the process area and will be provided with a controlled environment so that no special area classifications will be required.

1.9. MAINTENANCE SERVICE

1.9.1. The vendor shall provide the service and maintenance of the uninterruptible power supply for one year from the date of being placed into service. The coverage shall include travel, parts, and labor.

1.9.2. The vendor shall provide the name, address and phone number of the nearest service representative in the location were the equipment is to be installed.

1.10. WARRANTY
The vendor shall provide the terms and agreement on their warranty including coverage for the batteries.

2. PART 2 PRODUCTS

2.1. GENERAL DESIGN REQUIREMENTS

2.1.1. ELECTRICAL CONSIDERATIONS
The UPS shall be of a fully metal enclosed dead front type design. No electrically energized components shall be exposed to personnel under normal conditions with all doors closed and covers installed. The equipment supplied shall meet Underwriter's Laboratories (UL) requirements for electrical protection and personnel safety. All breaker controls shall extend through the front of the UPS so the breakers can be operated without opening any front covers. Provision for using air filters shall be made on the panel. All fuses shall be easily accessible from the front without disassembling any internal components of the UPS. All components shall be accessible from the front as the UPS is to be mounted against the wall.

All breaker ratings shall be those published as UL certified ratings for the equipment. All inductors and transformers shall be wound with copper conductors, aluminum conductors are not permitted. All wire shall be copper.

Where required, appropriate terminal blocks shall be installed, designed to accept ring tongue lugs. The vendor shall avoid the use of PVC type plastic, as the process materials attack PVC. All power connections shall be brought out on terminal bolts or terminal pads at the top of the panel. All power connections shall be made for compression type lugs with two-hole NEMA drilling.

a BATTERY CHARGER/RECTIFIER
The typical minimum recharge time from the designed maximum discharge level, referenced against a 600 amp-hour battery, shall not exceed two hours

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unless otherwise indicated. The charger shall have a programmed equalizing charge mode provided for equalizing the batteries. The input of the charger/rectifier shall have a transformer configured to provide full electrical isolation between the input power and the DC portion of the UPS.

b BATTERY REQUIREMENTS
All batteries shall be stationary type lead calcium/acid wet cells. Batteries shall be provided with the rack and necessary securing hardware for anchoring the batteries to the rack. All intercell connectors on the same rack shall be lead clad copper bars with corrosion inhibitor applied to each battery terminal and between racks preterminated, insulated, copper straps. A barrier shall be installed between the battery compartment and electronics compartment to prevent material from being dropped onto the batteries and the battery compartment shall be adequately ventilated to prevent the build up of dangerous concentrations of hydrogen.

c INVERTER REQUIREMENTS
The inverter shall be so designed so as to be started up with only battery power available and no AC power available. The inverter shall be designed with the appropriate protection built in to prevent damage to the solid state components should a mis-commutation in the switching bridges occur. The inverter shall have a current limit feature (set typically at 125% of rated load). The inverter may be either a PWM design or a Ferroresounant design unless otherwise indicated. The output circuit of the inverter shall be electrically isolated from the DC switching bridges, battery circuits, chassis ground and panel ground. The output breaker shall have no active trips, this breaker is to be used for isolating the inverter for servicing only.

d EXTERNAL BYPASS SWITCH
The UPS shall have an external bypass switch which will provide overlapping transfer between the UPS output and the bypass feed. The bypass switch shall be a Make-Before-Break switch to insure switch over without interruption of power to the connected loads.

2.1.2. MECHANICAL/STRUCTURAL CONSIDERATIONS

a PHYSICAL CONSIDERATIONS
The UPS shall be a free standing type design, to be mounted to the floor. Provisions shall be made for anchoring by the installation of concrete anchor bolts. The vendor will provide to the engineer, within 6 weeks after the time the contract is awarded, the anchorage pattern and required minimum bolt sizes for the proper attachment to the floor. The top of the unit shall be a solid sheet with no ventilation holes so as to prevent water or debris from dropping into the UPS from above. The framework shall be made of UL gauge steel and secured together to support all cover plates, bussing and component devices during shipment and installation. The vendor shall provide the layout of the enclosure with the acceptable raceway entry zones clearly identified, to the engineer at least 6 weeks after the time of the awarding of this contract. All front covers shall be bolt-on and removable except for those that are doors. Doors shall be hinged and provided with removable hinge pins and a lock for locking the cabinet.

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2.2. SPECIFIC DESIGN REQUIREMENTS

2.2.1. PANEL SPECIFICATIONS

a	NEMA Type:	12
b	Depth:	as required
c	Width:	as required
d	Height:	as required
e	Cable entry:	Hard wired in top of UPS.

2.2.2. BATTERY CHARGER

a	Minimun Capacity	7KVA at 120VAC
b	Incoming Power:	
	• Line Volts:	208 VAC / 60 Hz(+ or – 10% tolerance)
	• No. of Phases:	1 Phase – 4 Wire
c	Batteries:	
	• Full Load:	15 min
	• Half Load	30 min

2.2.3. INVERTER

a	Output Power:	
	• Line Volts:	120 VAC (+ or - 2 volts regulation tolerance)
	• Adjustable Voltage range:	114 VAC TO 126 VAC
	• No. of Phases:	1 Phase - 2 Wire
	• Hertz:	60 (+ or - 2 Hz tolerance)
	• Current:	50 Amp nominal, with 125% overload capability Current limiting set to 125% of rated load
	• Capacity:	5KW @ 0.8 p.f.

2.2.4. ALARMS AND INDICATIONS

a UPS panel status lights with no audible alarm

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- System Normal
- Sync in sync
- Load running on inverter

b Alarm indicators w\audible alarm:

- High temperature inside UPS
- Alarm summary (w\dry contact output for customer use)
- Low battery
- Battery discharge
- Output overload or Overcurrent
- AC input failure
- Load running on alternate line
- UPS on bypass (no local indicator light is required.)

2.2.5. Metering:

- DC charger output current
- DC Bus Voltage
- DC battery current
- AC output voltage
- AC output current
- AC output frequency

2.2.6. Manual functions:

- External bypass switch
- Alarm acknowledge/silence

Any deviation from this specification must be clearly stated in the bid.

REVISION	DATE	DESCRIPTION
0	November 18, 1998	Initial Specification for Quotations

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INSTRUMENTS

PRESSURE GAUGE SPECIFICATION

GENERAL	MANUFACTURER	Ashcroft
	MODEL NUMBER	1279
	ADD'L MODEL NUMBER	
ELEMENT	CASE TYPE	Solid Front
	CASE MATERIAL	Phenolic
	RING STYLE	Threaded
	MEASURING SYSTEM	Bourdon Tube
	DIAL COLOR	White
	DIAL SIZE	4 1/2"
	WINDOW MATERIAL	Shatterproof Glass
	POINTER	Adjustable
	ACCURACY	0.5 %
SOCKET	LOCATION	Bottom
	CONNECTION	1/2" NPT
	MATERIAL	316 SS
DIAPHRAGM SEAL	TOP HOUSING MATERIAL	Mfg. Std.
	BOTTOM HOUSING MATERIAL	Steel
	DIAPHRAGM MATERIAL	316L SS
	FILL FLUID	Silicone
	PROCESS CONNECTION	1" Socketweld
PROCESS CONDITIONS	TEMPERATURE	550°F Max.

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range psig	Operating Pressure	Line Size	P & I Diagram
1	PI-2101	S-261 STRAINER INLET	0 to 100	18	4"	D005
1	PI-2102	S-261 STRAINER OUTLET	0 to 100	18	4"	D005
1	PI-2103	P-260 PUMP DISCHARGE	0 to 200	121	3"	D005
1	PI-2107	HOT OIL SUPPLY HEADER	0 to 200	80	3"	D006
1	PI-2111	S-266 STRAINER INLET	0 to 100	18	4"	D005
1	PI-2112	S-266 STRAINER OUTLET	0 to 100	18	4"	D005
1	PI-2113	P-265 PUMP DISCHARGE	0 to 200	121	3"	D005
1	PI-2125	T-240 HOT OIL EXPANSION TANK	0 to 60	24	N/A	D005
1	PI-2151	S-276 STRAINER INLET	0 to 160	18	3"	D006
1	PI-2152	S-276 STRAINER OUTLET	0 to 160	18	3"	D006
1	PI-2153	P-275 PUMP DISCHARGE	0 to 200	121	2"	D006
1	PI-2158	UNLOADING HOT OIL TRACE LINE RETURN	0 to 200	121	2"	D006
1	PI-2161	S-281 STRAINER INLET	0 to 100	18	3"	D006
1	PI-2162	S-281 STRAINER OUTLET	0 to 100	18	3"	D006
1	PI-2163	P-280 PUMP DISCHARGE	0 to 100	44	2"	D006
1	PI-2168	PITCH PIPE HOT OIL TRACE LINE RETURN	0 to 100	44	2"	D006
1	PI-2171	S-286 STRAINER INLET	0 to 100	18	3"	D006
1	PI-2172	S-286 STRAINER OUTLET	0 to 100	18	3"	D006
1	PI-2173	P-285 PUMP DISCHARGE	0 to 100	49	2"	D006
1	PI-2178	T-200 IMMERSION HEATER HOT OIL RETURN	0 to 100	49	3"	D006

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INSTRUMENT SPECIFICATIONS INDEX

CONTROL SYSTEMS	**6526IS15.DOC**	Programmable Logic Controller	1	11/18/98
FLOW	**6526IS01.DOC**	Vortex Flowmeter & Transmitter	1	11/18/98
	6526IS22.DOC	Constant Differential Flow Controller	1	11/18/98
LEVEL	**6526IS02.DOC**	Capacitance Level Switch	1	11/18/98
	6526IS03.DOC	Radar Level Transmitter	1	11/18/98
PRESSURE	**6526IS05.DOC**	Pressure Gauge	1	11/18/98
	6526IS06.DOC	Pressure Transmitter	1	11/18/98
	6526IS18.DOC	Differential Pressure Transmitter	1	11/18/98
TEMPERATURE	**6526IS07.DOC**	Thermometer	1	11/18/98
	6526IS08.DOC	Temperature Transmitter	1	11/18/98
VALVE	**6526IS09.DOC**	Automated Wedgeplug Valve	1	11/18/98
	6526IS24.DOC	Control Valve	1	11/18/98
	6526IS10.DOC	Ball Control Valve	1	11/18/98
	6526IS21.DOC	Butterfly Control Valve	1	11/18/98
	6526IS23.DOC	Pressure Regulator	1	11/18/98
	6526IS12.DOC	Manual Wedgeplug Valve & Position Switch	1	11/18/98
	6526IS13.DOC	Pressure Regulator	1	11/18/98
	6526IS14.DOC	Automated Valve	1	11/18/98
	6526IS16.DOC	Automated Valve	1	11/18/98
	6526IS20.DOC	Manual Gate Valve & Position Switch	1	11/18/98
MISCELLANEOUS	**6526IS25.DOC**	Conservation Vent	1	11/18/98
	6526IS19.DOC	Pressure Relief Manway Cover	1	11/18/98
	6526IS17.MDB	Instrument Cable	1	11/18/98
REPORTS	**6526IR01.MDB**	Instrument Index	1	11/18/98
	6526IR02.MDB	N-200 I/O List	1	11/18/98

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VORTEX FLOWMETER & TRANSMITTER SPECIFICATION

GENERAL	MANUFACTURER	Rosemount
	MODEL NUMBER	8800A Series
	ADD'L MODEL NUMBER	
ELEMENT	SIZE / CONNECTIONS	4" 150# R.F. Flange
	TURNDOWN RATIO	38 to 1
	MATERIAL	316 SS, all wetted parts
	TEMPERATURE RATING	Process -330 to 800°F
		Ambient -40 to 185 °F
	ACCURACY	+/- 0.7% of rate
	PRESSURE DROP	Approx. 1.2 psi
TRANSMISSION	TYPE	"Smart"
	MOUNTING	Remote
	OUTPUT SIGNAL	4 to 20 maDC
	POWER SUPPLY	Loop powered by 24VDC
	INDICATOR SCALE	Not Required
	TOTALIZATION	Not Required
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	For 2" Pipe
	CONDUIT CONNECTION	2 @ 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT43
	DENSITY	46.8 lb./ft^3
	TEMPERATURE	550 °F Max.
		500°F Norm.
		450 °F Min.
	FLOW RATE	600 GPM– Max.
		410 GPM – Norm.
	OPERATING PRESSURE	125 psig
	CLASSIFICATION	Class I, Division 2, Group D
ACCESSORIES	CABLE LENGTH	30 Feet

INSTALLATION NOTE: FOR GIVEN PROCESS CONDITIONS THE FACTORY SUGGESTS INSTALLATION WITH A MINIMUM OF 35 STRAIGHT PIPE DIAMETERS UPSTREAM OF METER AND 5 DIAMETERS DOWNSTREAM.

Rev	Tag Number	Equipment & Service	Calib Range gpm	Operating Flow	Line Size	P & I Diagram
1	FE-2105	E-270 INLET	0 to 600	410	4"	D005
1	FT-2105	(Remote Mounted Transmitter)				
1	FE-2145	E-170 INLET	0 to 600	410	4"	D005
1	FT-2145	(Remote Mounted Transmitter)				

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VORTEX FLOWMETER & TRANSMITTER SPECIFICATION

GENERAL	MANUFACTURER	Rosemount
	MODEL NUMBER	8800A Series
	ADD'L MODEL NUMBER	
ELEMENT	SIZE / CONNECTIONS	1 1/2" 150# R.F. Flange
	TURNDOWN RATIO	38 to 1
	MATERIAL	316 SS, all wetted parts
	TEMPERATURE RATING	Process -330 to 800°F
		Ambient -40 to 185 °F
	ACCURACY	+/- 0.7% of rate
	PRESSURE DROP	Approx. 0.4 psi
TRANSMISSION	TYPE	"Smart"
	MOUNTING	Remote
	OUTPUT SIGNAL	4 to 20 maDC
	POWER SUPPLY	Loop powered by 24VDC
	INDICATOR SCALE	Not Required
	TOTALIZATION	Not Required
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	For 2" Pipe
	CONDUIT CONNECTION	2 @ 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT43
	DENSITY	46.8 lb./ft^3
	TEMPERATURE	550 °F Max.
		500°F Norm.
		450 °F Min.
	FLOW RATE	100 GPM– Max.
		32 GPM – Norm.
	OPERATING PRESSURE	140 psig
	CLASSIFICATION	Class I, Division 2, Group D
ACCESSORIES	CABLE LENGTH	30 Feet

INSTALLATION NOTE: FOR GIVEN PROCESS CONDITIONS THE FACTORY SUGGESTS INSTALLATION WITH A MINIMUM OF 35 STRAIGHT PIPE DIAMETERS UPSTREAM OF METER AND 5 DIAMETERS DOWNSTREAM.

Rev	Tag Number	Equipment & Service	Calib Range gpm	Operating Flow	Line Size	P & I Diagram
1	FE-2155A	UNLOADING LINE HOT OIL SUPPLY	0 to 100	32	1 ½"	D010
1	FT-2155A	(Remote Mounted Transmitter)				
1	FE-2155B	UNLOADING LINE HOT OIL RETURN	0 to 100	32	1 ½"	D010
1	FT-2155B	(Remote Mounted Transmitter)				

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CAPACITANCE LEVEL SWITCH SPECIFICATION

GENERAL	MANUFACTURER	Drexelbrook
	MODEL NUMBER	506-6000-22 LCS
	ADD'L MODEL NUMBER	
ELEMENT	MEASUREMENT TYPE	Point Level
	DEADBAND	1" Differential
	SENSOR TYPE	Rigid
	PROBE MATERIAL	316 SS
	COATING MATERIAL	Teflon
	ORIENTATION	Top
	PROCESS CONNECTIONS	2" ANSI 150 RF
	ELECTRONICS MOUNTING	Remote
SWITCH	TYPE	Relay
	CONTACT RATING	5A @ 120 VAC
	QUANTITY / FORM	DPDT
	RESPONSE TIME	Adjustable 0-90 sec.
	ELECTRONICS	Mfr. Standard
	POWER SUPPLY	120 VAC, 60 Hz
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	For 2" Pipe
	CONDUIT CONNECTION	3/4" NPT
	ENCLOSURE RATING	NEMA 1-5 & 12
	CLASSIFICATION	Class I, Division 2, Group D
PROCESS CONDITIONS	FLUID	Liquid Pitch
	PRESSURE	Atmospheric
	TEMPERATURE (max)	425 °F
ACCESSORIES	CABLE LENGTH	25 ft

Rev	Tag Number	Equipment & Service	Sensor Length inches	Setpoint Level	Tank Hght	P & I Diagram
1	LSHH-2006	T-200 PITCH STORAGE TANK	0 to 120	96	57 ft.	D004

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RADAR LEVEL TRANSMITTER SPECIFICATION

GENERAL	MANUFACTURER	TN Technologies
	MODEL NUMBER	RCM
	ADD'L MODEL NUMBER	
ELEMENT	MEASUREMENT TYPE	Level
	INSTRUMENT SPAN	3 to 112ft.
	SENSOR TYPE	Cone
	SENSOR BEAM WIDTH	Dia.=16 ft. @ 60 ft. of depth
	ANTENNA MATERIAL	304 SS
	ANTENNA SIZE	21.6" x 6.0"
	ORIENTATION	Vertical
	PROCESS CONNECTION	4" 150# Flange
	ELECTRONICS MOUNTING	Remote
TRANSMISSION	TYPE	"Smart"
	OUTPUT SIGNAL	4 to 20 ma DC
	ACCURACY	+/- 1/8"
	POWER SUPPLY	External
	INDICATOR SCALE	See Calibrated Range
	CALIBRATION	Continuous frequency self-calibration
HOUSING	MATERIAL	316 SS and/or Alumina Ceramic
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	For 2" Pipe
	CONDUIT CONNECTION	2 @ 3/4" NPT
	ENCLOSURE RATING	NEMA 4X
	CLASSIFICATION	Class I, Division 2, Group D
PROCESS CONDITIONS	FLUID	Liquid Pitch
	PRESSURE	Atmospheric
	TEMPERATURE	425 °F
ACCESSORIES	PROCESS SEAL MATERIAL	TFE
	TEMPERATURE RATING	450 °F
	RELAYS	2 SPDT, 8A, 220VAC

Rev	Tag Number	Equipment & Service	Calib Range feet	Operating Deadband	Tank Hght	P & I Diagram
1	LIT-2004	T-200 PITCH STORAGE TANK	0 to 57	3 ft	57 ft	D004
1	LE-2004					D004

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PRESSURE GAUGE SPECIFICATION

GENERAL	MANUFACTURER	Ashcroft
	MODEL NUMBER	1279
	ADD'L MODEL NUMBER	
ELEMENT	CASE TYPE	Solid Front
	CASE MATERIAL	Phenolic
	RING STYLE	Threaded
	MEASURING SYSTEM	Bourdon Tube
	DIAL COLOR	White
	DIAL SIZE	4 1/2"
	WINDOW MATERIAL	Shatterproof Glass
	POINTER	Adjustable
	ACCURACY	0.5 %
SOCKET	LOCATION	Bottom
	CONNECTION	1/2" NPT
	MATERIAL	316 SS
DIAPHRAGM SEAL	TOP HOUSING MATERIAL	Mfg. Std.
	BOTTOM HOUSING MATERIAL	Steel
	DIAPHRAGM MATERIAL	316L SS
	FILL FLUID	Silicone
	PROCESS CONNECTION	1" NPT
PROCESS CONDITIONS	TEMPERATURE	425°F Max.
ACCESSORIES		

Rev	Tag Number	Equipment & Service	Calib Range psig	Operating Pressure	Line Size	P & I Diagram
1	PI-2046	P-220 PUMP DISCHARGE	0 to 200	130	4"	D004
1	PI-2056	P-225 PUMP DISCHARGE	0 to 200	130	4"	D004
1	PI-2087	P-235 PUMP DISCHARGE	0 to 200	120	2"	D010
1	PI-2072	P-238 PUMP DISCHARGE	0 to 200	120	2"	D004

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PRESSURE GAUGE SPECIFICATION

Rev	Tag Number	Equipment & Service	Calib Range UNITS	Operating Pressure	Line Size	P & I Diagram
1	PI-2194	HOT OIL RETURN HEADER	0 to 100	18	4"	D006
1	PI-2191	P-255 PUMP SUCTION	0 to 160	20	2"	D006
1	PI-2192	P-255 PUMP DISCHARGE	0 to 160	20	2"	D006

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PRESSURE GAUGE SPECIFICATION

GENERAL	MANUFACTURER	Ashcroft
	MODEL NUMBER	1188
	ADD'L MODEL NUMBER	
ELEMENT	CASE TYPE	Solid Front
	CASE MATERIAL	Phenolic
	RING STYLE	Threaded
	MEASURING SYSTEM	Bellows
	DIAL COLOR	White
	DIAL SIZE	4 1/2"
	WINDOW MATERIAL	Shatterproof Glass
	POINTER	Adjustable
	ACCURACY	0.5 %
SOCKET	LOCATION	Bottom
	CONNECTION	1/2" NPT
	MATERIAL	316 SS
DIAPHRAGM SEAL	TOP HOUSING MATERIAL	N/A
	BOTTOM HOUSING MATERIAL	N/A
	DIAPHRAGM MATERIAL	N/A
	FILL FLUID	N/A
	PROCESS CONNECTION	N/A
PROCESS CONDITIONS	TEMPERATURE	70°F Max.

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range in. w.c.	Operating Pressure	Line Size	P & I Diagram
1	PI-2013	T-200 TANK N2 BLANKET	-10/10	2	2"	D004

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PRESSURE TRANSMITTER SPECIFICATION

GENERAL	MANUFACTURER	Rosemount
	MODEL NUMBER	3051CG
	ADD'L MODEL NUMBER	
ELEMENT	MEASUREMENT TYPE	Gauge
	INSTRUMENT SPAN	*BY VENDOR
	SENSOR TYPE	Diaphragm
	MATERIAL	316 SS
	FILL FLUID	Silicone
	WETTED PARTS	316 SS
	O-RING MATERIAL	TFE
	PROCESS CONNECTION	Direct Mount
TRANSMISSION	TYPE	"Smart"
	OUTPUT SIGNAL	4 to 20 ma DC
	ACCURACY	0.5 % of span
	POWER SUPPLY	External
	INDICATOR SCALE	Not Required
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	For 2" Pipe
	CONDUIT CONNECTION	2 @ 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group D
DIAPHRAGM SEAL	TOP HOUSING MATERIAL	316L SS
	BOTTOM HOUSING MATERIAL	316L SS
	DIAPHRAGM MATERIAL	316L SS
	FILL FLUID	D.C. 200
	PROCESS CONNECTION	4" ANSI 150 RF
PROCESS CONDITIONS	TEMPERATURE	400 °F
ACCESSORIES		

Rev	Tag Number	Equipment & Service	Calib Range "W.C.	Operating Pressure	Nozzle Size	P & I Diagram
1	PT-2001	T-200 PITCH TANK	0 to 25"	1"	4"	D004

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THERMOMETER SPECIFICATION

GENERAL	MANUFACTURER	Ashcroft
	MODEL NUMBER	
	ADD'L MODEL NUMBER	
ELEMENT	CASE TYPE	Hermetically Sealed
	CASE MATERIAL	Stainless Steel
	MEASURING SYSTEM	Bimetallic
	DIAL SIZE	5" Diameter
	WINDOW MATERIAL	Shatterproof Glass
	POINTER	Adjustable
	ACCURACY	1%
STEM	LOCATION	Everyangle
	CONNECTION	1/2" NPT
	MATERIAL	Stainless Steel
	LENGTH	To Fit Well
	DIAMETER	0.250"
THERMOWELL	TYPE	Tapered
	MATERIAL	316 SS
	"U" DIMENSION	2 1/2"
	"T" DIMENSION	3"
	PROCESS CONNNECTION	1" Socket Weld

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range °F	Operating Temperature	Line Size	P & I Diagram
1	TI-2130	PITCH LINE HOT OIL TRACE	50 to 550	500	1"	D006
1	TI-2131	PITCH LINE HOT OIL TRACE	50 to 550	500	1"	D006
1	TI-2132	PITCH LINE HOT OIL TRACE	50 to 550	500	1"	D006
1	TI-2136	PITCH LINE HOT OIL TRACE	50 to 550	500	1"	D006
1	TI-2154	PITCH LINE HOT OIL TRACE	50 to 550	500	2"	D006
1	TI-2157	PITCH LINE HOT OIL TRACE	50 to 550	500	2"	D006
1	TI-2164	PITCH LINE HOT OIL TRACE	50 to 550	500	2"	D006
1	TI-2167	PITCH LINE HOT OIL TRACE	50 to 550	500	2"	D006
1	TI-2174	PITCH LINE HOT OIL TRACE	50 to 550	500	3"	D006
1	TI-2177	PITCH LINE HOT OIL TRACE	50 to 550	500	3"	D006
1	TI-2179	PITCH LINE HOT OIL TRACE	50 to 550	500	3"	D006

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THERMOMETER SPECIFICATION

GENERAL	MANUFACTURER	Ashcroft
	MODEL NUMBER	
	ADD'L MODEL NUMBER	
ELEMENT	CASE TYPE	Hermetically Sealed
	CASE MATERIAL	Stainless Steel
	MEASURING SYSTEM	Bimetallic
	DIAL SIZE	5" Diameter
	WINDOW MATERIAL	Shatterproof Glass
	POINTER	Adjustable
	ACCURACY	1%
STEM	LOCATION	Everyangle
	CONNECTION	1/2" NPT
	MATERIAL	Stainless Steel
	LENGTH	To Fit Well
	DIAMETER	0.250"
THERMOWELL	TYPE	Tapered
	MATERIAL	316 SS
	"U" DIMENSION	2 1/2"
	"T" DIMENSION	4"
	PROCESS CONNNECTION	1" NPT

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range °F	Operating Temperature	Line Size	P & I Diagram
1	TI-2042	PITCH TRANSFER LINE	50 to 550	425	4"	D004
1	TI-2047	P-220 SUCTION	50 to 550	425	6"	D004
1	TI-2057	P-225 SUCTION	50 to 550	425	6"	D004

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THERMOMETER SPECIFICATION

GENERAL	MANUFACTURER	Ashcroft
	MODEL NUMBER	
	ADD'L MODEL NUMBER	
ELEMENT	CASE TYPE	Hermetically Sealed
	CASE MATERIAL	Stainless Steel
	MEASURING SYSTEM	Bimetallic
	DIAL SIZE	5" Diameter
	WINDOW MATERIAL	Shatterproof Glass
	POINTER	Adjustable
	ACCURACY	1%
STEM	LOCATION	Everyangle
	CONNECTION	1/2" NPT
	MATERIAL	Stainless Steel
	LENGTH	To Fit Well
	DIAMETER	0.250"
THERMOWELL	TYPE	Tapered
	MATERIAL	316 SS
	"U" DIMENSION	4 1/2"
	"T" DIMENSION	6"
	PROCESS CONNNECTION	1" NPT

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range °F	Operating Temperature	Line Size	P & I Diagram
1	TI-2084	PITCH UNLOADING LINE	50 to 550	425	8"	D010

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THERMOMETER SPECIFICATION

GENERAL	MANUFACTURER	Ashcroft
	MODEL NUMBER	
	ADD'L MODEL NUMBER	
ELEMENT	CASE TYPE	Hermetically Sealed
	CASE MATERIAL	Stainless Steel
	MEASURING SYSTEM	Bimetallic
	DIAL SIZE	5" Diameter
	WINDOW MATERIAL	Shatterproof Glass
	POINTER	Adjustable
	ACCURACY	1%
STEM	LOCATION	Everyangle
	CONNECTION	1/2" NPT
	MATERIAL	Stainless Steel
	LENGTH	To Fit Well
	DIAMETER	0.250"
THERMOWELL	TYPE	Straight
	MATERIAL	316 SS
	"U" DIMENSION	16 1/2"
	"T" DIMENSION	6"
	PROCESS CONNNECTION	1" NPT

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range °F	Operating Temperature	Line Size	P & I Diagram
1	TI-2011	LIQUID PITCH STORAGE TANK	50 to 550	425	NA	D004
1	TI-2012	LIQUID PITCH STORAGE TANK	50 to 550	425	NA	D004

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TEMPERATURE TRANSMITTER SPECIFICATION

GENERAL	MANUFACTURER	Rosemount
	MODEL NUMBER	3144
	ADD'L MODEL NUMBER	
ELEMENT	MEASUREMENT TYPE	Type "K" T/C
	INSTRUMENT SPAN	*BY VENDOR
	SENSOR TYPE	Single
	LOSS OF SIGNAL	Upscale
	STEM STYLE	Spring Loaded
	STEM MATERIAL	304 SS
	STEM CONNECTION	1/2" NPT
	STEM LENGTH	To Fit Well
	STEM DIAMETER	0.250"
TRANSMISSION	TYPE	"Smart"
	OUTPUT SIGNAL	4 to 20 maDC
	ACCURACY	0.5% of Span
	POWER SUPPLY	External
	INDICATOR SCALE	Not Required
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	For 2" Pipe
	CONDUIT CONNECTION	2, 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group C
THERMOWELL	TYPE	Straight
	MATERIAL	304 SS
	"U" DIMENSION	2 1/2"
	"T" DIMENSION	3"
	PROCESS CONNECTION	1" Socket Weld

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range °F	Operating Temperature	Line Size	P & I Diagram
1	TE-2156	PITCH LINE JACKETS OIL RETURN	0 to 800	500°F	2"	D006
1	TT-2156	Remote Mounted				D006
1	TE-2166	PITCH LINE JACKETS OIL RETURN	0 to 800	500°F	2"	D006
1	TT-2166	Remote Mounted				D006
1	TE-2176A	T-200 IMMERSION HEATERS OIL SUPPLY	0 to 800	500°F	3"	D006
1	TT-2176A	Remote Mounted				D006
1	TE-2141	T-68 IMMERSION HEATERS OIL SUPPLY	0 to 800	500°F	4"	D009
1	TT-2141	Remote Mounted				D009
1	TE-2143	T-65 SIDEWALL HEATERS OIL SUPPLY	0 to 800	500°F	4"	D009
1	TT-2143	Remote Mounted				D009
1	TE-2144	T-65 IMMERSION HEATERS OIL SUPPLY	0 to 800	500°F	3"	D009
1	TT-2144	Remote Mounted				D009
1	TE-2169A	HOT OIL TRACE TO DOCK	0 to 800	500 F	1 ½"	D010
1	TT-2169A	Remote Mounted				D010
1	TE-2169B	HOT OIL TRACE FROM DOCK	0 to 800	500 F	1 ½"	D010
1	TT-2169B	Remote Mounted				D010

TEMPERATURE TRANSMITTER SPECIFICATION

GENERAL	MANUFACTURER	Rosemount
	MODEL NUMBER	3144
	ADD'L MODEL NUMBER	
ELEMENT	MEASUREMENT TYPE	Type "K" T/C
	INSTRUMENT SPAN	*BY VENDOR
	SENSOR TYPE	Single
	LOSS OF SIGNAL	Upscale
	STEM STYLE	Spring Loaded
	STEM MATERIAL	304 SS
	STEM CONNECTION	1/2" NPT
	STEM LENGTH	To Fit Well
	STEM DIAMETER	0.250"
TRANSMISSION	TYPE	"Smart"
	OUTPUT SIGNAL	4 to 20 maDC
	ACCURACY	0.5% of Span
	POWER SUPPLY	External
	INDICATOR SCALE	Not Required
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	For 2" Pipe
	CONDUIT CONNECTION	2, 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group C
THERMOWELL	TYPE	Tapered
	MATERIAL	304 SS
	"U" DIMENSION	16 1/2"
	"T" DIMENSION	6"
	PROCESS CONNECTION	1" NPT

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range °F	Operating Temperature	Line Size	P & I Diagram
1	TE-2176B	T-200 PITCH STORAGE TANK	0 to 800	400°F	-	D004
1	TT-2176B	Remote Mounted			N/A	D004
1	TE-2176C	T-200 PITCH STORAGE TANK	0 to 800	400°F	-	D004
1	TT-2176C	Remote Mounted			N/A	D004

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TEMPERATURE TRANSMITTER SPECIFICATION

GENERAL	MANUFACTURER	Rosemount
	MODEL NUMBER	3144
	ADD'L MODEL NUMBER	
ELEMENT	MEASUREMENT TYPE	Type "K" T/C
	INSTRUMENT SPAN	*BY VENDOR
	SENSOR TYPE	Single
	LOSS OF SIGNAL	Upscale
	STEM STYLE	Spring Loaded
	STEM MATERIAL	304 SS
	STEM CONNECTION	1/2" NPT
	STEM LENGTH	To Fit Well
	STEM DIAMETER	0.250"
TRANSMISSION	TYPE	"Smart"
	OUTPUT SIGNAL	4 to 20 maDC
	ACCURACY	0.5% of Span
	POWER SUPPLY	External
	INDICATOR SCALE	Not Required
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	For 2" Pipe
	CONDUIT CONNECTION	2, 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group C
THERMOWELL	TYPE	Tapered
	MATERIAL	304 SS
	"U" DIMENSION	4 1/2"
	"T" DIMENSION	3"
	PROCESS CONNECTION	1" NPT

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range °F	Operating Temperature	Line Size	P & I Diagram
1	TE-2085	PITCH UNLOADING HEADER	0 to 800	400°F	-	D010
1	TT-2085	Remote Mounted			10"	D010

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AUTOMATED WEDGEPLUG VALVE SPECIFICATION

GENERAL	MANUFACTURER	Pacific Wedgeplug
	MODEL NUMBER	8"MA71
	ADD'L MODEL NUMBER	
BODY	TYPE	Non-lubricated Wedgeplug with partial steam jacket
	BODY / PORT SIZE	8"
	MATERIAL	Carbon Steel with Partial Steam Jacket
	CONNECTIONS	8" ANSI 150 RF
TRIM	TYPE	Wedgeplug
	PLUG MATERIAL	ASTM A217 CA15
	STEM MATERIAL	410 SS
ACTUATOR	TYPE	Electric Motor
	POWER SUPPLY	480 VAC, 3 PHASE
	SIZE	* BY VENDOR
	ACTUATION SPEED	80 seconds
	CLASSIFICATION	Class I, Div. 2, Group D
	VALVE FAILURE POSITION	Fail Last Position
POSITION SWITCH	TYPE	Proximity
	CONTACT RATING	115 VAC @ 5 amps
	QUANTITY / FORM	2 DPDT
	POSITION TRIPS	Closed & Opened
	LOCAL INDICATION	Yes
	ELECTRIC CONNECTION	Wired to Terminal Block
	CONDUIT CONNECTION	1 @ 3/4" NPT
	ENCLOSURE RATING	NEMA 4, 7
	CLASSIFICATION	Class I, Division 2, Group D
PROCESS CONDITIONS	FLUID	Hot Pitch
	TEMPERATURE	400 °F
	PRESSURE	100 psig

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	ZV-2082	PITCH UNLOADING	WEDGEPLUG	F.L.	8"	D010
1	ZSO-2082	W/Valve	POSITION SWITCH	OPENED	-	D010
1	ZSC-2082	W/Valve	POSITION SWITCH	CLOSED	-	D010

CONFIDENTIAL

BALL CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	4" CPT 5146AG150A15
	ADD'L MODEL NUMBER	
BODY	TYPE	2 Way Ball
	BODY / PORT SIZE	4"
	MATERIAL	Carbon Steel
	CONNECTIONS	ANSI 150 RF
	PACKING MATERIAL	Graph-lok
TRIM	TYPE	15 deg V
	MATERIAL	Stainless Steel
	SEAT STYLE	Single
	SEAT MATERIAL	316 SS
	GUIDING	NA
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	Bubble Tight
	RATED C_v	45
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	NA
	TRAVEL	* BY VENDOR
POSITIONER	TYPE	Direct Acting Electro-Pneumatic
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Closes Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number
	INSTRUMENT AIR SUPPLY	100 psig Nitrogen
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT 43
	FLOW RATE (norm, max)	440 GPM
	INLET PRESSURE	
	PRESSURE DROP	
	TREMPERATURE	550 deg F
	SPECIFIC GRAVITY	0.75
	CALCULATED C_v	

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	FV-2145	EXISTING HOT OIL HEADER	VALVE W/ I/P	F.O.	4"	D005

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BALL CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	3" CPT 5146AG150A15
	ADD'L MODEL NUMBER	
BODY	TYPE	2 Way Ball
	BODY / PORT SIZE	3"
	MATERIAL	Carbon Steel
	CONNECTIONS	ANSI 150 RF
	PACKING MATERIAL	Graph-lok
TRIM	TYPE	15 deg V
	MATERIAL	Stainless Steel
	SEAT STYLE	Single
	SEAT MATERIAL	316 SS
	GUIDING	NA
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	Bubble Tight
	RATED C_v	45
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	NA
	TRAVEL	* BY VENDOR
POSITIONER	TYPE	Direct Acting Electro-Pneumatic
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Closes Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number
	INSTRUMENT AIR SUPPLY	100 psig Nitrogen
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT 43
	FLOW RATE (norm, max)	110 GPM
	INLET PRESSURE	80 psig
	PRESSURE DROP	62 psig
	TREMPERATURE	550 deg F
	SPECIFIC GRAVITY	0.75
	CALCULATED C_v	12.09

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	FV-2105	HOT OIL RETURN	VALVE W/ I/P	F.O.	3"	D006

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BALL CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	3" CPT 5146AG150A30
	ADD'L MODEL NUMBER	
BODY	TYPE	2 Way Ball
	BODY / PORT SIZE	3"
	MATERIAL	Carbon Steel
	CONNECTIONS	ANSI 150 RF
	PACKING MATERIAL	Graph-lok
TRIM	TYPE	30 deg V
	MATERIAL	Stainless Steel
	SEAT STYLE	Single
	SEAT MATERIAL	316 SS
	GUIDING	NA
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	Bubble Tight
	RATED C_v	54.2
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	NA
	TRAVEL	* BY VENDOR
POSITIONER	TYPE	Direct Acting Electro-Pneumatic
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Opens Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number
	INSTRUMENT AIR SUPPLY	100 psig Nitrogen
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT 43
	FLOW RATE (norm, max)	120 GPM
	INLET PRESSURE	80 psig
	PRESSURE DROP	62 psig
	TREMPERATURE	550 deg F
	SPECIFIC GRAVITY	0.75
	CALCULATED C_v	13.2

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	TDV-2176	T-200 IMMERSION HEATERS HOT OIL SUPPLY	VALVE W/ I/P	F.C.	3"	D006

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BALL CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	2" CPT 5146AG150A30
	ADD'L MODEL NUMBER	
BODY	TYPE	2 Way Ball
	BODY / PORT SIZE	2"
	MATERIAL	Carbon Steel
	CONNECTIONS	ANSI 150 RF
	PACKING MATERIAL	Graph-lok
TRIM	TYPE	30 deg V
	MATERIAL	Stainless Steel
	SEAT STYLE	Single
	SEAT MATERIAL	316 SS
	GUIDING	NA
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	Bubble Tight
	RATED C_v	21.7
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	NA
	TRAVEL	* BY VENDOR
POSITIONER	TYPE	Direct Acting Electro-Pneumatic
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Opens Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number
	INSTRUMENT AIR SUPPLY	100 psig Nitrogen
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT 43
	FLOW RATE (norm, max)	30 GPM
	INLET PRESSURE	80 psig
	PRESSURE DROP	62 psig
	TREMPERATURE	550 deg F
	SPECIFIC GRAVITY	0.75
	CALCULATED C_v	3.3

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	TV-2166	PITCH LINE JACKETS OIL SUPPLY	VALVE W/ I/P	F.C.	3"	D006

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BALL CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	2" CPT 5146AG150A30
	ADD'L MODEL NUMBER	
BODY	TYPE	2 Way Ball
	BODY / PORT SIZE	2"
	MATERIAL	Carbon Steel
	CONNECTIONS	ANSI 150 RF
	PACKING MATERIAL	Graph-lok
TRIM	TYPE	30 deg V
	MATERIAL	Stainless Steel
	SEAT STYLE	Single
	SEAT MATERIAL	316 SS
	GUIDING	NA
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	Bubble Tight
	RATED C_V	21.7
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	NA
	TRAVEL	* BY VENDOR
POSITIONER	TYPE	Direct Acting Electro-Pneumatic
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Opens Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number
	INSTRUMENT AIR SUPPLY	100 psig Nitrogen
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT 43
	FLOW RATE (norm, max)	32 GPM
	INLET PRESSURE	80 psig
	PRESSURE DROP	62 psig
	TREMPERATURE	550 deg F
	SPECIFIC GRAVITY	0.75
	CALCULATED C_V	3.5

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	TV-2156	PITCH LINE JACKETS OIL SUPPLY	VALVE W/ I/P	F.C.	3"	D006

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BALL CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	4" CPT 5146AG150A60
	ADD'L MODEL NUMBER	
BODY	TYPE	2 Way Ball
	BODY / PORT SIZE	4"
	MATERIAL	Carbon Steel
	CONNECTIONS	ANSI 150 RF
	PACKING MATERIAL	Graph-lok
TRIM	TYPE	60 deg V
	MATERIAL	Stainless Steel
	SEAT STYLE	Single
	SEAT MATERIAL	316 SS
	GUIDING	NA
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	Bubble Tight
	RATED C_v	200.0
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	NA
	TRAVEL	* BY VENDOR
POSITIONER	TYPE	Direct Acting Electro-Pneumatic
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Closes Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number
	INSTRUMENT AIR SUPPLY	100 psig Nitrogen
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT 43
	FLOW RATE (norm, max)	440 GPM
	INLET PRESSURE	
	PRESSURE DROP	25 psig
	TREMPERATURE	550 deg F
	SPECIFIC GRAVITY	0.75
	CALCULATED C_v	76.2

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	TV-2141	T-65 COILS HOT OIL SUPPLY	VALVE W/ I/P	F.O.	4"	D009
1	TV-2143	T-65 SIDEWALL HTRS. HOT OIL SUPPLY	VALVE W/ I/P	F.O.	4"	D009

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BALL CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	3" CPT 5146AG150A30
	ADD'L MODEL NUMBER	
BODY	TYPE	2 Way Ball
	BODY / PORT SIZE	3"
	MATERIAL	Carbon Steel
	CONNECTIONS	ANSI 150 RF
	PACKING MATERIAL	Graph-lok
TRIM	TYPE	30 deg V
	MATERIAL	Stainless Steel
	SEAT STYLE	Single
	SEAT MATERIAL	316 SS
	GUIDING	NA
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	Bubble Tight
	RATED C_v	39.0
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	NA
	TRAVEL	* BY VENDOR
POSITIONER	TYPE	Direct Acting Electro-Pneumatic
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Closes Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number
	INSTRUMENT AIR SUPPLY	100 psig Nitrogen
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT 43
	FLOW RATE (norm, max)	100 GPM
	INLET PRESSURE	
	PRESSURE DROP	25 psig
	TREMPERATURE	550 deg F
	SPECIFIC GRAVITY	.75
	CALCULATED C_v	17.32

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	TV-2144	T-68 HEATERS HOT OIL SUPPLY	VALVE W/ I/P	F.O.	3"	D009

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BALL CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	2" CPT 5146AG150A30
	ADD'L MODEL NUMBER	
BODY	TYPE	2 Way Ball
	BODY / PORT SIZE	2"
	MATERIAL	Carbon Steel
	CONNECTIONS	ANSI 150 RF
	PACKING MATERIAL	Graph-lok
TRIM	TYPE	30 deg V
	MATERIAL	Stainless Steel
	SEAT STYLE	Single
	SEAT MATERIAL	316 SS
	GUIDING	NA
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	Bubble Tight
	RATED C_V	26.5
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	NA
	TRAVEL	* BY VENDOR
POSITIONER	TYPE	Direct Acting Electro-Pneumatic
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Closes Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number
	INSTRUMENT AIR SUPPLY	100 psig Nitrogen
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Caloria HT 43
	FLOW RATE (norm, max)	80 GPM
	INLET PRESSURE	
	PRESSURE DROP	25 psig
	TREMPERATURE	550 deg F
	SPECIFIC GRAVITY	0.75
	CALCULATED C_V	13.86

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	TV-2146	RETURN	VALVE W/ I/P	F.O.	2"	D009

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MANUAL WEDGEPLUG VALVE & POSITION SWITCH SPECIFICATION

GENERAL	SWITCH MANUFACTURER	
	SWITCH MODEL NUMBER	
	VALVE MANUFACTURER	Pacific Wedgeplug
	VALVE MODEL NUMBER	4" HA71-RF
	ADD'L MODEL NUMBER	
VALVE	TYPE	Non-lubricated Wedgeplug with partial steam jacket
	BODY & PORT SIZE	4"
	HANDLE TYPE	Handwheel
	PROCESS CONNECTIONS	4" 150# R.F. Flange
	MATERIAL	Carbon Steel with Partial Steam Jacket
	PLUG MATERIAL	ASTM A217 CA15
	STEM MATERIAL	410 SS
	PRESSURE / TEMP. RATING	* BY VENDOR
SWITCH	TYPE	Proximity
	CONTACT RATING	2 A @ 120 VAC
	QUANTITY / FORM	2 DPDT
	POSTION TRIPS	Closed & Opened
	LOCAL INDICATOR	Yes
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	Preassembled
	CONDUIT CONNECTION	2 @ 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group D
ACCESSORIES		

Rev	Tag Number	Equipment & Service	Description	Operating Position	Line Size	P & I Diagram
1	HV-2009	LIQUID PITCH RECYCLE	WEDGEPLUG	N.O.	4"	D004
1	ZSC-2009	W/Valve	POSITION SWITCH	CLOSED		D004
1	ZSO-2009	W/Valve	POSITION SWITCH	OPENED		D004

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MANUAL WEDGEPLUG VALVE & POSITION SWITCH SPECIFICATION

GENERAL	SWITCH MANUFACTURER	
	SWITCH MODEL NUMBER	
	VALVE MANUFACTURER	Pacific Wedgeplug
	VALVE MODEL NUMBER	8" GA71-RF
	ADD'L MODEL NUMBER	
VALVE	TYPE	Non-lubricated Wedgeplug with partial steam jacket
	BODY & PORT SIZE	8"
	HANDLE TYPE	Handwheel
	PROCESS CONNECTIONS	8" 150# R.F. Flange
	MATERIAL	Carbon Steel with Partial Steam Jacket
	PLUG MATERIAL	ASTM A217 CA15
	STEM MATERIAL	410 SS
	PRESSURE / TEMP. RATING	* BY VENDOR
SWITCH	TYPE	Proximity
	CONTACT RATING	2 A @ 120 VAC
	QUANTITY / FORM	2 DPDT
	POSTION TRIPS	Closed & Opened
	LOCAL INDICATOR	Yes
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	Preassembled
	CONDUIT CONNECTION	2 @ 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group D

ACCESSORIES

Rev	Tag Number	Equipment & Service	Description	Operating Position	Line Size	P & I Diagram
1	HV-2081	PITCH UNLOADING ON DOCK	WEDGEPLUG	N.O.	8"	D010
1	ZSC-2081	W/Valve	POSITION SWITCH	CLOSED		D010
1	ZSO-2081	W/Valve	POSITION SWITCH	OPENED		D010
1	HV-2083	PITCH UNLOADING BY PIPE BRIDGE	WEDGEPLUG	N.O.	8"	D010
1	ZSC-2083	W/Valve	POSITION SWITCH	CLOSED		D010
1	ZSO-2083	W/Valve	POSITION SWITCH	OPENED		D010

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PRESSURE REGULATOR SPECIFICATION

GENERAL	MANUFACTURER	Fairchild
	MODEL NUMBER	66132K
	ADD'L MODEL NUMBER	
BODY	TYPE	Reducing and Exhaust
	BODY SIZE	¼"
	PORT SIZE	
	MATERIAL	316 Stainless Steel
	PROCESS CONNECTION	1/4" NPT
	PACKING MATERIAL	N/A
TRIM	MATERIAL	316 SS
	SEAT TYPE	
	SEAT MATERIAL	316 SS and Teflon fiberglass
	SEAL MATERIAL	TFE
ACTUATOR	TYPE	Spring Diaphragm
	PILOT	Integral
	DIAPHRAGM MATERIAL	Viton with Teflon sheet on control side
	DIAPHRAGM RATING	500 psig
	SPRING RANGE	1/2 to 30 psig
EXTERNAL PARTS	TUBING MATERIAL	N/A
	FITTINGS MATERIAL	N/A
PROCESS CONDITIONS	FLUID	Nitrogen
	INLET PRESSURE	130 psig
	INLET TEMPERATURE	70 °F
	FLOW RATE	22 SCFM(max. capacity of valve)
	EXHAUST CAPACITY	1 SCFM(max. capacity of valve)

ACCESSORIES

Rev	Tag Number	Equipment & Service	Set Point psig	Failure Position	Line Size	P & I Diagram
1	PCV-2126	T-240 EXPANSION TANK N2 BLANKET	24	F.C.	2"	D005

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AUTOMATED VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	1" PT5146XG150/1539SX
	ADD'L MODEL NUMBER	
BODY	TYPE	2-Way Ball Valve
	BODY / PORT SIZE	1"
	MATERIAL	Carbon Steel
	CONNECTIONS	1" ANSI 150 RF
	BALL MATERIAL	316 SS
	BODY SEAL MATERIAL	Graphite coated 316 SS
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	100 psig Nitrogen
	SIZE	* BY VENDOR
	ORIENTATION	* BY VENDOR
	MANUAL OVERRIDE	N/A
	HANDWHEEL	N/A
SOLENOID	TYPE	Single Coil 3-Way Class 1 Div.2, Group D
	COIL VOLTAGE	120 VAC
	ELECTRIC CONNECTION	Pigtail Wires to Terminal Block
	TUBING /FITTINGS MATERIAL	Copper & Brass
	FILTER REGULATOR	W/ Gauges
POSITION SWITCH	TYPE	Not required
	CONTACT RATING	NA
	QUANTITY / FORM	NA
	LOCAL INDICATION	Yes
	ELECTRIC CONNECTION	NA
	CONDUIT CONNECTION	NA
	ENCLOSURE RATING	
	CLASSIFICATION	Class I, Division 2, Group D
PROCESS CONDITIONS	FLUID	Hot Oil
	TEMPERATURE	550 deg F
	PRESSURE	130 psig

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	ZV-2123	HOT OIL FLOW FROM EXPANSION TANK	BALL VALVE W/ACT	F.C.	1"	D005
1	ZY-2123	W/Valve	SOLENOID	F.C.		D005

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AUTOMATED VALVE SPECIFICATION

GENERAL	MANUFACTURER	Worcester Controls
	MODEL NUMBER	1 1/2" PT5146XG150
	ADD'L MODEL NUMBER	
BODY	TYPE	2-Way Ball Valve
	BODY / PORT SIZE	1 1/2"
	MATERIAL	Carbon Steel
	CONNECTIONS	1 1/2" ANSI 150 RF
	BALL MATERIAL	316 SS
	BODY SEAL MATERIAL	Graphite coated 316 SS
ACTUATOR	TYPE	Fail-safe electric actuator
	POWER SUPPLY	120 VAC
	SIZE	* BY VENDOR
	ORIENTATION	* BY VENDOR
	MANUAL OVERRIDE	N/A
	HANDWHEEL	N/A
	ENCLOSURE RATING	NEMA 4X, 7
	CLASSIFICATION	Class I, Division 2, Group D
PROCESS CONDITIONS	FLUID	Hot Oil
	TEMPERATURE	550 deg F
	PRESSURE	130 psig

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	ZV-2159A	HOT OIL TRACE TO DOCK	BALL VALVE	F.C.	1 ½"	D010
1	ZV-2159B	HOT OIL TRACE FROM DOCK	BALL VALVE	F.C.	1 ½"	D010

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PROGRAMMABLE LOGIC CONTROLLER SPECIFICATION

GENERAL	MANUFACTURER	Allen Bradley	
CONTROLLER	PROCESSOR SIZE	100k of user memory	
	MODEL NUMBER	1785-L40B	
REMOTE I/O	TYPE	Adapter Module	
	QUANTITY	One (1)	
	MODEL NUMBER	1771-ASB	
POWER SUPPLY	TYPE	External and 1 foot cable	
	QUANTITY	Two (2) of each	
	MODEL NUMBERS	1771-P7 & 1771-CP1	
CHASSIS	SIZE	16 Slot	8 Slot
	QUANTITY	One (1)	One (1)
	MODEL NUMBER	1771-A4B	1771-A2B
SERIAL	TYPE	Basic Module	
	QUANTITY	Zero (0)	
	MODEL NUMBER	1771-DB/B	
ANALOG INPUT	TYPE	8 Point, 4 to 20 mA DC Module	
	QUANTITY	Five (5)	
	MODEL NUMBER	1771-IFE	
ANALOG OUTPUT	TYPE	4 Point, 4 to 20 mA DC Module	
	QUANTITY	Six (6)	
	MODEL NUMBER	1771-OFE2	
DISCRETE INPUT	TYPE	16 Point, 120 VAC Module	
	QUANTITY	Two (2)	
	MODEL NUMBER	1771-IAD/C	
DISCRETE INPUT (ISOLATED)	TYPE	16 Point, Isolated Input Module	
	QUANTITY	Two (2) 1771-wn	
	MODEL NUMBER	1771-ID16/A	
DISCRETE OUTPUT (POWERED)	TYPE	16 Point, 120 VAC Module & Fused Wiring Arm	
	QUANTITY	One (1) of each	
	MODEL NUMBER	1771-OAD/C, 1771-WHF	
DISCRETE OUTPUT (ISOLATED)	TYPE	16 Point, Isolated Relay Module	
	QUANTITY	Two (2)	
	MODEL NUMBER	1771-OW16/B	
SLOT COVER PLATE	TYPE	I/O Blank Module	
	QUANTITY	Six (6)	
	MODEL NUMBER	FM1771	
JUNCTION BOX	TYPE	Station Connector	
	QUANTITY	One (1)	
	MODEL NUMBER	1770-SC	

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PROGRAMMABLE LOGIC CONTROLLER SPECIFICATION

Rev	Tag Number	Equipment & Service	Qty	Unit Size	Active Quantity	Spare Quantity	Percent Spares
1	UC-200	PITCH UNLOADING CABINET N-200	1.5	16 Slots	18	6	25.0%
1	PLC AI	Analog Inputs	5	8 Points	31	9	22.5%
1	PLC AO	Analog Outputs	6	4 Points	16	8	33.3%
1	PLC DI	Discrete Inputs	2	16 Points	18	14	43.8%
1	PLC DII	Discrete Inputs (Isolated)	2	16 Points	17	15	46.9%
1	PLC DOP	Discrete Outputs (Powered)	1	16 Points	4	12	75.0%
1	PLC DOI	Discrete Outputs (Isolated)	2	16 Points	20	12	37.5%

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AUTOMATED VALVE SPECIFICATION

GENERAL	MANUFACTURER	Pacific Wedgeplug
	MODEL NUMBER	4" 71-RF
	ADD'L MODEL NUMBER	
BODY	TYPE	2-Way Non-Lubricated Wedgeplug Valve with partial Steam Jacket
	BODY / PORT SIZE	4"
	MATERIAL	Carbon Steel
	CONNECTIONS	4" ANSI 150 RF
	PLUG MATERIAL	ASTM A217 CA15
	STEM MATERIAL	410 SS
ACTUATOR	TYPE	Spring Return Piston
	CONTROL AIR SUPPLY	100 psig Nitrogen
	SIZE	* BY VENDOR
	ORIENTATION	* BY VENDOR
	MANUAL OVERRIDE	N/A
	HANDWHEEL	N/A
SOLENOID	TYPE	Single Coil 3-Way Class 1 Div.2, Group D
	COIL VOLTAGE	120 VAC
	ELECTRIC CONNECTION	Pigtail Wires to Terminal Block
	TUBING /FITTINGS MATERIAL	Copper & Brass
	FILTER REGULATOR	W/ Gauges
POSITION SWITCH	TYPE	Proximity
	CONTACT RATING	115 VAC @ 5 amps
	QUANTITY / FORM	2 DPDT
	LOCAL INDICATION	Yes
	ELECTRIC CONNECTION	Wired to Terminal Block
	CONDUIT CONNECTION	1 @ 3/4" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group D
PROCESS CONDITIONS	FLUID	Liquid Pitch
	TEMPERATURE	425 deg F
	PRESSURE	130 psig

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	ZV-2044	PITCH TRANSFER	WEDGEPLUG	F.C.	4"	D004
1	ZY-2044	W/Valve	SOLENOID	F.C.		D004
1	ZSC-2044	W/Valve	POSITION SWITCH	N.O.		D004
1	ZSO-2044	W/Valve	POSITION SWITCH	N.O.		D004

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INSTRUMENT CABLE SPECIFICATION

Type	Description	Conductor Insulation Wire Colors	Jacket Insulation & Thickness	Shield / Drain Wire
C03C	3 CONDUCTOR #14AWG,600 V	80 °C BK RD BL	PVC/1.14mm	Not Required
C04C	4 CONDUCTOR #14AWG,600 V	OR		Not Required
D01P	1 TWISTED PAIR #16AWG,300 V	UL 13 105 °C BK WH	FR-PVC/35 mils	Not Required
D02P	2 TWISTED PAIR #18AWG,300 V	UL 13 105 °C BK/WH WH	FR-PVC/35 mils	Overall Aluminum-Mylar w/No Drain Wire
D04P	4 TWISTED PAIR #18AWG,300 V	UL 13 105 °C BK/WH WH	FR-PVC/50 mils	Overall Aluminum-Mylar w/No Drain Wire
D16P	16 TWISTED PAIR #18AWG,300 V	UL 13 105 °C BK WH	FR-PVC/60 mils	Overall Aluminum-Mylar w/No Drain Wire
T01P	T/C EXTENSION WIRE - TYPE	YL RD		
X01P	1 TWISTED PAIR - SHIELDED #16AWG,300 V	UL 13 105 °C BK RD SHLD	FR-PVC/35 mils	Aluminum-Mylar tape shield w/#18, 7 strand tinned Copper

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DIFFERENTIAL PRESSURE TRANSMITTER SPECIFICATION

GENERAL	MANUFACTURER	Rosemount
	MODEL NUMBER	3051CD
	ADD'L MODEL NUMBER	
ELEMENT	MEASUREMENT TYPE	Level
	INSTRUMENT SPAN	*BY VENDOR
	SENSOR TYPE	Diaphragm
	MATERIAL	316 SS
	FILL FLUID	Silicone
	WETTED PARTS	316 SS
	O-RING MATERIAL	Teflon
	PROCESS CONNECTION	2" ANSI 150 RF
TRANSMISSION	TYPE	"Smart"
	OUTPUT SIGNAL	4 to 20 ma DC
	ACCURACY	0.5 % of span
	POWER SUPPLY	External 24 VDC
	INDICATOR SCALE	None
	MOUNTING BRACKET	Required for 2" Pipe
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	N/A
	CONDUIT CONNECTION	2 @ 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group D
DIAPHRAGM SEAL	TOP HOUSING MATERIAL	Carbon Steel
	BOTTOM HOUSING MATERIAL	Stainless Steel
	DIAPHRAGM MATERIAL	Stainless Steel
	FILL FLUID	D.C. Silicone 704
	PROCESS CONNECTION	2" 150# R.F. Flange
	QUANTITY	Two
	CAPILLARY LENGTH	Ten Feet Each
MANIFOLD	TYPE	N/A
	MATERIAL	N/A
PROCESS CONDITIONS	FLUID	Caloria HT43
	DENSITY	46.8 lb./ft^3
	TEMPERATURE	450 to 550 °F
	PRESSURE	10 psig

ACCESSORIES

Rev	Tag Number	Equipment & Service	Calib Range "wc	Operating Pressure	Line Size	P & I Diagram
1	LT-2124	T-240 HO EXPANSION TANK	0 to 60	10 psig	2"	D005

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PRESSURE RELIEF MANWAY COVER SPECIFICATION

GENERAL	MANUFACTURER	Varec
	MODEL NUMBER	221P
	ADD'L MODEL NUMBER	
BODY	DESIGN TYPE	Hinged
	CLASSIFICATION TYPE	Relief
	CONNECTION	API 650 Flange
	VACUUM PORT	N/A
	BASE MATERIAL	Aluminum
	COVER MATERIAL	Aluminum
	DIAPHRAGM MATERIAL	Teflon
	VACUUM INSERT MATERIAL	N/A
	MISC. HARDWARE	SS
PROCESS CONDITIONS	FLUID & PHASE	Pitch Fumes
	TEMPERATURE	400 °F

Rev	Tag Number	Equipment & Service	Set Point inches w.c.	Operating Pressure	Nozzle Size	P & I Diagram
1	PSV-2007	T-200 PITCH STORAGE TANK	3.5	0	24"	D004

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MANUAL GATE VALVE & POSITION SWITCH SPECIFICATION

GENERAL	SWITCH MANUFACTURER	
	SWITCH MODEL NUMBER	
	VALVE MANUFACTURER	Crane or equal
	VALVE MODEL NUMBER	47XUF
	ADD'L MODEL NUMBER	
VALVE	TYPE	Gate to be field fitted with clamp-on jacket
	BODY & PORT SIZE	8"
	HANDLE TYPE	Hand Wheel
	PROCESS CONNECTIONS	ANSI 150 RF
	MATERIAL	Body, disc - Carbon Steel
	TRIM	13% Chromium hard facing
	PRESS./TEMP RATING	100 PSIG, 650 deg F
SWITCH	TYPE	Proximity
	CONTACT RATING	2 A @ 120 VAC
	QUANTITY / FORM	1 SPDT
	POSTION TRIPS	Closed for tag ZSC, Opened for tag ZSO
	LOCAL INDICATOR	No
HOUSING	MATERIAL	Aluminum
	FINISH	Epoxy Coated
	MOUNTING HARDWARE	Pre-assembled
	CONDUIT CONNECTION	2 @ 1/2" NPT
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class I, Division 2, Group D

Rev	Tag Number	Equipment & Service	Description	Operating Position	Line Size	P & I Diagram
1	HV-2008	PITCH UNLOADING TO T-200	GATE VALVE	N.O.	8"	D004
1	ZSO-2008	W/Valve	POSITION SWITCH	OPENED	-	D004
1	ZSC-2008	W/Valve	POSITION SWITSH	CLOSED	-	D004
1	HV-2028	PITCH UNLOADING TO T-210	GATE VALVE	N.O.	8"	D004
1	ZSO-2028	W/Valve	POSITION SWITCH	OPENED	-	D004
A	ZSC-2028	W/Valve	POSITION SWITCH	CLOSED	-	D004

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BUTTERFLY CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Garlock
	MODEL NUMBER	8" GAR-SEAL 100 Series
	ADD'L MODEL NUMBER	
BODY	TYPE	Butterfly
	BODY / PORT SIZE	8"
	MATERIAL	Ductile Iron and TFE liner
	CONNECTIONS	Full lug body, 8" ANSI 150 RF
	PACKING MATERIAL	TFE Disc seal rings
TRIM	DISC MATERIAL	TFE encapsulated iron insert
	SEAT STYLE	Single
	SEAT MATERIAL	TFE
	GUIDING	NA
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	Bubble Tight
	RATED C_v	1097
ACTUATOR	TYPE	Spring and Diaphragm
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	NA
	TRAVEL	N/A
POSITIONER	TYPE	Direct Acting Electro-Pneumatic
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Opens Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number by vendor
	INSTRUMENT AIR SUPPLY	100 psig Air
	ENCLOSURE RATING	NEMA 4
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Nitrogen and Pitch Vapors
	FLOW RATE (norm, max)	2140 scfh
	INLET PRESSURE	1" W.C.
	PRESSURE DROP	1" W.C.
	TREMPERATURE	400 °F
	SPECIFIC GRAVITY	0.97
	CALCULATED C_v	1.14

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	PV-2001	LIQUID PITCH STORAGE TANK T-200 VENT	BUTTERFLY VALVE W / INTEGRAL I/P	F.C.	8"	D004

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CONSTANT DIFFERENTIAL FLOW CONTROLLER SPECIFICATION

GENERAL	MANUFACTURER	Brooks
	MODEL NUMBER	1350-8800 with integral flow controller
	ADD'L MODEL NUMBER	
BODY	PROCESS FLUID	Nitrogen
	CONSTANT PRESSURE REF.	Downstream
	BODY MATERIAL	Stainless Steel
	DIAPHRAGM	Teflon
	DIFFERENTIAL SPRING	Stainless Steel
	TEMPERATURE RATING	300 °F
	PRESSURE DROP	10 psig minimum
	ACCURACY	+/-10 %
INDICATOR	TYPE	Integral Rotameter
	CONNECTION	¼" NPT
	RANGE	.5 to 5.0 SCFH
VALVE	TYPE	Needle
	BODY MATERIAL	Stainless Steel
	SEAL MATERIAL	Stainless Steel
	TURNDOWN RATIO	10 to 1
	PROCESS CONNECTION	¼" NPT
PROCESS CONDITIONS	PURGE RATE	0-5 SCFH
	INLET PRESSURE	130 PSIG

Rev	Tag Number	Equipment & Service	Calib Range SCFH	Operating Flow	Line Size	P & I Diagram
1	FICV-2003	LIQUID PITCH STOR. TK. PRESS.TRANS. PURGE	.5 to 5.0	1.5	1"	D004

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CONTROL VALVE SPECIFICATION

GENERAL	MANUFACTURER	Fisher Controls
	MODEL NUMBER	2" CP
	ADD'L MODEL NUMBER	
BODY	TYPE	Globe
	BODY / PORT SIZE	2" Body/ 1 1/2" Port
	MATERIAL	Carbon Steel
	CONNECTIONS	2"ANSI 150 RF Flanges
	PACKING MATERIAL	TFE
TRIM	TYPE	Equal Percentage
	MATERIAL	Stainless Steel
	SEAT STYLE	Flow up
	SEAT MATERIAL	Carbon filled PTFE
	GUIDING	Stainless Steel
	CHARACTERISTIC	Equal Percentage
	LEAKAGE CLASS	IV
	RATED C_v	45.7
ACTUATOR	TYPE	System 9000
	CONTROL AIR SUPPLY	0 to 80 psig
	SIZE	* BY VENDOR
	ORIENTATION	Top
	MANUAL OVERRIDE	Not Required
	TRAVEL	* BY VENDOR
POSITIONER	TYPE	Direct Acting
	CONTROL SIGNAL	4 to 20 ma DC
	INCREASING SIGNAL	Opens Valve
	GAUGES	Required
	TUBING MATERIAL	Brass
	FILTER / REGULATOR	Manufacturer & Model number
	INSTRUMENT AIR SUPPLY	80 psig
	ENCLOSURE RATING	NEMA 7
	CLASSIFICATION	Class 1, Division 2, Group D
PROCESS CONDITIONS	FLUID	Nitrogen
	FLOW RATE (norm, max)	2410 SCFH max
	INLET PRESSURE	3 inches w.c.
	PRESSURE DROP	2 inches w.c.
	TREMPERATURE	70°F (400 °F max)
	SPECIFIC GRAVITY	0.97
	CALCULATED C_v	39

Rev	Tag Number	Equipment & Service	Description	Failure Position	Line Size	P & I Diagram
1	PV-2003	N2 BLANKET TO PITCH STORAGE T-200	VALVE W/ I/P	F.C.	2"	D004

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PRESSURE REGULATOR SPECIFICATION

GENERAL	MANUFACTURER	Fisher Controls
	MODEL NUMBER	Y6292
	ADD'L MODEL NUMBER	
BODY	TYPE	Reducing
	BODY SIZE	2"
	PORT SIZE	¼" orifice
	MATERIAL	Carbon Steel
	PROCESS CONNECTION	2" ANSI 150 RF
	PACKING MATERIAL	
TRIM	MATERIAL	316 SS
	SEAT MATERIAL	Elastomer
	SEAL MATERIAL	PTFE
	OFFSET	10 %
ACTUATOR	TYPE	Spring Diaphragm
	PILOT	Integral
	DIAPHRAGM MATERIAL	PTFE
	DIAPHRAGM RATING	3 Psig
	SPRING RANGE	1 to 3 inches w.c.
EXTERNAL PARTS	TUBING MATERIAL	N/A
	FITTINGS MATERIAL	N/A
PROCESS CONDITIONS	FLUID	Nitrogen
	INLET PRESSURE	130 psig
	INLET TEMPERATURE	70 °F
	FLOW RATE (min, norm, max)	2410 scfh
	C_V (min, norm, max)	16.5

ACCESSORIES

Rev	Tag Number	Equipment & Service	Set Point inches w.c.	Failure Position	Line Size	P & I Diagram
1	PCV-2014	N2 BLANKET TO PITCH STORAGE T-200	3		2"	D004

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CONSERVATION VENT SPECIFICATION

GENERAL	MANUFACTURER	Protectoseal	
	MODEL NUMBER	F8546H	
	ADD'L MODEL NUMBER		
ELEMENT	MEASUREMENT TYPE	Pressure/Vacuum Vent	
	BASE MATERIAL	Stainless Steel	
	COVER MATERIAL	Stainless Steel	
	INSERT MATERIAL	Stainless Steel	
	VACUUM TRIM MATERIAL	Stainless Steel	
	INLET CONNECTION	6" ANSI Flange	
	OUTLET CONNECTION	End of Line	
VESSEL DATA	CAPACITY	2,000,000 gallons	
	DIAMETER	79 feet	
	HEIGHT	57 feet	
	RATED PRESSURE	4 inches w.c.	
	RATED VACUUM	-2 inches w.c.	
PROCESS CONDITIONS	FLUID	Liquid Pitch	
	TEMPERATURE (min / max)	450 °F	
	SPECIFIC GRAVITY		
	FLASH POINT		
SIZING CRITERIA		FILLING	EMPTYING
	FLOW RATE	1320 GPM	300 GPM
	PIPE DIAMETER	8"	6"
	MATERIAL BREATHING	11300 SCFH	2410 SCFH
	THERMAL BREATHING		
	DISCHARGE TO ATMOSPHERE	yes	yes
	ALLOWABLE ΔP	1 inch wc	1 inch wc
ACCESSORIES	INTEGRAL FLAME ARRESTER	No	

Rev	Tag Number	Equipment & Service	Set Points inches wc	Operating Pressure	Tank Hght	P & I Diagram
1	PSV-2002	LIQUID PITCH STORAGE TK. T-200	-1.0 / +2.5	0 psig		D004

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	PT-2001	PRESSURE TRANSMITTER	T-200 LIQUID PITCH TANK VENT	D004	IS06	0 to 25 "wc FIELD
1	PV-2001	BUTTERFLY CONTROL VALVE 8" & INTEGRAL I/P	T-200 LIQUID PITCH TANK VENT	D004	IS21	F.C. INLINE
1	PSV-2002	PRESSURE SAFETY VALVE	T-200 LIQUID PITCH TANK VENT	D004	IS25	-1 to 2.5 "wc INLINE
1	FICV-2003	ROTAMETER	T-200 LIQUID PITCH TANK N2 PURGE	D004	IS22	0.5 to 5.0 scfh INLINE
1	PV-2003	GLOBE CONTROL VALVE 2"	T-200 LIQUID PITCH TANK N2 BLANKET	D004	IS24	F.C. INLINE
1	LIT-2004	RADAR LEVEL TRANSMITTER	T-200 LIQUID PITCH TANK	D004	IS03	0 to 57 ft FIELD
1	LE-2004	RADAR LEVEL SENSOR		D004	IS03	3 to 112 ft INLINE
1	LSHH-2004	CONTACT W/TRANSMITTER		D004	IS03	N.O. FIELD
1	LI-2004	INDICATOR LEVEL	T-200 LIQUID PITCH TANK	D004	I016	0 to 100 % LOCAL PANEL IP-1
1	UA-2004	HORN	T-200 LIQUID PITCH TANK	D004	I016	- LOCAL PANEL IP-1
1	LLH-2004	PILOT LIGHT RED	T-200 LIQUID PITCH TANK	D004	I016	- LOCAL PANEL IP-1
1	LSHH-2006	CAPACITANCE LEVEL SWITCH	T-200 LIQUID PITCH TANK	D004	IS02	N.O. FIELD
1	PSV-2007	GAUGE HATCH 24"	T-200 LIQUID PITCH TANK	D004	IS19	3.5 "wc INLINE
1	HV-2008	GATE VALVE - MANUAL 8"	T-200 LIQUID PITCH TANK SUPPLY	D004	IS20	N.O. INLINE
1	ZSC-2008	POSITION SWITCH W/VALVE		D004	IS20	N.O. FIELD
1	ZSO-2008	POSITION SWITCH W/VALVE		D004	IS20	N.O. FIELD
1	HV-2009	WEDGEPLUG VALVE - MANUAL 4"	T-200 LIQUID PITCH TANK RECIRCULATION	D004	IS12	N.O. INLINE
1	ZSC-2009	POSITION SWITCH W/VALVE		D004	IS12	N.O. FIELD

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	ZSO-2009	POSITION SWITCH W/VALVE		D004	IS12	N.O. FIELD
1	TI-2011	THERMOMETER	T-200 LIQUID PITCH TANK LOWER	D004	IS07	50 to 550 degF INLINE
1	TI-2012	THERMOMETER	T-200 LIQUID PITCH TANK UPPER	D004	IS07	50 to 550 degF INLINE
1	PI-2013	PRESSURE GAUGE	T-200 LIQUID PITCH TANK N2 BLANKET	D004	IS05	-10 to 10 "wc FIELD
1	PCV-2014	PRESSURE REGULATOR 2"	T-200 LIQUID PITCH TANK N2 BLANKET	D004	IS23	3 "wc INLINE
1	HV-2028	GATE VALVE - MANUAL 8"	T-210 LIQUID PITCH TANK SUPPLY	D004	IS20	N.O. INLINE
1	ZSC-2028	POSITION SWITCH W/VALVE		D004	IS20	N.O. FIELD
1	ZSO-2028	POSITION SWITCH W/VALVE		D004	IS20	N.O. FIELD
1	HMS-2040A	PUSH BUTTON STATION STOP	P-220 PITCH TRANSFER PUMP MOTOR	D004	E012	- @ PUMP
1	HMS-2040B	PUSH BUTTON STATION START	P-220 PITCH TRANSFER PUMP MOTOR	D004	E012	- @ PUMP
1	HL-2040B	PILOT LIGHT RED	P-220 PITCH TRANSFER PUMP MOTOR	D004	E012	- @ PUMP
1	HMS-2040C	PUSH BUTTON STATION STOP	P-220 PITCH TRANSFER PUMP MOTOR	D004	E011	- @ RAILCAR UNLOADING
1	HMS-2040D	PUSH BUTTON STATION START	P-220 PITCH TRANSFER PUMP MOTOR	D004	E011	- @ RAILCAR UNLOADING
1	HL-2040D	PILOT LIGHT RED	P-220 PITCH TRANSFER PUMP MOTOR	D004	E011	- @ RAILCAR UNLOADING
1	PSV-2041	PRESSURE SAFETY VALVE 2x3"	P-220 PITCH TRANSFER PUMP DISCHARGE	D004	AS08	130 psig INLINE
1	TI-2042	THERMOMETER	PITCH TRANSFER HEADER OUTLET	D004	IS07	50 to 550 degF INLINE
1	ZV-2044	AUTOMATED WEDGEPLUG VALV 4"	PITCH TRANSFER HEADER OUTLET	D004	IS16	F.C. INLINE
1	ZY-2044	SOLENOID W/VALVE, 3-WAY		D004	IS16	F.C. FIELD

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	ZSC-2044	POSITION SWITCH W/VALVE		D004	IS16	N.O. FIELD
1	ZSO-2044	POSITION SWITCH W/VALVE		D004	IS16	N.O. FIELD
1	IT-2045	CURRENT TRANSMITTER	P-220 PITCH TRANSFER PUMP MOTOR	D004	E005	0 to 75 amps FIELD
1	II-2045A	LOCAL INDICATOR CURRENT	A-208 T-200 PITCH TANK AGITATOR MOTOR	D004	E012	0 to 75 amps MOTOR CONTROL CENTER
1	II-2045B	LOCAL INDICATOR CURRENT	P-220 PITCH TRANSFER PUMP MOTOR	D004	E012	0 to 75 amps @ PUMP
1	PI-2046	PRESSURE GAUGE W/DIAPHRAGM SEAL	DISCHARGE	D004	IS05	0 to 200 psig FIELD
1	TI-2047	THERMOMETER	P-220 PITCH TRANSFER PUMP SUCTION	D004	IS07	50 to 550 degF INLINE
1	HMS-2050A	PUSH BUTTON STATION STOP	P-225 PITCH TRANSFER PUMP MOTOR	D004	E012	- @ PUMP
1	HMS-2050B	PUSH BUTTON STATION START	P-225 PITCH TRANSFER PUMP MOTOR	D004	E012	- @ PUMP
1	HL-2050B	PILOT LIGHT RED	P-225 PITCH TRANSFER PUMP MOTOR	D004	E012	- @ PUMP
1	HMS-2050C	PUSH BUTTON STATION STOP	P-225 PITCH TRANSFER PUMP MOTOR	D004	E011	- @ RAILCAR UNLOADING
1	HMS-2050D	PUSH BUTTON STATION START	P-225 PITCH TRANSFER PUMP MOTOR	D004	E011	- @ RAILCAR UNLOADING
1	HL-2050D	PILOT LIGHT RED	P-225 PITCH TRANSFER PUMP MOTOR	D004	E011	- @ RAILCAR UNLOADING
1	PSV-2051	PRESSURE SAFETY VALVE 2x3"	P-225 PITCH TRANSFER PUMP DISCHARGE	D004	AS08	130 psig INLINE
1	IT-2055	CURRENT TRANSMITTER	P-225 PITCH TRANSFER PUMP MOTOR	D004	E005	0 to 75 amps FIELD
1	II-2055A	LOCAL INDICATOR CURRENT	A-208 T-200 PITCH TANK AGITATOR MOTOR	D004	E012	0 to 75 amps MOTOR CONTROL CENTER
1	II-2055B	LOCAL INDICATOR CURRENT	P-225 PITCH TRANSFER PUMP MOTOR	D004	E012	0 to 75 amps @ PUMP
1	PI-2056	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-225 PITCH TRANSFER PUMP DISCHARGE	D004	IS05	0 to 200 psig FIELD

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	TI-2057	THERMOMETER	P-225 PITCH TRANSFER PUMP SUCTION	D004	IS07	50 to 550 degF INLINE
1	HL-2070	PILOT LIGHT RED	P-238 PITCH EVACUATOR PUMP MOTOR	D004	E011	- @ PUMP
1	HMS-2070A	PUSH BUTTON STATION STOP	P-238 PITCH EVACUATOR PUMP MOTOR	D004	E011	- @ PUMP
1	HMS-2070B	PUSH BUTTON STATION START	P-238 PITCH EVACUATOR PUMP MOTOR	D004	E011	- @ PUMP
1	PSV-2071	PRESSURE SAFETY VALVE 1x2"	P-238 PITCH EVACUATOR PUMP DISCHARGE	D004	AS08	130 psig INLINE
1	PI-2072	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-238 PITCH EVACUATOR PUMP DISCHARGE	D004	IS05	0 to 200 psig FIELD
1	TI-2077	THERMOMETER	P-238 PITCH EVACUATOR PUMP SUCTION	D004	IS07	50 to 550 degF INLINE
1	HL-2080	PILOT LIGHT RED	P-235 DOCK PITCH EVACUATOR PUMP MOTOR	D010	E011	- @ PUMP
1	HMS-2080A	PUSH BUTTON STATION STOP	P-235 DOCK PITCH EVACUATOR PUMP MOTOR	D010	E011	- @ PUMP
1	HMS-2080B	PUSH BUTTON STATION START	P-235 DOCK PITCH EVACUATOR PUMP MOTOR	D010	E011	- @ PUMP
1	HV-2081	WEDGEPLUG VALVE - MANUAL 8"	SHIP UNLOADING HEADER INLET	D010	IS12	N.O. INLINE
1	ZSC-2081	POSITION SWITCH W/VALVE		D010	IS12	N.O. FIELD @ DOCK
1	ZSO-2081	POSITION SWITCH W/VALVE		D010	IS12	N.O. FIELD @ DOCK
1	ZLC-2081	PILOT LIGHT RED	SHIP UNLOADING HEADER	D010	I016	- LOCAL PANEL IP-1
1	ZLO-2081	PILOT LIGHT GREEN	SHIP UNLOADING HEADER	D010	I016	- LOCAL PANEL IP-1
1	ZV-2082	AUTOMATED WEDGEPLUG VALV 8"	SHIP UNLOADING HEADER INLET	D010	IS09	F.L. INLINE
1	ZSC-2082	POSITION SWITCH W/VALVE		D010	IS09	N.O. FIELD @ DOCK
1	ZSO-2082	POSITION SWITCH W/VALVE		D010	IS09	N.O. FIELD @ DOCK

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	HMSC-2082A	PUSH BUTTON - CLOSE RED	SHIP UNLOADING HEADER INLET	D010	I016	- LOCAL PANEL IP-1
1	HMSO-2082A	PUSH BUTTON - OPEN GREEN	SHIP UNLOADING HEADER INLET	D010	I016	- LOCAL PANEL IP-1
1	ZLC-2082A	PILOT LIGHT RED	SHIP UNLOADING HEADER	D010	I016	- LOCAL PANEL IP-1
1	ZLO-2082A	PILOT LIGHT GREEN	SHIP UNLOADING HEADER	D010	I016	- LOCAL PANEL IP-1
1	HMSC-2082B	PUSH BUTTON - CLOSE RED	SHIP UNLOADING HEADER INLET	D010	I018	- LOCAL PANEL IP-2
1	HMSO-2082B	PUSH BUTTON - OPEN GREEN	SHIP UNLOADING HEADER INLET	D010	I018	- LOCAL PANEL IP-2
1	ZLC-2082B	PILOT LIGHT RED	SHIP UNLOADING HEADER	D010	I018	- LOCAL PANEL IP-2
1	ZLO-2082B	PILOT LIGHT GREEN	SHIP UNLOADING HEADER	D010	I018	- LOCAL PANEL IP-2
1	HV-2083	WEDGEPLUG VALVE - MANUAL 8"	SHIP UNLOADING HEADER SUPPLY	D010	IS12	N.O. INLINE
1	ZSC-2083	POSITION SWITCH W/VALVE		D010	IS12	N.O. FIELD
1	ZSO-2083	POSITION SWITCH W/VALVE		D010	IS12	N.O. FIELD
1	ZLC-2083	PILOT LIGHT RED	SHIP UNLOADING HEADER	D010	I016	- LOCAL PANEL IP-1
1	ZLO-2083	PILOT LIGHT GREEN	SHIP UNLOADING HEADER	D010	I016	- LOCAL PANEL IP-1
1	TI-2084	THERMOMETER	SHIP UNLOADING HEADER SUPPLY	D010	IS07	50 to 550 degF INLINE
1	TT-2085	TEMPERATURE TRANSMITTER	SHIP UNLOADING HEADER SUPPLY	D010	IS08	0 to 800 degF FIELD
1	TE-2085	THERMOCOUPLE TYPE K		D010	IS08	degF INLINE
1	PSV-2086	PRESSURE SAFETY VALVE 1x2"	P-235 DOCK PITCH EVACUATOR PUMP DISCHARGE	D010	AS08	130 psig INLINE
1	PI-2087	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-235 DOCK PITCH EVACUATOR PUMP DISCHARGE	D010	IS05	0 to 200 psig FIELD

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	HL-2100	PILOT LIGHT RED	P-260 PRIMARY HOT OIL PUMP MOTOR	D005	E011	- @ PUMP
1	HMS-2100A	PUSH BUTTON STATION STOP	P-260 PRIMARY HOT OIL PUMP MOTOR	D005	E011	- @ PUMP
1	HMS-2100B	PUSH BUTTON STATION START	P-260 PRIMARY HOT OIL PUMP MOTOR	D005	E011	- @ PUMP
1	PI-2101	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-260 PRIMARY HOT OIL PUMP SUCTION STRAINER INLET	D005	IS05	0 to 100 psig FIELD
1	PI-2102	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-260 PRIMARY HOT OIL PUMP SUCTION STRAINER OUTLET	D005	IS05	0 to 100 psig FIELD
1	PI-2103	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-260 PRIMARY HOT OIL PUMP DISCHARGE	D005	IS05	0 to 200 psig FIELD
1	PSV-2104	PRESSURE SAFETY VALVE 4x6"	E-270 AHE-1000 FIRED HTF HEATER OUTLET	D005	AS08	120 psig INLINE
1	FT-2105	VORTEX FLOW TRANSMITTER	E-270 AHE-1000 FIRED HTF HEATER INLET	D005	IS01	0 to 600 gpm FIELD
1	FE-2105	VORTEX FLOW METER		D005	IS01	gpm INLINE
1	FV-2105	BALL CONTROL VALVE 3"	E-270 AHE-1000 FIRED HTF HEATER INLET	D006	IS10	F.O. INLINE
1	TT-2106	TEMPERATURE TRANSMITTER	E-270 AHE-1000 FIRED HTF HEATER OUTLET	D005	AS03	0 to 800 degF FIELD
1	TE-2106	THERMOCOUPLE TYPE K		D005	AS03	degF INLINE
1	TIC-2106	PANEL CONTROLLER	E-270 AHE-1000 FIRED HTF HEATER OUTLET	D005	AS03	0 to 800 degF FIELD
1	TV-2106	CONTROL VALVE ?"	E-270 AHE-1000 FIRED HTF HEATER OUTLET	D005	AS03	F.C. INLINE
1	PI-2107	PRESSURE GAUGE W/DIAPHRAGM SEAL	PRIMARY HOT OIL HEADER SUPPLY	D006	IS05	0 to 200 psig FIELD
1	HL-2110	PILOT LIGHT RED	P-265 PRIMARY HOT OIL PUMP MOTOR	D005	E011	- @ PUMP
1	HMS-2110A	PUSH BUTTON STATION STOP	P-265 PRIMARY HOT OIL PUMP MOTOR	D005	E011	- @ PUMP
1	HMS-2110B	PUSH BUTTON STATION START	P-265 PRIMARY HOT OIL PUMP MOTOR	D005	E011	- @ PUMP

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	PI-2111	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-265 PRIMARY HOT OIL PUMP SUCTION STRAINER INLET	D005	IS05	0 to 100 psig FIELD
1	PI-2112	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-265 PRIMARY HOT OIL PUMP SUCTION STRAINER OUTLET	D005	IS05	0 to 100 psig FIELD
1	PI-2113	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-265 PRIMARY HOT OIL PUMP DISCHARGE	D005	IS05	0 to 200 psig FIELD
1	HL-2120	PILOT LIGHT RED	P-245 HOT OIL FILL & DRAIN PUMP MOTOR	D005	E011	- @ PUMP
1	HMS-2120A	PUSH BUTTON STATION STOP	P-245 HOT OIL FILL & DRAIN PUMP MOTOR	D005	E011	- @ PUMP
1	HMS-2120B	PUSH BUTTON STATION START	P-245 HOT OIL FILL & DRAIN PUMP MOTOR	D005	E011	- @ PUMP
1	ZV-2123	BALL VALVE 1"	T-240 HTF EXPANSION TANK OVERFLOW	D005	IS14	F.C. INLINE
1	ZY-2123	SOLENOID W/VALVE, 3-WAY		D005	IS14	F.C. FIELD
1	LT-2124	DIFF PRESSURE TRANSMITTER	T-240 HTF EXPANSION TANK	D005	IS18	0 to 60 "wc FIELD
1	PI-2125	PRESSURE GAUGE W/DIAPHRAGM SEAL	T-240 HTF EXPANSION TANK	D005	IS05	0 to 60 psig FIELD
1	PCV-2126	PRESSURE REGULATOR 1/4"	T-240 HTF EXPANSION TANK N2 SUPPLY	D005	IS13	24 psig INLINE
1	PSV-2127	PRESSURE SAFETY VALVE 1-1/2x3"	T-240 HTF EXPANSION TANK	D005	AS08	27.5 psig INLINE
1	PSV-2128	PRESSURE SAFETY VALVE	T-240 HTF EXPANSION TANK	D005	AS08	2 oz/in2 INLINE
1	TI-2130	THERMOMETER	LINE 305 HOT OIL TRACING RETURN	D006	IS07	50 to 550 degF INLINE
1	TI-2131	THERMOMETER	LINE 306 HOT OIL TRACING RETURN	D006	IS07	50 to 550 degF INLINE
1	TI-2132	THERMOMETER	LINE 307 HOT OIL TRACING RETURN	D006	IS07	50 to 550 degF INLINE
1	TI-2136	THERMOMETER	LINE 310 HOT OIL TRACING RETURN	D006	IS07	50 to 550 degF INLINE
1	TT-2141	TEMPERATURE TRANSMITTER	T-65 HOT OIL COILS SUPPLY	D009	IS08	0 to 800 degF FIELD

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	TE-2141	THERMOCOUPLE TYPE K		D009	IS08	degF INLINE
1	TV-2141	BALL CONTROL VALVE 4"	T-65 HOT OIL COILS SUPPLY	D009	IS10	F.O. INLINE
1	TT-2143	TEMPERATURE TRANSMITTER	T-65 SIDEWALL HOT OIL HEATER SUPPLY	D009	IS08	0 to 800 degF FIELD
1	TE-2143	THERMOCOUPLE TYPE K		D009	IS08	degF INLINE
1	TV-2143	BALL CONTROL VALVE 4"	T-65 SIDEWALL HOT OIL HEATER SUPPLY	D009	IS10	F.O. INLINE
1	TT-2144	TEMPERATURE TRANSMITTER	T-68 HOT OIL HEATER SUPPLY	D009	IS08	0 to 800 degF FIELD
1	TE-2144	THERMOCOUPLE TYPE K		D009	IS08	degF INLINE
1	TV-2144	BALL CONTROL VALVE 4"	T-68 HOT OIL HEATER SUPPLY	D009	IS10	F.O. INLINE
1	FT-2145	VORTEX FLOW TRANSMITTER	E-170 AHE-700 FIRED HTF HEATER INLET	D005	IS01	0 to 600 gpm FIELD
1	FE-2145	VORTEX FLOW METER		D005	IS01	gpm INLINE
1	FV-2145	BALL CONTROL VALVE 4"	E-170 AHE-700 FIRED HTF HEATER INLET	D005	IS10	F.O. INLINE
1	TV-2146	BALL CONTROL VALVE 2"	RETURN	D009	IS10	F.O. INLINE
1	HL-2150	PILOT LIGHT RED	P-275 UNLOAD LINE HOT OIL PUMP MOTOR	D006	E011	- @ PUMP
1	HMS-2150A	PUSH BUTTON STATION STOP	P-275 UNLOAD LINE HOT OIL PUMP MOTOR	D006	E011	- @ PUMP
1	HMS-2150B	PUSH BUTTON STATION START	P-275 UNLOAD LINE HOT OIL PUMP MOTOR	D006	E011	- @ PUMP
1	PI-2151	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-275 UNLOAD LINE HOT OIL PUMP SUCTION STRAINER INLET	D006	IS05	0 to 160 psig FIELD
1	PI-2152	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-275 UNLOAD LINE HOT OIL PUMP SUCTION STRAINER OUTLET	D006	IS05	0 to 160 psig FIELD
1	PI-2153	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-275 UNLOAD LINE HOT OIL PUMP DISCHARGE	D006	IS05	0 to 200 psig FIELD

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	PSV-2153	PRESSURE SAFETY VALVE 2x3"	P-275 UNLOAD LINE HOT OIL PUMP DISCHARGE	D006	AS08	145 psig INLINE
1	TI-2154	THERMOMETER	SHIP UNLDG TRACE HOT OIL HEADER SUPPLY	D006	IS07	50 to 550 degF INLINE
1	FT-2155A	VORTEX FLOW TRANSMITTER	SHIP UNLDG TRACE HOT OIL HEADER SUPPLY	D010	IS01	0 to 100 gpm FIELD
1	FE-2155A	VORTEX FLOW METER		D010	IS01	gpm INLINE
1	FT-2155B	VORTEX FLOW TRANSMITTER	SHIP UNLDG TRACE HOT OIL HEADER RETURN	D010	IS01	0 to 100 gpm FIELD
1	FE-2155B	VORTEX FLOW METER		D010	IS01	gpm INLINE
1	TT-2156	TEMPERATURE TRANSMITTER	SHIP UNLDG TRACE HOT OIL HEADER RETURN	D006	IS08	0 to 800 degF FIELD
1	TE-2156	THERMOCOUPLE TYPE K		D006	IS08	degF INLINE
1	TV-2156	BALL CONTROL VALVE 2"	SHIP UNLDG TRACE HOT OIL HEADER RETURN	D006	IS10	F.C. INLINE
1	TI-2157	THERMOMETER	SHIP UNLDG TRACE HOT OIL HEADER RETURN	D006	IS07	50 to 550 degF INLINE
1	PI-2158	PRESSURE GAUGE W/DIAPHRAGM SEAL	SHIP UNLDG TRACE HOT OIL HEADER RETURN	D006	IS05	0 to 200 psig FIELD
1	ZV-2159A	MOTOR OPERATED VALVE 1.5"	SHIP UNLDG TRACE HOT OIL HEADER SUPPLY	D010	IS14	F.C. INLINE
1	ZV-2159B	MOTOR OPERATED VALVE 1.5"	SHIP UNLDG TRACE HOT OIL HEADER RETURN	D010	IS14	F.C. INLINE
1	HL-2160	PILOT LIGHT RED	P-280 PITCH XFER LINES HOT OIL PUMP MOTOR	D006	E011	- @ PUMP
1	HMS-2160A	PUSH BUTTON STATION STOP	P-280 PITCH XFER LINES HOT OIL PUMP MOTOR	D006	E011	- @ PUMP
1	HMS-2160B	PUSH BUTTON STATION START	P-280 PITCH XFER LINES HOT OIL PUMP MOTOR	D006	E011	- @ PUMP
1	PI-2161	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-280 PITCH XFER LINES HOT OIL PUMP SUCTION STRAINER INLET	D006	IS05	0 to 100 psig FIELD
1	PI-2162	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-280 PITCH XFER LINES HOT OIL PUMP SUCTION STRAINER OUTLET	D006	IS05	0 to 100 psig FIELD

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	PI-2163	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-280 PITCH XFER LINES HOT OIL PUMP DISCHARGE	D006	IS05	0 to 100 psig FIELD
1	PSV-2163	PRESSURE SAFETY VALVE 1x2"	P-280 PITCH XFER LINES HOT OIL PUMP DISCHARGE	D006	AS08	135 psig INLINE
1	TI-2164	THERMOMETER	PITCH PIPG TRACE HOT OIL HEADER SUPPLY	D006	IS07	50 to 550 degF INLINE
1	TT-2166	TEMPERATURE TRANSMITTER	PITCH PIPG TRACE HOT OIL HEADER RETURN	D006	IS08	0 to 800 degF FIELD
1	TE-2166	THERMOCOUPLE TYPE K		D006	IS08	degF INLINE
1	TV-2166	BALL CONTROL VALVE 2"	PITCH PIPG TRACE HOT OIL HEADER RETURN	D006	IS10	F.C. INLINE
1	TI-2167	THERMOMETER	PITCH PIPG TRACE HOT OIL HEADER RETURN	D006	IS07	50 to 550 degF INLINE
1	PI-2168	PRESSURE GAUGE W/DIAPHRAGM SEAL	PITCH PIPG TRACE HOT OIL HEADER RETURN	D006	IS05	0 to 100 psig FIELD
1	TE-2169A	THERMOCOUPLE TYPE K		D010	IS08	degF INLINE
1	TT-2169A	TEMPERATURE TRANSMITTER	SHIP UNLDG TRACE HOT OIL HEADER SUPPLY	D010	IS08	0 to 800 degF FIELD
1	TE-2169B	THERMOCOUPLE TYPE K		D010	IS08	degF INLINE
1	TT-2169B	TEMPERATURE TRANSMITTER	SHIP UNLDG TRACE HOT OIL HEADER RETURN	D010	IS08	0 to 800 degF FIELD
1	HL-2170	PILOT LIGHT RED	P-285 E-201 & E-202 HOT OIL PUMP MOTOR	D006	E011	- @ PUMP
1	HMS-2170A	PUSH BUTTON STATION STOP	P-285 E-201 & E-202 HOT OIL PUMP MOTOR	D006	E011	- @ PUMP
1	HMS-2170B	PUSH BUTTON STATION START	P-285 E-201 & E-202 HOT OIL PUMP MOTOR	D006	E011	- @ PUMP
1	PI-2171	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-285 E-201 & E-202 HOT OIL PUMP SUCTION STRAINER INLET	D006	IS05	0 to 100 psig FIELD
1	PI-2172	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-285 E-201 & E-202 HOT OIL PUMP SUCTION STRAINER OUTLET	D006	IS05	0 to 100 psig FIELD
1	PI-2173	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-285 E-201 & E-202 HOT OIL PUMP DISCHARGE	D006	IS05	0 to 100 psig FIELD

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	PSV-2173	PRESSURE SAFETY VALVE 1.5x3"	P-285 E-201 & E-202 HOT OIL PUMP DISCHARGE	D006	AS08	135 psig INLINE
1	TI-2174	THERMOMETER	E-201 & E-202 HOT OIL HEADER SUPPLY	D006	IS07	50 to 550 degF INLINE
1	TDV-2176	BALL CONTROL VALVE 3"	E-201 & E-202 HOT OIL HEADER SUPPLY	D006	IS10	F.C. INLINE
1	TT-2176A	TEMPERATURE TRANSMITTER W/THERMOCOUPLE	E-201 & E-202 HOT OIL HEADER SUPPLY	D006	IS08	0 to 800 degF FIELD
1	TE-2176A	THERMOCOUPLE TYPE K		D006	IS08	degF INLINE
1	TT-2176B	TEMPERATURE TRANSMITTER	T-200 LIQUID PITCH TANK LOWER	D004	IS08	0 to 800 degF FIELD
1	TE-2176B	THERMOCOUPLE TYPE K		D004	IS08	degF INLINE
1	TT-2176C	TEMPERATURE TRANSMITTER	T-200 LIQUID PITCH TANK UPPER	D004	IS08	0 to 800 degF FIELD
1	TE-2176C	THERMOCOUPLE TYPE K		D004	IS08	degF INLINE
1	TI-2177	THERMOMETER	E-201 & E-202 HOT OIL HEADER RETURN	D006	IS07	50 to 550 degF INLINE
1	PI-2178	PRESSURE GAUGE W/DIAPHRAGM SEAL	E-201 & E-202 HOT OIL HEADER RETURN	D006	IS05	0 to 100 psig FIELD
1	TI-2179	THERMOMETER	E-201 & E-202 HOT OIL HEADER RETURN	D006	IS07	50 to 550 degF INLINE
1	HL-2190	PILOT LIGHT RED	P-255 HOT OIL DRAIN TRANSFER PUMP MOTOR	D006	E011	- @ PUMP
1	HMS-2190A	PUSH BUTTON STATION STOP	P-255 HOT OIL DRAIN TRANSFER PUMP MOTOR	D006	E011	- @ PUMP
1	HMS-2190B	PUSH BUTTON STATION START	P-255 HOT OIL DRAIN TRANSFER PUMP MOTOR	D006	E011	- @ PUMP
1	PI-2191	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-255 HOT OIL DRAIN TRANSFER PUMP SUCTION	D006	IS05	0 to 160 psig FIELD
1	PI-2192	PRESSURE GAUGE W/DIAPHRAGM SEAL	P-255 HOT OIL DRAIN TRANSFER PUMP DISCHARGE	D006	IS05	0 to 160 psig FIELD
1	PSV-2193	PRESSURE SAFETY VALVE 4x6"	PRIMARY HOT OIL HEADER RETURN	D005	AS08	40 psig INLINE

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Rev.	Tag Number	Description	Equipment & Service	P & I D	Spec	Range & Loaction
1	PI-2194	PRESSURE GAUGE W/DIAPHRAGM SEAL	PRIMARY HOT OIL HEADER RETURN	D006	IS05	0 to 100 psig FIELD
1	PCV-2200	PRESSURE REGULATOR	T-300 BULK NITROGEN TANK INLET	D007	AS04	psig INLINE
1	LI-2201	LEVEL GAUGE	T-300 BULK NITROGEN TANK	D007	AS04	FIELD
1	PSV-2202	PRESSURE SAFETY VALVE	T-300 BULK NITROGEN TANK	D007	AS04	psig INLINE
1	PSV-2203	PRESSURE SAFETY VALVE	T-300 BULK NITROGEN TANK	D007	AS04	psig INLINE
1	PCV-2204	PRESSURE REGULATOR	T-300 BULK NITROGEN TANK OUTLET	D007	AS04	psig INLINE
1	PCV-2205	PRESSURE REGULATOR	E-310 NITROGEN EVAPORATOR OUTLET	D007	AS04	130 psig INLINE
1	PSV-2206	PRESSURE SAFETY VALVE 1x2"	NITROGEN HEADER	D007	AS08	150 psig INLINE
1	HS-2210	SELECTOR SWITCH HAND/OFF/AUTO	P-320 BULK STORAGE AREA SUMP PUMP MOTOR	D008	E012	- FIELD
1	PCV-2220	PRESSURE REGULATOR	E-270 AHE-1000 FIRED HTF HEATER NATURAL GAS	D005	AS03	psig INLINE

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Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	PIC-2001	PLC AI PRESSURE	21	0-0	1	T-200 LIQUID PITCH TANK VENT	0 to 25 "wc		I004	D004
1	TI-2169A	PLC AI TEMPERATURE	21	0-0	2	SHIP UNLDG TRACE HOT OIL HEADER SUPPLY	0 to 800 degF		I004	D010
1	TI-2169B	PLC AI TEMPERATURE	21	0-0	3	SHIP UNLDG TRACE HOT OIL HEADER RETURN	0 to 800 degF		I004	D010
1	II-2005	PLC AI CURRENT	21	0-0	4	A-208 T-200 PITCH TANK AGITATOR MOTOR	0 to 75 amps	Future	I004	D004
1	II-2015	PLC AI CURRENT	21	0-0	5	A-209 T-200 PITCH TANK AGITATOR MOTOR	0 to 75 amps	Future	I004	D004
1	PIC-2021	PLC AI PRESSURE	21	0-0	6	T-210 LIQUID PITCH TANK VENT	0 to 25 "wc	Future	I004	D004
1	II-2025	PLC AI CURRENT	21	0-0	7	A-218 T-210 PITCH TANK AGITATOR MOTOR	0 to 75 amps	Future	I004	D004
1	II-2035	PLC AI CURRENT	21	0-0	8	A-219 T-210 PITCH TANK AGITATOR MOTOR	0 to 75 amps	Future	I004	D004
1	II-2045	PLC AI CURRENT	21	0-1	1	P-220 PITCH TRANSFER PUMP MOTOR	0 to 75 amps		I004	D004
1	II-2055	PLC AI CURRENT	21	0-1	2	P-225 PITCH TRANSFER PUMP MOTOR	0 to 75 amps		I004	D004
1	II-2065	PLC AI CURRENT	21	0-1	3	P-230 PITCH TRANSFER PUMP MOTOR	0 to 75 amps	Future	I004	D004
1	TI-2085	PLC AI TEMPERATURE	21	0-1	4	SHIP UNLOADING HEADER SUPPLY	0 to 800 degF		I004	D010
1	FIC-2105	PLC AI FLOW	21	0-1	5	E-270 AHE-1000 FIRED HTF HEATER INLET	0 to 600 gpm		I004	D005
1	TI-2106	PLC AI TEMPERATURE	21	0-1	6	E-270 AHE-1000 FIRED HTF HEATER OUTLET	0 to 800 degF		I004	D005
1	LI-2124	PLC AI LEVEL	21	0-1	7	T-240 HTF EXPANSION TANK	0 to 100 %		I004	D005
1	TIC-2141	PLC AI TEMPERATURE	21	0-1	8	T-65 HOT OIL COILS SUPPLY	0 to 800 degF		I004	D009
1	TIC-2143	PLC AI TEMPERATURE	21	0-2	1	T-65 SIDEWALL HOT OIL HEATER SUPPLY	0 to 800 degF		I005	D009
1	TIC-2144	PLC AI TEMPERATURE	21	0-2	2	T-68 HOT OIL HEATER SUPPLY	0 to 800 degF		I005	D009

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Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	FIC-2145	PLC AI FLOW	21	0-2	3	E-170 AHE-700 FIRED HTF HEATER INLET	0 to 600 gpm		I005	D005
1	TIC-2146	PLC AI TEMPERATURE	21	0-2	4	RETURN	0 to 800 degF		I005	D009
1	TI-2147	PLC AI TEMPERATURE	21	0-2	5	E-170 AHE-700 FIRED HTF HEATER OUTLET	0 to 800 degF		I005	D005
1	FI-2155A	PLC AI FLOW	21	0-2	6	SHIP UNLDG TRACE HOT OIL HEADER SUPPLY	0 to 100 gpm		I005	D010
1	FI-2155B	PLC AI FLOW	21	0-2	7	SHIP UNLDG TRACE HOT OIL HEADER RETURN	0 to 100 gpm		I005	D010
1	TIC-2156	PLC AI TEMPERATURE	21	0-2	8	SHIP UNLDG TRACE HOT OIL HEADER RETURN	0 to 800 degF		I005	D006
1	TIC-2166	PLC AI TEMPERATURE	21	0-3	1	PITCH PIPG TRACE HOT OIL HEADER RETURN	0 to 800 degF		I005	D006
1	TDIC-2176A	PLC AI TEMPERATURE	21	0-3	2	E-201 & E-202 HOT OIL HEADER SUPPLY	0 to 800 degF		I005	D006
1	TDIC-2176B	PLC AI TEMPERATURE	21	0-3	3	T-200 LIQUID PITCH TANK LOWER	0 to 800 degF		I005	D006
1	TDIC-2186A	PLC AI TEMPERATURE	21	0-3	4	E-211 & E-212 HOT OIL HEADER SUPPLY	0 to 800 degF	Future	I005	D006
1	TDIC-2186B	PLC AI TEMPERATURE	21	0-3	5	T-210 LIQUID PITCH TANK LOWER	0 to 800 degF	Future	I005	D006
1	LIS-A	PLC AI LEVEL	21	0-3	6	T-68 PITCH STORAGE TANK	0 to 100 %		I005	D009
1	LIS-B	PLC AI LEVEL	21	0-3	7	T-65 PITCH STORAGE TANK	0 to 100 %		I005	D009
1	SPARE-POINT	PLC AI	21	0-3	8		-		I005	-
1	TDIC-2176C	PLC AI TEMPERATURE	21	0-4	1	T-200 LIQUID PITCH TANK UPPER	0 to 800 degF		I006	D006
1	LIS-2004	PLC AI LEVEL	21	0-4	2	T-200 LIQUID PITCH TANK	0 to 100 %		I006	D004
1	SPARE-POINT	PLC AI	21	0-4	3		-		I006	-
1	SPARE-POINT	PLC AI	21	0-4	4		-		I006	-

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Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	TDIC-2186C	PLC AI TEMPERATURE	21	0-4	5	T-210 LIQUID PITCH TANK UPPER	0 to 800 degF	Future	I006	D006
1	LIS-2024	PLC AI LEVEL	21	0-4	6	T-210 LIQUID PITCH TANK	0 to 100 %	Future	I006	D004
1	SPARE-POINT	PLC AI	21	0-4	7		-		I006	-
1	SPARE-POINT	PLC AI	21	0-4	8		-		I006	-
1	PVC-2001	PLC AO CONTROL	21	0-5	1	T-200 LIQUID PITCH TANK VENT	0 to 100 %		I006	D004
1	PVC-2003	PLC AO CONTROL	21	0-5	2	T-200 LIQUID PITCH TANK N2 BLANKET	0 to 100 %		I006	D004
1	PVC-2021	PLC AO CONTROL	21	0-5	3	T-210 LIQUID PITCH TANK VENT	0 to 100 %	Future	I006	D004
1	PVC-2023	PLC AO CONTROL	21	0-5	4	T-210 LIQUID PITCH TANK N2 BLANKET	0 to 100 %	Future	I006	D004
1	FVC-2105	PLC AO CONTROL	21	0-6	1	E-270 AHE-1000 FIRED HTF HEATER INLET	0 to 100 %		I007	D005
1	TVC-2141	PLC AO CONTROL	21	0-6	2	T-65 HOT OIL COILS SUPPLY	0 to 100 %		I007	D009
1	TVC-2143	PLC AO CONTROL	21	0-6	3	T-65 SIDEWALL HOT OIL HEATER SUPPLY	0 to 100 %		I007	D009
1	TVC-2144	PLC AO CONTROL	21	0-6	4	T-68 HOT OIL HEATER SUPPLY	0 to 100 %		I007	D009
1	FVC-2145	PLC AO CONTROL	21	0-7	1	E-170 AHE-700 FIRED HTF HEATER INLET	0 to 100 %		I007	D005
1	TVC-2146	PLC AO CONTROL	21	0-7	2	RETURN	0 to 100 %		I007	D009
1	TVC-2156	PLC AO CONTROL	21	0-7	3	SHIP UNLDG TRACE HOT OIL HEADER RETURN	0 to 100 %		I007	D006
1	TVC-2166	PLC AO CONTROL	21	0-7	4	PITCH PIPG TRACE HOT OIL HEADER RETURN	0 to 100 %		I007	D006
1	TDVC-2176	PLC AO CONTROL	21	1-0	1	E-201 & E-202 HOT OIL HEADER SUPPLY	0 to 100 %		I008	D006
1	TDVC-2186	PLC AO CONTROL	21	1-0	2	E-211 & E-212 HOT OIL HEADER SUPPLY	0 to 100 %	Future	I008	D006

Koppers010911

CONFIDENTIAL

Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	LII-A	PLC AO INDICATION	21	1-0	3	T-68 PITCH STORAGE TANK	0 to 100 %		I008	D009
1	LII-B	PLC AO INDICATION	21	1-0	4	T-65 PITCH STORAGE TANK	0 to 100 %		I008	D009
1	SPARE-POINT	PLC AO	21	1-1	1		-		I008	-
1	SPARE-POINT	PLC AO	21	1-1	2		-		I008	-
1	SPARE-POINT	PLC AO	21	1-1	3		-		I008	-
1	SPARE-POINT	PLC AO	21	1-1	4		-		I008	-
1	SPARE-POINT	PLC AO	21	1-2	1		-		I009	-
1	SPARE-POINT	PLC AO	21	1-2	2		-		I009	-
1	SPARE-POINT	PLC AO	21	1-2	3		-		I009	-
1	SPARE-POINT	PLC AO	21	1-2	4		-		I009	-
1	ZIC-2008	PLC DI 1:CLOSED	21	1-6	00	T-200 LIQUID PITCH TANK SUPPLY	-		I011	D004
1	ZIO-2008	PLC DI 1:OPENED	21	1-6	01	T-200 LIQUID PITCH TANK SUPPLY	-		I011	D004
1	ZIC-2009	PLC DI 1:CLOSED	21	1-6	02	T-200 LIQUID PITCH TANK RECIRCULATION	-		I011	D004
1	ZIO-2009	PLC DI 1:OPENED	21	1-6	03	T-200 LIQUID PITCH TANK RECIRCULATION	-		I011	D004
1	ZIC-2028	PLC DI 1:CLOSED	21	1-6	04	T-210 LIQUID PITCH TANK SUPPLY	-		I011	D004
1	ZIO-2028	PLC DI 1:OPENED	21	1-6	05	T-210 LIQUID PITCH TANK SUPPLY	-		I011	D004
1	ZIC-2029	PLC DI 1:CLOSED	21	1-6	06	T-210 LIQUID PITCH TANK RECIRCULATION	-	Future	I011	D004
1	ZIO-2029	PLC DI 1:OPENED	21	1-6	07	T-210 LIQUID PITCH TANK RECIRCULATION	-	Future	I011	D004

Koppers010912

CONFIDENTIAL

Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	ZIC-2044	PLC DI 1:CLOSED	21	1-6	10	PITCH TRANSFER HEADER OUTLET	-		I011	D004
1	ZIO-2044	PLC DI 1:OPENED	21	1-6	11	PITCH TRANSFER HEADER OUTLET	-		I011	D004
1	ZIC-2081	PLC DI 1:CLOSED	21	1-6	12	SHIP UNLOADING HEADER INLET	-		I011	D010
1	ZIO-2081	PLC DI 1:OPENED	21	1-6	13	SHIP UNLOADING HEADER INLET	-		I011	D010
1	ZIC-2082	PLC DI 1:CLOSED	21	1-6	14	SHIP UNLOADING HEADER INLET	-		I011	D010
1	ZIO-2082	PLC DI 1:OPENED	21	1-6	15	SHIP UNLOADING HEADER INLET	-		I011	D010
1	ZIC-2083	PLC DI 1:CLOSED	21	1-6	16	SHIP UNLOADING HEADER SUPPLY	-		I011	D010
1	ZIO-2083	PLC DI 1:OPENED	21	1-6	17	SHIP UNLOADING HEADER SUPPLY	-		I011	D010
1	SPARE-POINT	PLC DOP	21	1-7	00		-		I011	-
1	ZYO-2123	PLC DOP 1:OPEN	21	1-7	01	T-240 HTF EXPANSION TANK OVERFLOW	-		I011	D005
1	SPARE-POINT	PLC DOP	21	1-7	02		-		I011	-
1	ZVO-2159A	PLC DOP 1:OPEN	21	1-7	03	SHIP UNLDG TRACE HOT OIL HEADER SUPPLY	-		I011	D010
1	SPARE-POINT	PLC DOP	21	1-7	04		-		I011	-
1	ZVO-2159B	PLC DOP 1:OPEN	21	1-7	05	SHIP UNLDG TRACE HOT OIL HEADER RETURN	-		I011	D010
1	SPARE-POINT	PLC DOP	21	1-7	06		-		I011	-
1	SPARE-POINT	PLC DOP	21	1-7	07		-		I011	-
1	ZYO-2044	PLC DOP 1:OPEN	21	1-7	10	PITCH TRANSFER HEADER OUTLET	-		I011	D004
1	SPARE-POINT	PLC DOP	21	1-7	11		-		I011	-

Koppers010913

CONFIDENTIAL

Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	SPARE-POINT	PLC DOP	21	1-7	12		-		I011	-
1	SPARE-POINT	PLC DOP	21	1-7	13		-		I011	-
1	SPARE-POINT	PLC DOP	21	1-7	14		-		I011	-
1	SPARE-POINT	PLC DOP	21	1-7	15		-		I011	-
1	SPARE-POINT	PLC DOP	21	1-7	16		-		I011	-
1	SPARE-POINT	PLC DOP	21	1-7	17		-		I011	-
1	LAHH-2006	PLC DI 0:HI LEVEL	21	2-0	00	T-200 LIQUID PITCH TANK	-		I012	D004
1	LAHH-2026	PLC DI 0:HI LEVEL	21	2-0	01	T-210 LIQUID PITCH TANK	-	Future	I012	D004
1	SPARE-POINT	PLC DI	21	2-0	02		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	03		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	04		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	05		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	06		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	07		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	10		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	11		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	12		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	13		-		I012	-

Koppers010914

Koppers Industries

Portland, Oregon — November 18, 1998

Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	SPARE-POINT	PLC DI	21	2-0	14		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	15		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	16		-		I012	-
1	SPARE-POINT	PLC DI	21	2-0	17		-		I012	-
1	YI-2000	PLC DII 1:RUNNING	21	2-2	00	A-208 T-200 PITCH TANK AGITATOR MOTOR	-	Future	I013	D004
1	YI-2010	PLC DII 1:RUNNING	21	2-2	01	A-209 T-200 PITCH TANK AGITATOR MOTOR	-	Future	I013	D004
1	YI-2020	PLC DII 1:RUNNING	21	2-2	02	A-218 T-210 PITCH TANK AGITATOR MOTOR	-	Future	I013	D004
1	YI-2030	PLC DII 1:RUNNING	21	2-2	03	A-219 T-210 PITCH TANK AGITATOR MOTOR	-	Future	I013	D004
1	YI-2040	PLC DII 1:RUNNING	21	2-2	04	P-220 PITCH TRANSFER PUMP MOTOR	-		I013	D004
1	YI-2050	PLC DII 1:RUNNING	21	2-2	05	P-225 PITCH TRANSFER PUMP MOTOR	-		I013	D004
1	YI-2060	PLC DII 1:RUNNING	21	2-2	06	P-230 PITCH TRANSFER PUMP MOTOR	-	Future	I013	D004
1	YI-2070	PLC DII 1:RUNNING	21	2-2	07	P-238 PITCH EVACUATOR PUMP MOTOR	-		I013	D004
1	YI-2100	PLC DII 1:RUNNING	21	2-2	10	P-260 PRIMARY HOT OIL PUMP MOTOR	-		I013	D005
1	YI-2110	PLC DII 1:RUNNING	21	2-2	11	P-265 PRIMARY HOT OIL PUMP MOTOR	-		I013	D005
1	YI-2120	PLC DII 1:RUNNING	21	2-2	12	P-245 HOT OIL FILL & DRAIN PUMP MOTOR	-		I013	D005
1	YI-2150	PLC DII 1:RUNNING	21	2-2	13	P-275 UNLOAD LINE HOT OIL PUMP MOTOR	-		I013	D006
1	YI-2160	PLC DII 1:RUNNING	21	2-2	14	P-280 PITCH XFER LINES HOT OIL PUMP MOTOR	-		I013	D006
1	YI-2170	PLC DII 1:RUNNING	21	2-2	15	P-285 E-201 & E-202 HOT OIL PUMP MOTOR	-		I013	D006

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Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	YI-2180	PLC DII 1:RUNNING	21	2-2	16	P-290 E-211 & E-212 HOT OIL PUMP MOTOR	-		I013	D006
1	YI-2190	PLC DII 1:RUNNING	21	2-2	17	P-255 HOT OIL DRAIN TRANSFER PUMP MOTOR	-		I013	D006
1	LAS-2004	PLC DOI 1:HI LEVEL	21	2-3	00	T-200 LIQUID PITCH TANK	-		I013	D004
1	LAS-2024	PLC DOI 1:HI LEVEL	21	2-3	01	T-210 LIQUID PITCH TANK	-	Future	I013	D004
1	HSC-2082	PLC DOI 1:CLOSE	21	2-3	02	SHIP UNLOADING HEADER INLET	-		I013	D010
1	LLS-2124A	PLC DOI 0:SHUTDOWN	21	2-3	03	E-170 AHE-700 FIRED HTF HEATER	-		I013	D005
1	LLS-2124B	PLC DOI 0:SHUTDOWN	21	2-3	04	E-270 AHE-1000 FIRED HTF HEATER	-		I013	D005
1	SPARE-POINT	PLC DOI	21	2-3	05		-		I013	-
1	SPARE-POINT	PLC DOI	21	2-3	06		-		I013	-
1	SPARE-POINT	PLC DOI	21	2-3	07		-		I013	-
1	YMS-2000	PLC DOI 1:STOP	21	2-3	10	A-208 T-200 PITCH TANK AGITATOR MOTOR	-	Future	I013	D004
1	YMS-2010	PLC DOI 1:STOP	21	2-3	11	A-209 T-200 PITCH TANK AGITATOR MOTOR	-	Future	I013	D004
1	YMS-2020	PLC DOI 1:STOP	21	2-3	12	A-218 T-210 PITCH TANK AGITATOR MOTOR	-	Future	I013	D004
1	YMS-2030	PLC DOI 1:STOP	21	2-3	13	A-219 T-210 PITCH TANK AGITATOR MOTOR	-	Future	I013	D004
1	YMS-2040	PLC DOI 1:STOP	21	2-3	14	P-220 PITCH TRANSFER PUMP MOTOR	-		I013	D004
1	YMS-2050	PLC DOI 1:STOP	21	2-3	15	P-225 PITCH TRANSFER PUMP MOTOR	-		I013	D004
1	YMS-2060	PLC DOI 1:STOP	21	2-3	16	P-230 PITCH TRANSFER PUMP MOTOR	-	Future	I013	D004
1	YMS-2070	PLC DOI 1:STOP	21	2-3	17	P-238 PITCH EVACUATOR PUMP MOTOR	-		I013	D004

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CONFIDENTIAL

Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	SPARE-POINT	PLC DOI	21	2-4	00		-		I014	-
1	SPARE-POINT	PLC DOI	21	2-4	01		-		I014	-
1	SPARE-POINT	PLC DOI	21	2-4	02		-		I014	-
1	SPARE-POINT	PLC DOI	21	2-4	03		-		I014	-
1	SPARE-POINT	PLC DOI	21	2-4	04		-		I014	-
1	SPARE-POINT	PLC DOI	21	2-4	05		-		I014	-
1	SPARE-POINT	PLC DOI	21	2-4	06		-		I014	-
1	SPARE-POINT	PLC DOI	21	2-4	07		-		I014	-
1	YMS-2100	PLC DOI 1:STOP	21	2-4	10	P-260 PRIMARY HOT OIL PUMP MOTOR	-		I014	D005
1	YMS-2110	PLC DOI 1:STOP	21	2-4	11	P-265 PRIMARY HOT OIL PUMP MOTOR	-		I014	D005
1	YMS-2120	PLC DOI 1:STOP	21	2-4	12	P-245 HOT OIL FILL & DRAIN PUMP MOTOR	-		I014	D005
1	YMS-2150	PLC DOI 1:STOP	21	2-4	13	P-275 UNLOAD LINE HOT OIL PUMP MOTOR	-		I014	D006
1	YMS-2160	PLC DOI 1:STOP	21	2-4	14	P-280 PITCH XFER LINES HOT OIL PUMP MOTOR	-		I014	D006
1	YMS-2170	PLC DOI 1:STOP	21	2-4	15	P-285 E-201 & E-202 HOT OIL PUMP MOTOR	-		I014	D006
1	YMS-2180	PLC DOI 1:STOP	21	2-4	16	P-290 E-211 & E-212 HOT OIL PUMP MOTOR	-		I014	D006
1	YMS-2190	PLC DOI 1:STOP	21	2-4	17	P-255 HOT OIL DRAIN TRANSFER PUMP MOTOR	-		I014	D006
1	TO YI-2080	PLC DII 1:RUNNING	21	2-5	00	P-235 DOCK PITCH EVACUATOR PUMP MOTOR	-		I014	D010
1	SPARE-POINT	PLC DII	21	2-5	01		-		I014	-

Koppers010917

CONFIDENTIAL

Rev	Software Tag Number	Type Description	Proc.	Slot	Point	Equipment & Service	Range & Units	PLC Reference	I/O Diag	P & I Diag
1	SPARE-POINT	PLC DII	21	2-5	02		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	03		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	04		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	05		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	06		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	07		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	10		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	11		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	12		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	13		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	14		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	15		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	16		-		I014	-
1	SPARE-POINT	PLC DII	21	2-5	17		-		I014	-

Koppers010918

EQUIPMENT

Koppers010920

CONFIDENTIAL

POSITIVE DISPLACEMENT PUMP SPECIFICATION SHEET

Plant Portland, OR **Job Number** PCC-6526 **Item Number** P-220/P-225
No. Required Two **No. Operating** One and one spare P-230 Future
Service Recirculate and transfer liquid pitch to/from pitch storage tanks T-200

Representative: Fickess Pumps, Inc.
d/b/a Power Equipment Company
1651 Sunflower Road
New Brighton, PA 15066
Attention: Ed Fickess
Phone 724-452-5227
Fax 724-452-7298

Manufacturer: Viking Pumps

DESIGN DATA:

Liq. Pumped Liquid Pitch @ 380 to 420 (°F) **Design @ 550 °F Disch Pr** 225 psig
Capacity: **Normal** 300 gpm **Max Flow** 312 gpm **Minimum Flow** 300 gpm **Suct Press** 27 psig
@400F: SG 1.19 **Visc** 400cP ; **Vap Pr** ____ psia **Diff Press** 130 psi
Avail NPSH 13 Ft(Liq) **Solids** 12 wt% **Size** **Coke (1/4" max)** ____
Req'd NPSH 5.0 Ft(Liq) **Corrosive?** No **Erosive** Yes
Priming Method Flooded **Location** ____ **Altitude** 24 Ft
Cycle of Operation Intermittent **Pump RPM** 350

CHARACTERISTICS OF LIQUID (check all that apply)

Clean ____ **Gritty** X **Volatile** ____ **Entrained Air** ____
Acidulous ____ (____%) **Alkaline** ____ **pH value** ____
Lubricating X Yes ____ No
Objectionable known metals reacting with liquid Brass, Bronze

MATERIALS OF CONSTRUCTION:

Case Cast Steel **Rotor** Ductile Iron **Idler** Ductile Iron
Rotor Shaft Hardened Steel **Idler Pin Sleeve** Tungsten Carbide **Idler Pin** Steel
Bushing Tungsten Carbide **Bracket Bushing** Hardened Cast Steel

PUMP ORIENTATION (facing pump at Shaft End):

Suction Port Location **Side** 6" 150# Flanged **Right Hand** X **Left Hand** ____
Discharge Port Location **Side** 6" 150# Flanged **Right Hand** X **Left Hand** ____
Rotation (check) **Clockwise** X **CCW** ____

PUMP FEATURES (check all that apply):

General Purpose Pump ____ **Heavy Duty Pump** X
Full Jacketed Pump Yes **Jacketed: Head** ____ **Seal Chamber** ____
Special Packing By Mfg. **Multi-Ring Deep Stuffing Box Pump** ____
Manufacturer Viking Pump **Suggested Model** QS - 223
Mechanical Seal ____ **Manufacturer** ____
Relief Valve Location **On Pump Head** ____ **In Piping** X, By Purchaser
Setting 130 psig (20 psig above Discharge Head)
Ports Tapped (inches) ____ **Flanged (inches)** 150# ANSI steel 6" 150# Flanged
Hot Oil (500°F)Connections - Pump Head Two 1", Seal Three 1 1/4"all NPT.
With Calrez gasket

TYPE OF DRIVE (check all that apply) See below. Drive includes reversible motor and variable frequency drive.

Gear X **V-Belt** ____ **Flat Belt** ____
Double Reduction- Gear ____ **V-Belt & Gear** ____ **Direct Connected** ____
Chain ____ **All Weather** ____
Totally Enclosed Guard X **Single** ____ **Twin** ____ **Mult** ____ **Special** ____
Suggested Drive Model 5.08 to 1 type 'C' helical reducer. At Pump rpm of 350, Pump delivers 312 gpm.

MOTOR DATA:

CONFIDENTIAL Koppers010921

Make	Seimens	**HP**	40	**Type**	TEFC	**RPM**	1800
Phase	3	**Cycle**	60 Hz	**Volts**	230/460	**Frame**	224T

Vendor to verify HP. Motor shall be designed Duty with a Service Factor of 1.15

NET WEIGHT — SHIPPING WEIGHT

Pump, Base, Gear Box & Couplings 750 lbs
Motor 650 lbs **Total** lbs

Vendor to ship with motor, gear box, couplings, pump and Insulating Jacket mounted on base plate. Pump to be tested for flow and pressure.

ACCESSORIES & OTHER: Include insulating jacket for each pump purchased. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of 19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3", fitted to the shape of the pumps and the process and hot oil connections.

Pump motor shall be provided with reversible operating capability.

If quotation varies in any way from these specification, the exceptions must be noted.

Four sets of Operating and Maintenance Manuals, dimensioned drawings and priced spare parts shall be required.

CONFIDENTIAL Koppers010922

POSITIVE DISPLACEMENT PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number PCC-6526 Item Number P-235 and 238
No. Required Two No. Operating Two
Service Evacuate Pitch piping

Representative: Fickess Pumps, Inc.
d/b/a Power Equipment Company
1651 Sunflower Road
New Brighton, PA 15066
Attention: Ed Fickess

Phone 724-452-5227
Fax 724-452-7298

Manufacturer: Vicking Pumps

DESIGN DATA:

Liq. Pumped Liquid Pitch @ 380 to 420 (°F) Design @ 550 °F Disch Pr 225 psig
Capacity: Normal 13 gpm Max Flow 15 gpm Minimum Flow 13 gpm Suct Press 27 psig
@400F: SG 1.19 Visc 400cP ; Vap Pr ____ psia Diff Press 130 psi
Avail NPSH 13 Ft(Liq) Solids 12 wt% Size Coke (1/4" max)
Req'd NPSH 5.0 Ft(Liq) Corrosive? No Erosive Yes
Priming Method Flooded Location ____ Altitude 24 Ft
Cycle of Operation Intermittent Pump RPM 350

CHARACTERISTICS OF LIQUID (check all that apply)

Clean ____ Gritty X Volatile ____ Entrained Air ____
Acidulous ____ (____%) Alkaline ____ pH value ____
Lubricating X Yes ____ No
Objectionable known metals reacting with liquid Brass, Bronze

MATERIALS OF CONSTRUCTION:

Case Cast Steel Rotor Ductile Iron Idler Ductile Iron
Rotor Shaft Hardened Steel Idler Pin Sleeve Tungsten Carbide Idler Pin Steel
Bushing Tungsten Carbide Bracket Bushing Hardened Cast Steel

PUMP ORIENTATION (facing pump at Shaft End):

Suction Port Location Side 2" NPT Right Hand X Left Hand ____
Discharge Port Location Top 2" NPT Right Hand X Left Hand ____
Rotation (check) Clockwise X CCW ____

PUMP FEATURES (check all that apply):

General Purpose Pump ____ Heavy Duty Pump X
Full Jacketed Pump Yes Jacketed: Head ____ Seal Chamber ____
Special Packing By Mfg. Multi-Ring Deep Stuffing Box Pump ____
Manufacturer Viking Pump Suggested Model K-223
Mechanical Seal ____ Manufacturer ____
Relief Valve Location On Pump Head ____ In Piping X. By Purchaser
Setting 130 psig (20 psig above Discharge Head)
Ports Tapped (inches) ____ Flanged (inches) 150# ANSI steel 2" NPT
Hot Oil (500°F)Connections - Pump Head Two 1", Seal Three 1 1/4"all NPT.
With Calrez gasket

TYPE OF DRIVE (check all that apply) See below. Drive includes reversible motor and variable frequency drive.

Gear X V-Belt ____ Flat Belt ____
Double Reduction- Gear ____ V-Belt & Gear ____ Direct Connected ____
Chain ____ All Weather ____
Totally Enclosed Guard X Single ____ Twin ____ Mult ____ Special ____
Suggested Drive Model 7.65 to 1 type 'B' helical reducer. At Pump rpm of 155, Pump delivers 13 gpm.

MOTOR DATA:

CONFIDENTIAL Koppers010923

Make	Seimens	HP	3	Type	TEFC	RPM	1150
Phase	3	Cycle	60 Hz	Volts	230/460	Frame	213T

Vendor to verify HP. Motor shall be designed Duty with a Service Factor of 1.15

NET WEIGHT		SHIPPING WEIGHT	
Pump, Base, Gear Box & Couplings	350	lbs	
Motor	150	lbs Total	lbs

Vendor to ship with motor, gear box, couplings, pump and Insulating Jacket mounted on base plate. Pump to be tested for flow and pressure.

ACCESSORIES & OTHER: Include insulating jacket for each pump purchased. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of 19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3, fitted to the shape of the pumps and the process and hot oil connections.

Pump motor shall be provided with reversible operating capability.

If quotation varies in any way from these specification, the exceptions must be noted.

Four sets of Operating and Maintenance Manuals, dimensioned drawings and priced spare parts shall be required.

CONFIDENTIAL Koppers010924

6562AS02

CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number 6526 Item Number P-245/P-255
No. Required 2 No. Operating 2
Location HTM Fill and Drain Pump (P-245)/ HTM Drain Transfer Pump (P-255)
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped Caloria HT - 43 @ 500 (°F) Disch Pr 28 psig
Capacity: Normal 25 gpm Design 25 gpm Suct Press 0 (P-245)/ 28 (P-255) psig
@P.T.: SG 0.729 Visc 0.08 cP; Vap Pr 1.74 psia Diff Press 0 psi
@60F : SG 0.876 Visc 1.0 cP; Vap Pr _____ psia Diff Head 75 Ft
Avail NPSH _____ Ft(Liq) Solids Zero wt% Size _____
Req'd NPSH _____ Ft(Liq) Corrosive Slight Erosive _____
Priming Method Flooded Location _____ Altitude _____ Ft

PUMP SPECIFICATIONS:

Manufacturer Dean Model 3141 No. of Stages 1
Size & Type 1 x 3 x 8.5 End Suction Performance Curve _____
RPM 1750 Eff _____ % Impeller Dia.; Bid _____ Min _____ Max _____ in
BHP: @ Design _____ Max BHP Req _____ Recommend Driver HP 2
Circular No. _____ Dim Print _____ Section Drawing _____
Process Connections - Flanged - Suction 3" 300# RF Discharge 1" 300 # RF

CONSTRUCTION MATERIALS:		CONSTRUCTION FEATURES:						
Casing & Nozzle	Case Steel A-216	Case:Back Pull Out	Split	-	Horiz	Vert		
Impeller	Cast Iron	Support:	C/L		Foot		Bracket	
Casing Ring	Cast Iron	Impeller:	Open		Closed	X	Semi-Enc	
Impeller Rings	n/a	Stuff Box:	Jacket:		Air Cooled	X		
Shaft	11-13 S/S	Mech Seal			Intern	X	External	
Shaft Sleeve	n/a				Single	X	Double	
Packing Gland	n/a				Balanced	X	Unbalan	
Packing	n/a				Manufact	J. Crane	Model	Type21
Seal Cage	Ductile Iron	Bearings:Water Jacket			No	X	Yes	
Base Plate	Steel	Lubrication:			Oil		Grease	X
		Flexible Coupling:Make		TBWoods	Type	SC Spacer		
		Coupling Guard:			Yes	X	No	
		Shaft Seal Lubrication			By Product			
		Rotation from Free End						
		Connections(inches):			Suction		Discharge	

MOTOR DATA:

Make Seimans-EPACT HP 2 Type TEFC RPM 1750
Phase 3 Cycle 60 Volts 480 Frame 145T

Net Weight			Shipping Weight		
Pump, Base, Coupling	_____	lbs	Pump, Base, Coupling	_____	lbs
Motor	_____	lbs	Total	_____	lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of

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19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

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CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number 6526 Item Number P-260/265
No. Required 2 No. Operating 2
Location: HTM Primary Hot Oil Pump (P-260/265)) **NOTE: These Pumps are being provided by American Heating Company. See AS03 Spec for E-270.**
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped	Caloria HT - 43		@ 500 (°F)		Disch Pr		Max. 114	psig
Capacity:	Normal	410 gpm	Design	410 gpm	Suct Press	18	psig
@P.T.:	SG	0.729	Visc 0.08 cP;	Vap Pr	1.74 psia	Diff Press		psi
@60F :	SG	0.876	Visc 1.0 cP;	Vap Pr	psia	Diff Head	290	Ft
Avail NPSH		Ft(Liq)	Solids	Zero wt%	Size		
Req'd NPSH		Ft(Liq)	Corrosive	Slight	Erosive		
Priming Method	Flooded		Location		Altitude		Ft

PUMP SPECIFICATIONS:

Manufacturer	Dean	Model	3141	No. of Stages	1
Size & Type	3 x 4 x 8.5 End Suction	Performance Curve			
RPM	3500	Eff %	Impeller Dia.; Bid	Min	Max in
BHP: @ Design		Max BHP Req		Recommend Driver HP	50
Circular No.		Dim Print		Section Drawing	

Process Connections - Flanged - Suction 4" 300# RF Discharge 3" 300 # RF

CONSTRUCTION MATERIALS: CONSTRUCTION FEATURES:

Casing & Nozzle	Case Steel A-216	Case:Back Pull Out	Split	-	Horiz	Vert	
Impeller	Cast Iron	Support:	C/L		Foot		Bracket	
Casing Ring	Cast Iron	Impeller:	Open		Closed	X	Semi-Enc	
Impeller Rings	n/a	Stuff Box:	Jacket:		Air Cooled	X		
Shaft	11-13 S/S	Mech Seal			Intern	X	External	
Shaft Sleeve	n/a				Single	X	Double	
Packing Gland	n/a				Balanced	X	Unbalan	
Packing	n/a				Manufact	J. Crane	Model	Type21
Seal Cage	Ductile Iron	Bearings:Water Jacket			No	X	Yes	
Base Plate	Steel	Lubrication:			Oil		Grease	X
		Flexible Coupling:Make	TBWoods		Type	SC Spacer		
		Coupling Guard:			Yes	X	No	
		Shaft Seal Lubrication			By Product			
		Rotation from Free End						
		Connections(inches):			Suction		Discharge	

MOTOR DATA:

Make	Seimans-EPACT	HP	50	Type	TEFC	RPM	3500
Phase	3	Cycle	60	Volts	480	Frame	326T

Net Weight			Shipping Weight		
Pump, Base, Coupling		lbs	Pump, Base, Coupling		lbs
Motor		lbs	Total		lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket

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Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of 19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

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CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number 6526 Item Number P-275
No. Required 1 No. Operating 1
Location HTM Booster Pump - Hot Oil to Unloading Line (P-275))
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped	Caloria HT - 43			@	500	(°F)	Disch Pr		215..5	psig
Capacity:	Normal	32	gpm		Design	32	gpm	Suct Press	115	psig
@P.T.: SG	0.729	Visc	0.08	cP;	Vap Pr	1.74	psia	Diff Press		psi
@60F : SG	0.876	Visc	1.0	cP;	Vap Pr		psia	Diff Head	320	Ft
Avail NPSH		Ft(Liq)			Solids	Zero	wt%	Size		
Req'd NPSH		Ft(Liq)			Corrosive	Slight		Erosive		
Priming Method	Flooded				Location			Altitude		Ft

PUMP SPECIFICATIONS:

Manufacturer Dean Model 3141 No. of Stages 1
Size & Type 2 x 3 x 10 End Suction Performance Curve
RPM 3500 Eff % Impeller Dia.; Bid 9" Min Max in
BHP: @ Design Max BHP Req Recommend Driver HP 15
Circular No. Dim Print Section Drawing
Process Connections - Flanged - Suction 3" 300# RF Discharge 2" 300 # RF

CONSTRUCTION MATERIALS:

Casing & Nozzle	Case Steel A-216
Impeller	Cast Iron
Casing Ring	Cast Iron
Impeller Rings	n/a
Shaft	11-13 S/S
Shaft Sleeve	n/a
Packing Gland	n/a
Packing	n/a
Seal Cage	Ductile Iron
Base Plate	Steel

CONSTRUCTION FEATURES:

Case:Back Pull Out	Split	-		Horiz	Vert	
Support:	C/L		Foot		Bracket	
Impeller:	Open		Closed	X	Semi-Enc	
Stuff Box:	Jacket:		Air Cooled	X		
Mech Seal			Intern	X	External	
			Single	X	Double	
			Balanced	X	Unbalan	
		Manufact	J. Crane	Model	Type21	
Bearings:Water Jacket			No	X	Yes	
Lubrication:			Oil		Grease	X
Flexible Coupling:Make		TBWoods	Type	SC Spacer		
Coupling Guard:			Yes	X	No	
Shaft Seal Lubrication			By Product			
Rotation from Free End						
Connections(inches):			Suction		Discharge	

MOTOR DATA:

Make Seimans-EPACT HP 15 Type TEFC RPM 3500
Phase 3 Cycle 60 Volts 480 Frame 254T

Net Weight			Shipping Weight		
Pump, Base, Coupling		lbs	Pump, Base, Coupling		lbs
Motor		lbs	Total		lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of

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19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

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CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number 6526 Item Number P-280
No. Required 1 No. Operating 1
Location Pitch Transfer Line Tracing Hot Oil Booster Pump))
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped	Caloria HT - 43	@	500	(°F)	Disch Pr		141.6	psig
Capacity:	Normal	30	gpm	Design	30	gpm	Suct Press	115	psig
@P.T.: SG	0.729	Visc	0.08	cP;	Vap Pr	1.74	psia	Diff Press		psi
@60F : SG	0.876	Visc	1.0	cP;	Vap Pr		psia	Diff Head	82	Ft
Avail NPSH		Ft(Liq)			Solids	Zero	wt%	Size		
Req'd NPSH		Ft(Liq)			Corrosive	Slight		Erosive		
Priming Method	Flooded				Location			Altitude		Ft

PUMP SPECIFICATIONS:

Manufacturer Dean Model 3141 No. of Stages 1
Size & Type 2x 3 x 10 End Suction Performance Curve
RPM 1750 Eff % Impeller Dia.; Bid 9" Min Max in
BHP: @ Design Max BHP Req Recommend Driver HP 3
Circular No. Dim Print Section Drawing
Process Connections - Flanged - Suction 3" 300# RF Discharge 2" 300 # RF

CONSTRUCTION MATERIALS:		CONSTRUCTION FEATURES:						
Casing & Nozzle	Case Steel A-216	Case:Back Pull Out	Split	-	Horiz	Vert		
Impeller	Cast Iron	Support:	C/L		Foot		Bracket	
Casing Ring	Cast Iron	Impeller:	Open		Closed	X	Semi-Enc	
Impeller Rings	n/a	Stuff Box:	Jacket:		Air Cooled	X		
Shaft	11-13 S/S	Mech Seal			Intern	X	External	
Shaft Sleeve	n/a				Single	X	Double	
Packing Gland	n/a				Balanced	X	Unbalan	
Packing	n/a				Manufact	J. Crane	Model	Type21
Seal Cage	Ductile Iron	Bearings:Water Jacket			No	X	Yes	
Base Plate	Steel	Lubrication:			Oil		Grease	X
		Flexible Coupling:Make		TBWoods	Type	SC Spacer		
		Coupling Guard:			Yes	X	No	
		Shaft Seal Lubrication			By Product			
		Rotation from Free End						
		Connections(inches):			Suction		Discharge	

MOTOR DATA:

Make Seimans-EPACT HP 3 Type TEFC RPM 1750
Phase 3 Cycle 60 Volts 480 Frame 182T

Net Weight			Shipping Weight		
Pump, Base, Coupling		lbs	Pump, Base, Coupling		lbs
Motor		lbs	Total		lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of

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19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

CENTRIFUGAL PUMP SPECIFICATION SHEET

Plant Portland, OR Job Number 6526 Item Number P-285/P-290
No. Required 1 No. Operating 1 P-290 is Future
Location HTM Booster Pump - Hot Oil to E-201/202 (P-285)/ Hot Oil to Future E-211/212 (P-290))
Service Heat Transfer Media (HTM) - Exxon Caloria HT-43

OPERATING CONDITIONS:

Liq. Pumped Caloria HT - 43 @ 500 (°F) Disch Pressure 350 psig
Capacity: Normal 135 gpm (1 HTM Coil) Design 235 gpm (2 HTM Coils) Suct Press 115 psig
@P.T.: SG 0.729 Visc 0.08 cP; Vap Pr 1.74 psia Diff Press _____ psi
@60F : SG 0.876 Visc 1.0 cP; Vap Pr _____ psia Diff Head 53 Ft
Avail NPSH _____ Ft(Liq) Solids Zero wt% Size _____
Req'd NPSH _____ Ft(Liq) Corrosive Slight Erosive _____
Priming Method Flooded Location _____ Altitude _____ Ft

PUMP SPECIFICATIONS:

Manufacturer Dean Model RA - 3141 No. of Stages 1
Size & Type 3 x 4x 8 ½ End Suction Performance Curve _____
RPM 1750 Eff _____ % Impeller Dia.; Bid 7 ½ Min _____ Max 8 ½ in
BHP: @ Design _____ Max BHP Req _____ Recommend Driver HP 5
Circular No. _____ Dim Print _____ Section Drawing _____
Process Connections - Flanged - Suction 4" 300# RF Discharge 3" 300 # RF

CONSTRUCTION MATERIALS: CONSTRUCTION FEATURES:

Casing & Nozzle	Case Steel A-216	Case:Back Pull Out		Split	-	Horiz	Vert	
Impeller	Cast Iron	Support:	C/L		Foot		Bracket	
Casing Ring	Cast Iron	Impeller:	Open		Closed	X	Semi-Enc	
Impeller Rings	n/a	Stuff Box:	Jacket:		Air Cooled	X		
Shaft	11-13 S/S	Mech Seal			Intern	X	External	
Shaft Sleeve	n/a				Single	X	Double	
Packing Gland	n/a				Balanced	X	Unbalan	
Packing	n/a				Manufacturer	J. Crane	Model	Type21
Seal Cage	Ductile Iron	Bearings:Water Jacket			No	X	Yes	
Base Plate	Steel	Lubrication:			Oil		Grease	X

Flexible Coupling:Make TBWoods Type SC Spacer
Coupling Guard: Yes X No
Shaft Seal Lubrication By Product
Rotation from Free End _____
Connections(inches): Suction _____ Discharge _____

MOTOR DATA:

Make Seimans-EPACT HP 5 Type TEFC RPM 1750
Phase 3 Cycle 60 Volts 480 Frame 184T

Net Weight			Shipping Weight		
Pump, Base, Coupling	_____	lbs	Pump, Base, Coupling	_____	lbs
Motor	_____	lbs	Total	700	lbs

Special Instructions or Features:

1. Include insulating jacket for each pump. These devices shall be insulated with removable/reusable covers referred to as "Hot Cap" as manufactured by Ohio Valley Industrial Services, Inc. (412-269-0020), or "Ultra Jacket Series 1000" as manufactured by fabric Products (205-699-6171). These removable/reusable insulation jacketing are designed for 1000°F service and have a 3" fiberglass blanket (3# density), covered with a Fiberglas® lagging of

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19 oz/sq yd inner fabric and a PTEF coated and impregnated Fiberglas® 17 oz/sq yd outer fabric and secured with stainless steel grommets, Nomax Velcro and/or "D" rings, TEF-Glass 17 straps, teflon coated Fiberglas® drawcords and stainless steel pins and lacing hooks. These removable/reusable covers shall be specified to fit the contour of the device and shall overlap the adjoining metal jacketing by at least 3".

2. Vendor to ship with motor, coupling, ,pump and insulation jacket mounted on baseplate, with 4 sets of O&M manuals, dimensioned drawings and priced spare parts lists.

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CLAMP-ON HEAT TRANSFER SURFACE

Item	Plate-Type clamp-on heater suitable for HTM service to 600°F and 150 psig.	
Number	Six (6) See Tag Numbers Below	
Purpose	Maintain Tank Shell Surface hot by heating with heat transfer media (HTM)	
Manufacturer	Paul Mueller Company c/o Thermoflow Equipment 3223 Babcock Boulevard Pittsburgh, PA 15237-2886	Thomas Korenich (412) 366-2012 fax (412) 367-0842
Process	Heating Fluid	Exxon's Caloria HT 43
	Temperature	Maximum - 575°F Normal 480/520°F
	Pressure	Maximum - 200 psig Normal - 175 psig
	Flow	25 gpm
	Pressure Drop	Less than 1/2 psig
Construction	Materials	14 gauge, Carbon steel, double embossed
	Connections	Side Inlet - 1" NPS, 3000# SW Coupling Side Outlet - 1" NPS, 3000# SW Coupling
	Mueller Type	6DKR with SW at end
	Mounting	Mounting lugs and spring bolt assembly included
	Code	ASTM, Not code stamped
Shape	Units 30" by 30" for "F" & "G". 30" by 5'-6" for "C". Slotted (Cutout) to fit over OD of Shell Nozzle as below. Rolled to fit a 79' OD tank	
Nozzle TAG NUMBER's	Four units tag "F" Nozzle (4") One unit tag "G" Nozzle (4") One unit tag "C" Nozzle (6")	

For location of inlet and outlet piping and nozzle center, see drawing 6526-P012

CLAMP-ON HEAT TRANSFER SURFACE

Item	Plate-Type clamp-on heater suitable for HTM service to 600°F and 150 psig.	
Number	Five (5) See Tag Numbers Below	
Purpose	Maintain Tank Roof Nozzles hot by heating with heat transfer media (HTM)	
Manufacturer	Paul Mueller Company c/o Thermoflow Equipment 3223 Babcock Boulevard Pittsburgh, PA 15237-2886	Thomas Korenich (412) 366-2012 fax (412) 367-0842
Process	Heating Fluid	Exxon's Caloria HT 43
	Temperature	Maximum - 575°F Normal 480/520 °F
	Pressure	Maximum - 200 psig Normal - 175 psig
	Flow	25 gpm
	Pressure Drop	Less than 1/2 psig
Construction	Materials	14 gauge, Carbon steel, double embossed
	Connections	Side Inlet - 1" NPS, 3000# SW Coupling Side Outlet - 1" NPS, 3000# SW Coupling
	Mueller Type	6D with SW at end
	Mounting	Mounting lugs and spring bolt assembly included
	Code	ASTM, Not code stamped
Shape	Units to fit nozzles with extension as shown on drawing. Rolled to fit circumference of pipe size below.	
Nozzle TAG NUMBER's	One unit tag "B" Nozzle (8") One unit tag "D" Nozzle (8")	

For location of inlet and outlet piping and nozzle extension lengths, see drawing 6526-P012

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VESSEL SPECIFICATION SHEET

Plant Portland, OR Job Number 6525 Item Number T-240
No. Required One (1)) Purpose Hold Heat Transfer Media (HTM)
Location T-240 Replaces an Existing Hot Oil Expansion Tank now Sitting some 20 feet above grade on an existing structure.
Service T-240 is HTM Expansion Tank

PERFORMANCE OF UNIT:

Type (Horiz/Vert)	Horizontal		Capacity, approx.	2,000 Nominal	gal
Diameter (ID/OD)	6'	Ft	Type Heads	Flat	
St. Side Length	10'	Ft	Corrosion Allow.		in.

See Drawing #6526-A004 for T-240 Design Criteria, nozzles and location

Operating Temp.		°F	Design Temp.		°F
Operating Pressure		psig	Design Pressure		psig

CONSTRUCTION MATERIALS:
See Drawing #6526-A004 for T-240 Design Criteria, nozzles and location

FABRICATION NOTES: As per ASME Code for Unfired Pressure Vessels, latest edition, with code stamp to show maximum allowable working pressure to design temperature. Fabrication of materials not subject to pressure or code requirements as per ChemTech Std. S10-003-0 & S10-004-0, unless otherwise noted. Shell seams shall not intersect nozzle openings. Projection of nozzles and manways from outside of shell to face of flange to be 8" for insulated tanks and 6" for uninsulated tanks. Projection of head nozzles and all true locations of nozzles and attachments shall be furnished later. Flange bolt holes shall straddle horizontal & vertical centerlines unless otherwise noted.

Stress Relieve Radiograph

CONNECTIONS: ASA Safety Valve
See Drawing #6526-A004 for T-240 Design Criteria, nozzles and location

INSULATION AND COATINGS:

Thickness	None	Material	
Weatherproofing	Painting		
Painting		SSPC-SP6-63, 1 coat Red Oxide Primer	

ACCESSORIES:

Heating or Cooling			
Ladder or Stairs		None	
Anti-Swirl Baffles			
Support			
Grounding Boss		See Drawing	

SHIPMENT: Ship

Special Instructions or Features: Tanks shall be dry and sealed for shipment.

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VESSEL SPECIFICATION SHEET

Plant Portland, OR Job Number 6525 Item Number T-250
No. Required One (1)) Purpose Storage of Heat Transfer Media (HTM)
Location This Tank has been designed and built by American Heating Company, per their drawing #403-A8-6A. Modifications are required and listed below.
Service T-250 is HTM Storage Tank

PERFORMANCE OF UNIT:

Type (Horiz/Vert)	Horizontal		Capacity, approx.	2,000 Nominal	gal
Diameter (ID/OD)	4'-8"'	Ft	Type Heads	Flat	
St. Side Length	16'	Ft	Corrosion Allow.		in.

See American Heating Company Drawing #403-A8-6A for details on the original tank details.

Per ChemTech Drawing #6526-P005 the following modifications are required:

1. **Install a 2" 150# RF Flanged connection on the top of the tank**
2. **Install a 4" blind flange on the un-used bottom nozzle.**
3. **Install a plug in the un-used bottom 1 1/2" coupling.**
4. **Install one grounding boss, as shown on drawing for T-240**

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SPECIFICATION FOR BURNER REPLACEMENT FOR E-270 & OTHER INFORMATION

The hot oil heater, E-270 is an American Heating Company (Clifton, NJ) model AHE-1000-1P (10 mm Btu/hr absorption). Per American Heating Company's (AHC) drawing 403-1, the burner system supplied was an Industrial Combustion Model MPLG 125S. This natural gas fired burner is reported to have a heat release of 12.6 mm Btu/hr.

The current air pollution permit requires that the burner be replaced with a burner that limits the heat release to 8 mm Btu/hr. The specifications for this replacement natural gas fired burner are:

1. Heat release rated for 8 mm Btu/hr.
2. Minimum turndown ratio of 10 to 1. Prefer 15 to 1. Vendor to state turndown provided.
3. Non-cycling with heat absorption of 700,000 Btu/hr while maintaining a hot oil exit temperature of 525°F, while circulating 410 gpm of Exxon's Caloria HT-43 heat treansfer media at a return temperature of 450°F for a hot oil absorption of 6.87 mm Btu/hr.
4. Integrate with the burner controls and flame safeguards originally provided.
5. Attach burner to the existing mounting plate on the heater.
6. Mount controls in a NEMA 4 new or existing junction box. Complete system is to be designed for outdoor operation.
7. The blower motor, and any other motors, shall be 480 volt, TEFC motor.
8. The burner controls include transformer, etc, to operate off 480 volt power supply to system.
9. Utilize as much of the gas train safety valves as practical.
10. The burner and burner system and controls shall be suitable for outdoor use
11. The replacement burner shall have all of the same features as the originally provided burner.
12. Comply with NFPA, FM and UL.
13. The heater controls shall be operable from a local mounted control panel at the heater as well as remotely. The local panel shall include a terminal strip for connection to a remote controls by others.

Hot Oil Pumps P-260 and P-265

The hot oil heater system shall include two (2) Dean 3 x 4 x 8.5 Model 3141 pumps that require the motors to be changed from 575 volt to 480 volt, 3 phase, 60 cycle, TEFC, 50 hp, 3600 rpm motors. The pumps and motors are on separate baseplates and not piped to the skid mounted hot oil heater. The interconnecting piping, 4", is by others.

Pressure Relief Valve PSV 2104

The safety relief valve is not supplied by the E-270 vendor. This PRV will be purchased per ChemTech Spec # 6526RVHO.

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6562AS04

LIQUID NITROGEN STORAGE & EVAPORATOR SYSTEM

Applicable Equipment Numbers

E-300 Liquid Nitrogen Storage
E-310 Liquid Nitrogen Evaporator

E-300	Capacity	3,000 gallons of liquid nitrogen	
	Style	Vertical with 3 anchor pads	
E-310	Capacity	3,000 SCFH	Delivery of gas at 130 psig.

Piping for delivery, interconnection between E-300 and E-310, and nitrogen gas connetion all by supplier of system, Air Liquide. This piping and equipment shall include relief valves, liquid level indication and pressure control valves.

Connection for supply of nitrogen gas to be a Mueller 4 bolt for client to extend piping.

Air Liquide to deliver, set, anchor, pipe, and test system. Air Liquide to install fencing and gate around system.

Work by others will include the installation of a concrete foundation pad. Air Liquide shall provide foundation drawings.

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PITCH TANK HOT OIL HEATERS E-201 and E-202

Refer to ChemTech drawing 6526-A003 for arrangement and installation details.

The finned piping is being supplied by American Heating Company (AHC), Cliftion, NJ per their drawing #403-A8-4, dated 7/98.

The pipe is 3" schedule 40 with 3/4" high fins, 0.05" thick with 3 fins per inch, 28' long. Each length of pipe contains 27'-6" of finned surface. Six of these 28' sections are joined with short radius return bends to form a bundle. This configuration is referred to as a 3" x 6 x 28' bundle. AHC is supplying 4 finned pipe supports for each bundle. There are 8 of these heater bundles in the Pitch Tank, T-200, arranged in two hot oil loops. Each hot oil loop contains 4,000 ft^2 of heat transfer surface. Therefore, the total heat transfer surface in T-200 is 8,000 ft^2.

Through each loop will circulate 60 gpm of hot oil, Exxon's Caloria HT-43 heat transfer media (HTM).

	Temperature	Pressure	Flow
Rated Heat Input Based on:			
HTM inlet	550°F	50 psig	60 gpm
HTM discharge	500°F	15 psig	
Normal Operation			
HTM inlet	450°F	50 psig	60 gpm
HTM discharge	500°F	15 psig	

Pitch Temperature to Maintain 450°F

Heat Transferred per loop 700,000 Btu/hr.

The heat loss from the pitch tank, T-200 is 700,000 Btu/hr

Design basis One of the hot oil loops is sufficient to maintain the pitch temperature. The second hot oil loop is for recovery when the Hot Oil Heater may be shut down.

The design basis is a 72°F LMDT and a conservative U of 2.4 $Btu/Ft^2/°F$.

CONFIDENTIAL Koppers010945

6562AS07

STRAINER, PITCH

Item	**S-221 & S-226** = 6" **S-236 & S-239** = 2"	Pipe line basket strainer suitable for 550°F service at 130 psig.
Manufacturer	Viking Pump, Inc. c/o Power Equipment Company 1651 Sunflower Road New Brighton, PA 15066	Or approved equal Phone 724-452-5227 Fax 724-452-7298 Att: Ed Fickess
Process	Fluid Temperature Pressure	Coal Tar Pitch Maximum - 550°F Normal - 450°F Maximum - 30 psig Normal - 25 psig
Construction	Materials Seal Connections Basket Mesh Lid Removal	Ductile Iron Encapsulated Teflon 150# RF Flanged No Mesh, Stainless steel Basket Lid Ease® Design
Viking Model #	S-221 & S-226 S-236 & S-239	F-1 060-F DUC-03 0 For 6" piping Flowrate 300 gpm of 400 cp coal tar pitch F-1 020-F DUC-03 0 For 2" piping Flowrate 13 gpm of 400 cp coal tar pitch

SPECIAL ADDED HEATING JACKETS - Each Strainer shall be fitted and shipped with a plate-type clamp-on heater suitable for heat transfer media at 570°F and 150 psig.

Heating Jacket supplied by

	Paul Mueller Company c/o Thermoflow Equipment 3233 Babcock Boulevard Pittsburgh, PA 15237-2886	 Thomas Korenich 412-366-2012 - Voice 412-367-0842 - Fax
	Construction Connections Code	18 gauge on 18 gauge 304 SS throughout Side inlet - 1" NPS, 3000# SW coupling Side outlet - 1" NPS, 3000# SW coupling ASME, not code stamped

CONFIDENTIAL Koppers010947

STRAINER, HEAT TRANSFER MEDIA

for pipe 3" and smaller

Item	**S-246** @ P-245 = 3" **S-256** @ P-255 = 3" **S-276** @ P-275 = 3" **S-281** @ P-281 = 3" **S-286** @ P-285 = 3"	Pipe line basket strainer suitable for 575°F service at 130 psig.
Manufacturer	Armstrong International c/o Thermatics P.O. Box 606 Mayview & Baker Lawrence, PA 15055	Or approved equal Phone 724-746-2660 fax 724-746-5705
Process	Fluid HTM Temperature	Exxon's Caloric HT-43 Maximum - 575°F Normal - 550/500°F
	Pressure	Maximum - 115 psig Normal - 18 psig
Construction	Materials Connections Basket Mesh Screen Retainer Type	Cast Steel 600# socket weld 40 x 40 Mesh, Monel Bolted Design with gasket
Armstrong Model #		3-B6SW600 with Bolted Screen Retainer For 3" piping Maximum Flowrate 120 gpm of 1 cp HTM

CONFIDENTIAL Koppers010948

STRAINER, HEAT TRANSFER MEDIA

for pipe 4" and larger

Item	**S-261** @ P-260 = 4" **S-266** @ P-265 = 4"	Pipe line basket strainer suitable for 575°F service at 130 psig.
Manufacturer	Armstrong International c/o Thermatics P.O. Box 606 Mayview & Baker Lawrence, PA 15055	Or approved equal Phone 724-746-2660 fax 724-746-5705
Process	Fluid HTM Temperature	Exxon's Caloric HT-43 Maximum - 575°F Normal - 550/500°F
	Pressure	Maximum - 25 psig Normal - 18 psig
Construction	Materials Connections Basket Mesh Screen Retainer Type	Cast Steel 150# RF Flanged 40 x 40 Mesh, Monel Bolted Design with gasket
Armstrong Model #		4-B6FL 150 with Bolted Screen Retainer For 4" piping Flowrate 410 gpm of 1 cp

CONFIDENTIAL Koppers010949

6562AS08

PRESSURE SAFETY VALVES

PITCH SERVICE

Item	**PSV-2041**	@ P-220	Pitch Transfer Pump
	PSV-2051	@ P-225	Pitch Transfer Pump

Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26JA20L-121	With **"J"** orifice of 1.135 in^2 area
Number Required	Two	At discharge of Pump P-220 and P-225

Service	Fluid	Coal Tar Pitch, Liquid
	Temperature	Max 550°F
	Specific Gravity	1.19
	Viscosity	400 cp
	Capacity	312 gpm
	Set Pressure	130 psig
	Back Pressure	7 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	1.287 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	353 gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	2" 150# RF Flanged
	Outlet	3" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

Remarks: Include plate-type clamp-on heating jacket with 1" socket weld connections.

CONFIDENTIAL Koppers010951

PRESSURE SAFETY VALVE HEATING JACKET for PITCH PRV's

Item	– **Warmer for PSV-2041** – **Warmer for PSV-2051**	Plate-Type clamp-on heater suitable for HTM service to 600°F and 150 psig.

Purpose: Maintain relief valve temperature by heating with heat transfer media (HTM)

Manufacturer: Paul Mueller Company
c/o Thermoflow Equipment
3223 Babcock Boulevard
Pittsburgh, PA 15237-2886

Thomas Korenich
(412) 366-2012
fax (412) 367-0842

Process	Heating Fluid	Exxon's Caloria HT 43
	Temperature	Maximum - 575°F Normal 480/520 °F
	Pressure	Maximum - 200 psig Normal - 175 psig

Construction	Materials	18 gauge, 304 stainless steel
	Connections	Side Inlet - 1" NPS, 3000# SW Coupling Side Outlet - 1" NPS, 3000# SW Coupling
	Code	ASTM, Not code stamped

Remarks: Heating Jacket to be supplied with PRV above.

PRESSURE SAFETY VALVES

PITCH SERVICE

Item	– **PSV-2071**	@ P-238	Pitch Evacutator Pump
	– **PSV-2086**	@ P-235	Dock Pitch Evacutator Pump
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044		Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26DA20L-121		With **"D"** orifice of 0.11 in^2 area
Number Required	Two	One @ discharge of Pump P-238 One @ discharge of Pump P-235	
Service	Fluid		Coal Tar Pitch, Liquid
	Temperature		Max 550°F
	Specific Gravity		1.19
	Viscosity		400 cp
	Capacity		13 gpm
	Set Pressure		130 psig
	Back Pressure		7 psig (maximum)
	Over Pressure		10%
	Calc. Orifice Area		0.11 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity		26 gpm
Construction	Valve Type		Conventional
	Bonnet Type		Closed
	Cap		Screwed Cap
Connections	Inlet		1" 150# RF Flanged
	Outlet		2" 150 # RF Flanged
Materials	Body		Carbon Steel
	Sleeve Guide		Stainless Steel
	Bonnet & Cap		Carbon Steel
	Spring		Chrome Alloy
	Disc		Stainless Steel
	Nozzles		Stainless Steel

Remarks: Include plate-type clamp-on heating jacket with 1" socket weld connections.

CONFIDENTIAL Koppers010953

PRESSURE SAFETY VALVE HEATING JACKET for PITCH PRV's

Item	– **Warmer for PSV-2071** – **Warmer for PSV-2086**	Plate-Type clamp-on heater suitable for HTM service to 600°F and 150 psig.

Purpose: Maintain relief valve temperature by heating with heat transfer media (HTM)

Manufacturer: Paul Mueller Company
c/o Thermoflow Equipment
3223 Babcock Boulevard
Pittsburgh, PA 15237-2886

Thomas Korenich
(412) 366-2012
fax (412) 367-0842

Process	Heating Fluid	Exxon's Caloria HT 43
	Temperature	Maximum - 575°F Normal 480/520 °F
	Pressure	Maximum - 200 psig Normal - 175 psig

Construction	Materials	18 gauge, 304 stainless steel
	Connections	Side Inlet - 1" NPS, 3000# SW Coupling Side Outlet - 1" NPS, 3000# SW Coupling
	Code	ASTM, Not code stamped

Remarks: Heating Jacket to be supplied with PRV above.

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PRESSURE SAFETY VALVES

NITROGEN

Item	**PSV-2206** @ E-310 Exit (Nitrogen Evaporator)	
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26**D**20L-121	With **"D"** orifice of 0.11 in^2 area
Number Required	One	At discharge of Nitrogen Evaporator, E310
Service	Fluid	Nitrogen Gas
	Temperature	Ambient, 30 °F
	Specific Gravity	0.967
	Capacity	4,000 SCFH
	Set Pressure	150 psig
	Back Pressure	0 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	0.0200 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	22,000 acfh
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	1" 150# RF Flanged
	Outlet	2" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

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PRESSURE SAFETY VALVES

Item	**PSV-2104**	**Hot Oil Heater E-270 (Blocked Flow)**	
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044		Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26MA20L-121		With **"M"** orifice of 3.60 in^2 area
Number Required	One	At discharge of E-270	
Service	Fluid		Exxon Caloria HT-43
	Temperature		Max 575°F
	Specific Gravity		0.73
	Viscosity		1 cp
	Capacity		950 gpm of Hot Oil to satisfy P-260's Pump Curve
	Set Pressure		120 psig
	Back Pressure		34 psig (maximum)
	Over Pressure		10%
	Calc. Orifice Area		2.980 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity		1148 gpm
Construction	Valve Type		Conventional
	Bonnet Type		Closed
	Cap		Screwed Cap
Connections	Inlet		4" 150# RF Flanged
	Outlet		6" 150 # RF Flanged
Materials	Body		Carbon Steel
	Sleeve Guide		Stainless Steel
	Bonnet & Cap		Carbon Steel
	Spring		Chrome Alloy
	Disc		Stainless Steel
	Nozzles		Stainless Steel

CONFIDENTIAL Koppers010956

PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item **PSV-2193** **Hot Oil Thermal Relief to Expansion Tank, T-240**

Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26NA20L-121	With "N orifice of 4.34 in^2 area
Number Required	One	Hot Oil Suction Header Relief to T-240 via Existing 12" Header
Service	Fluid	Exxon Caloria HT-43
	Temperature	Max 575°F
	Specific Gravity	0.73
	Viscosity	1 cp
	Capacity	400 gpm
	Set Pressure	40 psig
	Back Pressure	34 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	3.928 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	441.955 gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	4" 150# RF Flanged
	Outlet	6" 150# RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

CONFIDENTIAL Koppers010957

PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item	**PSV-2127**	**Hot Oil Expansion Tank, T-240 Nitrogen Vent**
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26**H**A20-121 Lowest Cost 7000 or 28xx series OK	With **"H"** orifice of 0.785 in^2 area
Number Required	One	Pressure Relief of Nitrogen from T-240 Designed for Fire-Gas Expansion, ½ tank exposed.

Service	Fluid	Nitrogen gas
	Temperature	Max 500°F
	Specific Gravity	0.97 (Air=1.0)
	Viscosity	n/a
	Capacity	435 gpm displacement rate (3500 ft3/hr)
	Set Pressure	27.5 psig
	Back Pressure	0 psig (maximum)
	Over Pressure	11
	Calc. Orifice Area	0.563 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	40169 ft3/hr
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	1.5" 150# RF Flanged
	Outlet	3" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

CONFIDENTIAL Koppers010958

PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item	**PSV-2173**	**Hot Oil Pump P-285 Relief**
	PSV-2183	**(Future) Hot Oil Pump P-290 Relief**
Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26HA20L-121	With **"H"** orifice of 0.785 in^2 area
Number Required	One (Tag as PSV-2173)	Pressure & Thermal Relief of Hot Oil

Service	Fluid	Exxon Caloria HT-43
	Temperature	Max 575°F
	Specific Gravity	0.73
	Viscosity	1 cp
	Capacity	120 gpm
	Set Pressure	135 psig
	Back Pressure	120 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	0.6980 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	134.957gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	1.5" 150# RF Flanged
	Outlet	3" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

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PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item **PSV-2163** **Hot Oil Pump P-280 Relief**

Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26EA20L-121	With **"E"** orifice of 0.196 in^2 area
Number Required	One	Pressure & Thermal Relief of Hot Oil - P-280

Service	Fluid	Exxon Caloria HT-43
	Temperature	Max 575°F
	Specific Gravity	0.73
	Viscosity	1 cp
	Capacity	32 gpm
	Set Pressure	135 psig
	Back Pressure	120 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	0.186 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	33.720 gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	1" 150# RF Flanged
	Outlet	2" 150 # RF Flanged
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

CONFIDENTIAL Koppers010960

PRESSURE SAFETY VALVES

HOT OIL SERVICE

Item — **PSV-2153** **Hot Oil Pump P-275 Relief**

Manufacturer	Teledyne Farris Engineering c/o Klaus Equipment Company 2879 West Hardies Road Gibsonia, PA 15044	Do not substitute (724) 444-3420 Fax (724) 444-3425
Model Number	26GA20L-121	With **"G"** orifice of 0.503 in^2 area
Number Required	One	Pressure & Thermal Relief of Hot Oil - P-275
Service	Fluid	Exxon Caloria HT-43
	Temperature	Max 575°F
	Specific Gravity	0.73
	Viscosity	1 cp
	Capacity	150 gpm (To Satisfy Pump Curve)
	Set Pressure	145 psig
	Back Pressure	34 psig (maximum)
	Over Pressure	10%
	Calc. Orifice Area	0.416 in^2 as per ASME Sec.VII
	Maximum Relieving Capacity	181.370 gpm
Construction	Valve Type	Conventional
	Bonnet Type	Closed
	Cap	Screwed Cap
Connections	Inlet	2" 150# RF Flanged
	Outlet	3" 150 # RF Flanged
	Note: Valve Body sized larger than required for "G" orifice.	
Materials	Body	Carbon Steel
	Sleeve Guide	Stainless Steel
	Bonnet & Cap	Carbon Steel
	Spring	Chrome Alloy
	Disc	Stainless Steel
	Nozzles	Stainless Steel

CONFIDENTIAL Koppers010961

VACCUM BREAKER SPECIFICATION

Tag PSV-2128 for T-240

GENERAL	MANUFACTURER	**Protectoseal** c/o A. Blair Powell Company 210 Riverview Dr (724) 684-0100 Monessen, PA 15062
	MODEL NUMBER	Protectoseal C6242V
	ADD'L MODEL NUMBER	NONE
ELEMENT	MEASUREMENT TYPE	NONE
	BASE MATERIAL	DUCTILE IRON BODY
	COVER MATERIAL	DUCTILE IRON
	INSERT MATERIAL	316 SS INTERNALS
	VACUUM TRIM MATERIAL	TEFLON
	INLET CONNECTION	2" CLASS 150 FLANGE
	OUTLET CONNECTION	NONE
VESSEL DATA	CAPACITY	2000 gallons
	DIAMETER	6 feet
	HEIGHT	10 feet
	RATED VACUUM	5.7 In H^2O
	PRESSURE RELIEF SET AT	27.5 psig.
PROCESS CONDITIONS	FLUID	Air
	TEMPERATURE (min / max)	Ambient
	SPECIFIC GRAVITY	1
	FLASH POINT	N/A
	OPERATING PRESSURE	24 psig.
SIZING CRITERIA		FILLING EMPTYING
	FLOW RATE	820 gpm (two HTM Pumps at 410 gpm each)
	PIPE DIAMETER	2" 150# flanged
	MATERIAL BREATHING	
	THERMAL BREATHING	
	DISCHARGE TO ATMOSPHERE	
	ALLOWABLE ΔP	
ACCESSORIES	INTEGRAL FLAME ARRESTER	No

Rev	Tag Number	Equipment & Service	Set Points oz. / in²	Operating Pressure	Tank Hght	P & I Diagram
1	PSV-2128	Vacuum Breaker for T-240 (Hot Oil Expansion Tank)	2	24 psig		D005

CONFIDENTIAL Koppers010962

API STANDARD 650
STORAGE TANK
DATA SHEET

DATE "November 18, 1998
BY Lawrence A. Mack, ChemTech Consultants
FILE NO. P-CA6526
PAGE 1 OF 3

GENERAL INFORMATION (TO BE COMPLETED BY PURCHASER)

1. PURCHASER/AGENT: KOPPERS Industries, Inc. Att: Jack Stevenson
   ADDRESS: 1005 William Pitt Way
   CITY: Pittsburgh STATE: PA ZIP CODE: 15238-1312 PHONE: 412-826-3962
2. USER: KOPPERS - Liquid Pitch Ship Unloading
3. ERECTION SITE: NAME OF PLANT: KOPPERS - Liquid Pitch Unloading
   LOCATION: Portland Oregon Zip Code 97210-3663 Phone 503-286-3681
4. TANK NO.: T-200 NOMINAL CAPACITY: 2,000,000 gal NET WORKING CAPACITY: 2,017,000 gal
5. PUMPING RATES: IN: 1325 gpm OUT: 300 gpm
6. MAXIMUM OPERATING TEMPERATURE: 500 F 1.2 @ 390°F See Notes # 2
7. PRODUCT STORED: Coal tar pitch DESIGN SPECIFIC GRAVITY: 1.34 AT 15 °C
   DESIGN METAL TEMPERATURE: Max 500 Min. 20 F VAPOR PRESSURE: 5.8×10^{-2} psi @ 480°F
8. CORROSION ALLOWANCE: SHELL: 1/16" INCHES ROOF: 1/16" INCHES
   BOTTOM: 1/16" INCHES STRUCTURALS: 0 INCHES
9. SHELL DESIGN: X BASIC STANDARD 650 ___ APPENDIX A X APPENDIX F
   DESIGN PRESSURE: Minus 2" to Plus 4" WC gage
10. ROOF DESIGN: X BASIC STANDARD 650 ___ APPENDIX C (EXTERNAL FLOATING)
    ___ APPENDIX G (ALLUMINUM DOME) See Note #4. ___ APPENDIX H (INTERNAL FLOATING)
    FRANGIBLE ROOF JOINT? See Note #1. X YES ___ NO
11. ROOF DESIGN INFORMATION
    UNIFORM LIVE LOAD: PONUDS/SQUARE FOOT
    SPECIAL LOADS (PROVIDE SKETCH): POUNDS/SQUARE FOOT
    INSULATION LOAD: 6" mineral wool with corrugated aluminum jacket (2 1/2" by 5/8" corrugations) on shell and flat aluminum jacket on roof. POUNDS/SQUARE FOOT Insulation & jacket - 4 #/ft²
    MAXIMUM DESIGN ROOF TEMPERATURE: 400 F
    GASES IN THE VAPOR SPACE: air, N2, pitch fumes
12. EARTHQUAKE DESIGN? X Yes ___ NO (APPENDIX E) ROOF TIE RODS (3.10.4.5) ___ YES X NO
    SEISMIC ZONE: 3 IMPORTANCE FACTOR: 1
    ZONE FACTOR (TABLE E-2): 0.30 SITE COEFFICIENT (TABLE E-3): S4 - Note that the 1997 Uniform
13. WIND LOAD: VELOCITY: 90 MILES/HOUR Building Code, Table 16J, Section 2-30
    PROVIDE INTERMEDIATE WIND GIRDER (3.9.7)? ___ YES X NO specifies a Classification of S_4.
14. ENVIRONMENTAL EFFECTS: MAXIMUM RAINFALL: 2 INCHES/HOUR
    TOTAL SNOW ACCUMULATION: To be determined by the Portland Building Official per UBC 2-390 (UBC is the Uniform Building Code, 1997 Issue)
15. SIZE RESTRICTIONS: MAXIMUM DIAMETER: 79 FEET MAXIMUM HEIGHT: 57 feet shell height FEET
16. FOUNDATION TYPE: ___ EARTH X CONCRETE RINGWALL See Note #3. ___ OTHER

REMARKS

Note #1. Weak shell to roof connection as allowed by API-650. Typical detail of shell to roof joint is shown on drawing 6526-A002, detail #2.
Note #2. Design Sp.G. is to allow contents to cool to 15°C.
Note #3. Foundations by others.
Note #4. Deleted

CONFIDENTIAL
Koppers010963

API STANDARD 650
STORAGE TANK
DATA SHEET

DATE "November 18, 1998
BY Lawrence A. Mack, ChemTech Consultants
FILE NO. P-CA6526
PAGE 2 OF 3

OPTION 1

CONSTRUCTION DETAILS (TO BE COMPLETED BY MANUFACTURER AND/OR PURCHASER)

1. MANUFACTURER
   ADDRESS
   CITY STATE ZIP CODE PHONE
   SERIAL NO.
2. FABRICATOR
   ADDRESS
   CITY STATE ZIP CODE PHONE
   SERIAL NO.
3. MATERIAL SPECIFICATIONS: SHELL A-36 minimum
   ROOF A-36 minimum
   BOTTOM A-36 minimum
   STRUCTURALS A-36 minimum
4. NO. OF SHELL COURSES 8
5. PLATE WIDTHS AND THICKNESS (INCLUDING CORROSION ALLOWANCE), IN INCHES: Bottom up — TO BE CONFIRMED BY VENDOR

1	8' x 0.8750"		4	8' x 0.5625"		7	8' x 0.2500"	
2	8' x 0.8125"		5	8' x 0.5000"		8	0.2500"	
3	8' x 0.6875"		6	8' x 0.3750"		9		

6. TANK BOTTOM: PLATE THICKNESS 3/8 INCHES ___ LAP X BUTT SEAMS
   SLOPE See drawing 5626-A001, Plan of Floor Slope INCH PER FOOT ___ TO ___ FROM CENTER
7. MINIMUM WIDTH AND THICKNESS OF BOTTOM ANNULAR PLATES (3.5) INCHES:
8. ROOF-TO-SHELL DETAIL (FIGURE F-1) 6" minimum overhang to cover insulation. See Notes # 1 and 4
9. INTERMEDIATE WIND GIRDER? ___ YES X NO TOP WIND GIRDER FOR USE AS WALKWAY? ___ YES ___ NO
10. ROOF TYPE: X SUPPORTED ___ SELF SUPPORTED ___ FLOATING
    SLOPE OR RADIUS Cone , 3/4 in 12 INCHES
11. ROOF PLATE: THICKNESS To be determined by Tank manufacturer. INCHES ___ LAP ___ BUTT ___ JOINT
12. PAINT:
    SHELL-- EXTERIOR? ___ YES X NO INTERIOR? ___ YES X NO
    SURFACE PREPARATION
    BOTTOM-- UNDERSIDE? ___ YES X NO INTERIOR? ___ YES X NO
    SURFACE PREPARATION
    STRUCTURAL STEEL-- EXTERIOR? ___ YES X NO INTERIOR? ___ YES X NO
    SPECIFICATION Hot Dipped Galvanized. Handrail painted per OSHA. See Note #9.
13. TANK BOTTOM COATING: INTERIOR? ___ YES X NO MATERIAL
    APPLICATION SPECIFICATION
14. INSPECTION BY: SHOP FIELD X
15. WELD EXAMINATION: RADIOGRAPH X
    SUPPLEMENTARY LIQUID PENETRANT OR ULTRASONIC X
16. FILMS PROPERTY OF Purchaser
17. LEAK TESTING: BOTTOM hydro-test - See Note # 5 and 7 ROOF None
    SHELL hydro-test - See Note # 5 and 7
18. MILLTEST REPORTS: REQUIRED? X YES ___NO
    PLATE STRUCTURAL SHAPES
19. PURCHASER'S REFERENCE DRAWING Drawings 6526-A001, A002, A003 and A006
20. TANK SIZE: DIAMETER 79 FEET HEIGHT 57' Shell Height FEET
21. DATE OF STANDARD 650 EDITION/REVISION Latest

REMARKS

Note #5. Supply all blanks and gaskets for hydro-test. Shell nozzles E-1 and E-2 internal piping shall be connected to tank heating piping by others.
Note #6. Tank heating coil support pads by tank manufacturer.
Note #7. Cost of water for testing by Purchaser. Source of water may be: pumped by tank manufacturer from river, fire hydrant , or city water. Source and scope of work by tank manufacture to be determined at site visit.
Note #8. Insulation by others. Tank manufacture to supply all insulation support rings. Bottom plates shall extend at least 5" beyond shell to accommodate bottom insulation course.
Note #9. All external structural steel to be hot dipped galvanized, ASTM A-123. Galvanized handrail shall be painted yellow per OSHA.

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Kopper501096S

API STANDARD 650
STORAGE TANK
DATA SHEET

DATE "November 18, 1998
BY Lawrence A. Mack, ChemTech Consultants
FILE NO. P-CA6526
PAGE 3 OF 3

APPURTENANCES (TO BE COMPLETED BY MANUFACTURER AND/OR PURCHASER)

1. STAIRWAY STYLE: See Note #10. X CIRCULAR ___ STRAIGHT ANGLE TO HORIZONTAL By Tank Desig DEGREES
   LADDER Not required.
2. WALKWAY: WIDTH See drawing 6526-A001 See Note #10 INCHES LENGTH See drawing 6526-A001 FEET
3. DRAWOFF SUMP: None STANDARD SPECIAL
4. BOLTED DOOR SHEET ___ YES X NO (APPENDIX A TANKS ONLY) ___ RAISED ___ FLUSH
5. SCAFFOLD HITCH
6. INTERNAL PIPING: Only as required per drawings. SWING LINE SUCTION LINE
   See Note #11 & 14 HEATING COIL SURFACE AREA 6,000 SQ. FEET By Others
7. ROOF DRAIN: None required. HOSE JOINTED
   SIPHON
8. NO. AND SIZE OF SHELL MANHOLES 1 36" x 48" As shown on drawings
9. NO. AND SIZE OF ROOF MANHOLES 1 24" Manway also used as Emergency Relief.
10. SHELL NOZZLES (SEE FIGURES 3-4B,3-5, AND 3-7 AND TABLES 3-8,3-9, AND 3-10):

MARK	Number	SIZE	FLANGED			THREADED					ORIENTATION	HEIGHT FROM	SERVICE
			SGL	DBL	SPL	A	B	C	D	E	N = 0	BOTTOM	
A	1	See Note # 12, 14,											Manway
C	2	15 and 16											Outl
E1	2												Heater Inlet
E2	2												Heater Outlet
F	4												Circulation Pipe
G	1												Spare
H	4												Thermometer
J	2												Grounding Boss
K	1												Overflow

11. ROOF NOZZLES, INCLUDING VENTING CONNECTION (SEE FIGURES 3-14 AND 3-15 AND TABLES 3-16 AND 3-17):

MARK	Number	SIZE	FLANGED	THREADED	REINFORCEMENT	ORIENTATION N = 0	DISTANCE FROM CENTER	SERVICE
B	1	See Note # 12, 14						Vent
D	1	15 and 16						Inlet
M	1							Spare
N	1							Manhole & Emergency Relief
P	1							Nitrogen
R	1							High Level
S	1							Level
T	1							Gage Hatch
W	1							PT

NOTE: SKETCHES AND/OR SEPARATE SHEETS MAY BE ATTACHED TO COVER SPECIAL REQUIREMENTS.

REMARKS

Note #10. Spiral stairs, landings and platform designed and installed by tank manufacturer. However, the spiral walkway shall be bolted to clips welded to the shell and extending beyond the insulation. Allow 1/8" gap between spiral walkway steel and corrugated aluminum jacket. Bolts and nuts shall be galvanized per ASTM A-153.) The maximum distance between stair supports is 10 raisers. Handrail, treads, toe plates and landings shall conform to OSHA, including painting.

Note #11 See Note #5 for connection of hot oil heater piping. Tank manufacturer to detail and install all Hot Oil heating support pads.

Note #12. See drawings 6526-A001, A002 and A003 for nozzles sizes and dimensions from shell and roof.. Tables to be completed by tank manufacturer.

Note #13. Outlet nozzle, "C", detail #5, and "F" have been strengthened for external seismic load. Use only full strength welds for these nozzles.

Note #14. All pipe, gaskets, bolts and pipe fittings used for nozzles, or internal piping, shall conform to ASME B31.3, latest addition. Tank manufacturer shall install all internal piping and pipe supports shown on drawings, except the "heater inlet and outlet piping". Nozzles E-1 & 2 shall terminate with a beveled pipe for welding attachment by others.

Note #15. All nozzles 6" and larger shall be Standard Wall pipe unless specified otherwise on the drawings.

Note #16. Nozzles 6" and under shall be schedule 80 pipe

Note #17. Nozzles marked "C", "F" and "M" shall have a 2 foot square smooth clearance for Purchaser to attach dimpled plate coil type heating jacket.

Note #18. Anchor chairs are not shown on the drawings, but required. Space anchor chairs to avoid nozzles. Refer to drawing 6526-A006. Anchor chair design must be coordinated with the foundation designer and minimize the insulator's effort and maximize the effectiveness.

Note #.19. Tank Manufacturer to broom clean tank bottom after hydrostatic testing.

Kamerer Amos

From: Kamerer Amos
Sent: Thursday, April 10, 2003 9:42 AM
To: Fitzgerald Kevin
Cc: Dietz Jim; Hyde Leslie; Self Traci
Subject: Tank T-66 Anthracene Paste

Kevin,

I finally have all of the cost info on the cleaning, drumming, etc., on the anthracene paste sold to China Steel.

We spent a total of $48,583 for everything: labor, drums, dunnage, inland freight, container and ocean freight and hazardous disposal of 16 drums of final wash water and used PPE.

For comparison purposes, I have calculated what it would have cost to dispose of this as hazardous waste and have come up with a cost of $86,466. This includes: the same labor costs and 16 drums of hazardous waste, as above, plus 3 drop boxes of the actual PAC material, freight to Utah, Utah taxes, etc., etc.

So, this reflects a 44% savings, without any additional consideration of the reduced compliance issues that resulted.

If anyone needs any more detail, let me know.

Amos Kamerer
Phone # 503-286-3681
Fax # 503-285-2831
E-mail: Kamereras@koppers.com

CONFIDENTIAL

West Coast Marine Cleaning
™ INCORPORATED

95,232#	X .38	=	36188.16
47,616 ST	X 28	=	1333.25
2280	X 2	=	4560.00
400	X 2	=	800.00
560	X 2	=	1120.00
3	X 20	=	60.00
Drop box Cleaning	3X6X40	=	720.00
			~~$44,061.41~~ 44781
+ Drums			4,472.00
			~~$48,533.41~~
			49253

Difference — $1,086

possible — 2,436 (inc. demurrage)

EPA compliance issue's

mingling cost / incremental cost

WA 360-835-3780
Toll Free 877-WCMCINC • OR 503-285-2485

Emerald SERVICES, INC.

Invoice Number: 29112

9010 EAST MARGINAL WAY SOUTH
SUITE 200
SEATTLE, WA 98108
Tel. (206) 832-3000 Fax No. (206) 832-3030
Federal ID No. 91-1578671

Customer Service Contact: Connie Valadez
Phone No. (206) 832-3027

Invoice Date: 12/30/02

Page: 1

Customer ID: KOP700

Bill-to Address:
KOPPERS INDUSTRIES
AMOS KAMERER
7540 NW ST HELENS ROAD
PORTLAND, OR 97210

Site Address:
KOPPERS INDUSTRIES
AMOS KAMERER
7540 NW ST HELENS RD
PORTLAND
OR

Job No. 60 - 52441.11

P.O. Number 14-2-51117
Payment Term: NET30

PROVIDE LABOR, EQUIPMENT TO TRANSPORT WASTE AND DISPOSE OF WASTE
THIS IS LOAD #6

Date	Description	Ref. No.	Quantity	Unit	Unit Price	Total Price
					.38#	
12/13/02	DISPOSAL		46,420	POUND	~~0.35~~	16,247.00
	UTAH HAZ. WASTE TAX		23.5	TONS	28	658.00
	TRANSPORTATION		1	TRIP	2,280	2,280.00
	DEMURRAGE		8	HOUR	50	400.00
	BIN DROP FEE		1	EACH	560	560.00
	BIN RENTAL N/C		1	QUOTE		
	BIN LINERS		2	EACH	20	40.00
	FUEL SURCHARGE N/C			QUOTE		

DAN 4/9/03
Disposal prices up

TOTAL - 208,180 ÷ 5 TRIPS = 41,636 #

	49253
Emerald	34397
fork lift	2388
opening tank	416
	86,454

RECEIVED
JAN 3 2002
KOPPERS INDS, INC.
PORTLAND OR

Amount Subject to Sales Tax	Amount Exempt from Sales Tax
0.00	20,185.00

Subtotal:	20,185.00
Sales Tax:	0.00
Total:	20,185.00

West Coast Marine Cleaning™ INCORPORATED

T-66 TANK Recap

Product Removal	34,399
HAZ. disposal (16 drums - WASH+PPE)	9,472
Drums (300 - 233 = 67 on hand / 1 Full)	~~5,700~~ 1408
Plywood container dunnage	328
Fork lift Rental	2,398
freight - Terminal to PoFP	573
Freight - PoFP to Shanghai	3,769
	~~$ 54,639~~ 50347
	- 2,160
	~~$ 49,479~~ 48,167
TANK OPENING	416
Port Demurrage	~~1,350~~
	~~$8,583~~

43.206 MT = 95,252 #

Net Revenue $ 2160.30

Possible demurrage 15 day = 3 X 30 X 15 = $1350

WA 360-835-3780
Toll Free 877-WCMCINC • OR 503-285-2485

Mellon
Corporate Card

Mellon Financial Corporation
Suite 154-0910
500 Ross Street
Pittsburgh, PA 15262-000

no remittance required
correspondence may be sent to above address

Account Number	5405-9500-0042-6086
Memo Statement Date	03/24/2003

Accounting Code	

TJ TURNER
KOPPERS INDUSTRIES INC
7540 NW SAINT HELENS RD
PORTLAND OR 97210-3663

N03693

Post Date	Tran Date	Reference Number	Description	MCC	Amount
02-27	02-25	68421353057987114235097	ENVIROCLEAR 503-632-1681 OR	5969	100.00
03-10	03-07	67541863067004001046349	UNITED RENTALS 209-342-6450 CA	7399	2,397.64
03-19	03-17	67417343077120779513690	MR PLYWD STORE/SE STAR PORTLAND OR	5211	326.70

RECEIVED
MAR 31 2003
KOPPERS INDS, INC.
PORTLAND OR

Send Billing Inquiries To:

Mellon Financial Corporation
Suite 154-0910
500 Ross Street
Pittsburgh, PA 15262-0001

To Report Lost Or Stolen Card:

1-800-258-9275

Monthly Spending Limit: $25,000.00

Purchases +	2,824.34
Cash Advance +	.00
Cash Adv Fees +	.00
Card Fees +	.00
Misc. Fees +	.00
Credits -	.00
Total Activity for Period	$2,824.34
Number of Days In Cycle Period	30

According to the agreement between Mellon and your employer, you are NOT responsible for submitting payment on this account.
You ARE responsible for following the policies and rules for use of this card as dictated by your employer.

CONFIDENTIAL

Emerald SERVICES, INC.

9010 EAST MARGINAL WAY SOUTH
SUITE 200
SEATTLE, WA 98108
Tel. (206) 832-3000 Fax No. (206) 832-3030
Federal ID No. 91-1578671

Customer Service Contact: Connie Valadez
Phone No. (206) 832-3027

Invoice Number: 29896

Invoice Date: 03/07/03

Page: 1

Customer ID: KOP700

Bill-to Address:
KOPPERS INDUSTRIES
AMOS KAMERER
7540 NW ST HELENS ROAD
PORTLAND, OR 97210

Site Address:
TANK # 66
7540 NW ST HELENS ROAD
PORTLAND
OR

Job No. 60 - 53190

P.O. Number
Payment Term: NET30

Date	Description	Ref. No.	Quantity	Unit	Unit Price	Total Price
PROVIDE LABOR, EQUIPMENT MATERIAL TO REMOVE PRODUCT FROM TANK # 66						
02/03/03	LEAD PERSON - ST		6	HOUR	43.5	261.00
	LABORER - ST		8	HOUR	39.5	316.00
02/04/03	LABORER - ST		38	HOUR	39.5	1,501.00
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
02/05/03	LABORER - ST		30	HOUR	39.5	1,185.00
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
02/06/03	VACUUM TRUCK - SM		5	HOUR	32.95	164.75
	LABORER - ST		35	HOUR	39.5	1,382.50
	DRIVER - ST		5	HOUR	41.5	207.50
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
02/07/03	VACUUM TRUCK - SM		2	HOUR	32.95	65.90
	LABORER - ST		30	HOUR	39.5	1,185.00
	DRIVER - ST		2	HOUR	41.5	83.00
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25

Balance forward to page 2..... 7,976.65

Emerald SERVICES, INC.

Invoice Number: 29896

9010 EAST MARGINAL WAY SOUTH
SUITE 200
SEATTLE, WA 98108
Tel. (206) 832-3000 Fax No. (206) 832-3030
Federal ID No. 91-1578671

Customer Service Contact: Connie Valadez
Phone No. (206) 832-3027

Invoice Date: 03/31/03

Customer ID: KOP700

Bill-to Address:
KOPPERS INDUSTRIES
AMOS KAMERER
7540 NW ST HELENS ROAD
PORTLAND, OR 97210

Site Address:
TANK # 66
7540 NW ST HELENS ROAD
PORTLAND
OR

Job No. 60 - 53190

P.O. Number
Payment Term: NET30

Date	Description	Ref. No.	Quantity	Unit	Unit Price	Total Price
Balance forward from page 1.....						7,976.65
02/10/03	VACUUM TRUCK - SM		2	HOUR	32.95	65.90
	LABORER - ST		46	HOUR	39.5	1,817.00
	DRIVER - ST		2	HOUR	41.5	83.00
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
02/11/03	VACUUM TRUCK - SM		2	HOUR	32.95	65.90
	LABORER - ST		46	HOUR	39.5	1,817.00
	DRIVER - ST		2	HOUR	41.5	83.00
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
02/12/03	VACUUM TRUCK - SM		1	HOUR	32.95	32.95
	LABORER - ST		39	HOUR	39.5	1,540.50
	DRIVER - ST		1	HOUR	41.5	41.50
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
02/13/03	VACUUM TRUCK - SM		1	HOUR	32.95	32.95
	LABORER - ST		39	HOUR	39.5	1,540.50
	DRIVER - ST		1	HOUR	41.5	41.50
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25

Emerald SERVICES, INC.

9010 EAST MARGINAL WAY SOUTH
SUITE 200
SEATTLE, WA 98108
Tel. (206) 832-3000 Fax No. (206) 832-3030
Federal ID No. 91-1578671

Customer Service Contact: Connie Valadez
Phone No. (206) 832-3027

Invoice Number: 29896

Invoice Date: 03/31/03

Customer ID: KOP700

Bill-to Address:
KOPPERS INDUSTRIES
AMOS KAMERER
7540 NW ST HELENS ROAD
PORTLAND, OR 97210

Site Address:
TANK # 66
7540 NW ST HELENS ROAD
PORTLAND
OR

Job No. 60 - 53190

P.O. Number
Payment Term: NET30

Date	Description	Ref. No.	Quantity	Unit	Unit Price	Total Price
02/14/03	LABORER - ST		30	HOUR	39.5	1,185.00
	LEAD PERSON - ST		7	HOUR	43.5	304.50
02/17/03	LABORER - ST		24	HOUR	39.5	948.00
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
02/18/03	LABORER - ST		32	HOUR	39.5	1,264.00
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
02/19/03	LABORER - ST		24	HOUR	39.5	948.00
	LEAD PERSON - ST		8	HOUR	43.5	348.00
02/20/03	VACUUM TRUCK - SM		2	HOUR	32.95	65.90
	LABORER - ST		18	HOUR	39.5	711.00
	LABORER - OT		2	HOUR	52.25	104.50
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
	DRIVER - ST		2	HOUR	41.5	83.00
02/24/03	VACUUM TRUCK - SM		5	HOUR	32.95	164.75
	DRIVER - ST		5	HOUR	41.5	207.50

Balance forward to page 4..... 24,316.25

Emerald SERVICES, INC.

9010 EAST MARGINAL WAY SOUTH
SUITE 200
SEATTLE, WA 98108
Tel. (206) 832-3000 Fax No. (206) 832-3030
Federal ID No. 91-1578671

Customer Service Contact: Connie Valadez
Phone No. (206) 832-3027

Invoice Number: 29896

Invoice Date: 03/31/03

Customer ID: KOP700

Bill-to Address:
KOPPERS INDUSTRIES
AMOS KAMERER
7540 NW ST HELENS ROAD
PORTLAND, OR 97210

Site Address:
TANK # 66
7540 NW ST HELENS ROAD
PORTLAND
OR

Job No. 60 - 53190

P.O. Number
Payment Term: NET30

Date	Description	Ref. No.	Quantity	Unit	Unit Price	Total Price
Balance forward from page 3.....						24,316.25
	LABORER - ST		19	HOUR	39.5	750.50
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
02/25/03	VACUUM TRUCK - SM		2	HOUR	32.95	65.90
	GUZZLER/SUPERSUCKER		2	HOUR	80.5	161.00
	DRIVER - ST		4	HOUR	41.5	166.00
	LEAD PERSON - ST		8	HOUR	43.5	348.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
	LABORER - ST		17.5	HOUR	39.5	691.25
02/26/03	LEAD PERSON - ST		7	HOUR	43.5	304.50
	LABORER - ST		5	HOUR	39.5	197.50
02/28/03	AIR PAVEMENT BREAKER		1	EACH	322	322.00
	PROPANE TANK		1	MONTH	48.3	48.30
	SPACE HEATER 150,000 BTU		1	MONTH	272.55	272.55
	LABORER - ST		2	HOUR	39.5	79.00
03/03/03	LEAD PERSON - ST		6	HOUR	43.5	261.00
	LEAD PERSON - OT		1	HOUR	58.25	58.25
	LABORER - ST		16	HOUR	39.5	632.00
	MISC- SUPPLIES	SR-69027	1	EACH	2,701.25	2,701.25

Emerald SERVICES, INC.

Invoice Number: 29896

9010 EAST MARGINAL WAY SOUTH
SUITE 200
SEATTLE, WA 98108
Tel. (206) 832-3000 Fax No. (206) 832-3030
Federal ID No. 91-1578671

Customer Service Contact: Connie Valadez
Phone No. (206) 832-3027

Customer ID: KOP700

Invoice Date: 03/31/03

Bill-to Address:
KOPPERS INDUSTRIES
AMOS KAMERER
7540 NW ST HELENS ROAD
PORTLAND, OR 97210

Site Address:
TANK # 66
7540 NW ST HELENS ROAD
PORTLAND
OR

Job No. 60 - 53190

P.O. Number
Payment Term: NET30

Date	Description	Ref. No.	Quantity	Unit	Unit Price	Total Price
03/04/03	ROLL OFF (DINO)		1	HOUR	32.75	32.75
	DRIVER - ST		2	HOUR	41.5	83.00
	LABORER - OT		2	HOUR	52.25	104.50
03/05/03	LABORER - ST		4	HOUR	39.5	158.00
	LEAD PERSON - ST		6	HOUR	43.5	261.00
03/06/03	LEAD PERSON - ST		3	HOUR	43.5	130.50
	LABORER - ST		16	HOUR	39.5	632.00
03/07/03	LABORER - ST		8	HOUR	39.5	316.00
03/20/03	LABORER - ST		16	HOUR	39.5	632.00
	LABORER - OT		4	HOUR	52.25	209.00
03/21/03	CREOSOTE PPE	MF-86767	8	DRUM	240	1,920.00
	CREOSOTE	MF-86766	8	DRUM	240	1,920.00
	LABORER - ST		16	HOUR	39.5	632.00

Amount Subject to Sales Tax	Amount Exempt from Sales Tax
0.00	38,870.50

Subtotal:	38,870.50
Sales Tax:	0.00
Total:	38,870.50

KOPPERS
7540 N.W. St. Helens Rd.
Portland, Oregon 97210
Phone: (503) 286-3681
Fax: (503) 285-2831
E-mail: amos_kamerer@koppers.com

T-101

2 of 6, maybe 3

20% of Roof insulation gone

Piping is all Asbestos insulated

AMOS S. KAMERER

Kamerer Amos

From: Dietz Jim
Sent: Thursday, March 21, 2002 4:21 AM
To: Potts Mike
Cc: Kamerer Amos; HTC Analyses Team; Bachman Drew; Cameron William; Fitzgerald Kevin
Subject: RE: T-101 Ash

Mike - Thanks - can't blame us for trying. Jim

-----Original Message-----
From: Potts Mike
Sent: Thursday, March 21, 2002 7:06 AM
To: Dietz Jim
Cc: Kamerer Amos; HTC Analyses Team
Subject: RE: T-101 Ash

Jim:
I made 4 blends. They were 80% NSR/20% sludge, 70%NSR/30% sludge, 50/50 and 60% sludge/40%NSR. All blends were put in an oven at 150° F for 48 hours. After this time, they are the same as when I made them. The sludge is not going into solution.

Mike Potts

-----Original Message-----
From: Dietz Jim
Sent: Monday, March 18, 2002 1:35 PM
To: Potts Mike
Subject: RE: T-101 Ash

Mike,

Good point - I would only plan to mix NSR with this residue for shipment to Stickney. Stickney can then add it to their creosote tank for final correction with more NSR, light distillate and heavy oil. The questions are - 1) how much NSR is required to pump at 150F? 2) how much NSR, LDO and HO are required to make this pumpable mixture in-spec for P2?

Jim

-----Original Message-----
From: Potts Mike
Sent: Monday, March 18, 2002 2:31 PM
To: Dietz Jim
Subject: RE: T-101 Ash

Jim:
What do you want to make the blend from. I need to know what is available before I can figure a blend.

Mike

-----Original Message-----
From: Dietz Jim
Sent: Monday, March 18, 2002 1:18 PM
To: Potts Mike; Kamerer Amos
Cc: HTC Analyses Team
Subject: RE: T-101 Ash

Mike, Let's try to make a P2 blend from the residue and report the percentages. Jim

-----Original Message-----
From: Potts Mike
Sent: Monday, March 18, 2002 7:00 AM

CONFIDENTIAL

Kamerer Amos

From: Kamerer Amos
Sent: Thursday, February 28, 2002 1:37 PM
To: Dietz Jim
Cc: Wombles Bob; Baron Tom
Subject: Tank T-101 Samples

Jim,

We will get this sample off to HTC tomorrow, Tom it will be addressed to you. It looks like solid creosote PAC to us. Bob and Tom, this needs to be identified for possible blending with other distillate's into to a sellable product.

Regarding the tank itself, it looks like only 2 of the 6 vertical coil steam heaters are in working condition. However, it's been 15 + years since they have actually been used, so we are not sure. We could not get another measurement, so we will have to go with what we have, at about 170,000 gals. As I am sure you realize, we would have to check out all of the lines and pumps, etc. regarding their working condition before ever getting started.

Amos Kamerer
Phone # 503-286-3681
Fax # 503-285-2831
E-mail: Kamereras@koppers.com

CONFIDENTIAL Koppers010978

CONFIDENTIAL

Northwest Terminal Tank Condition Recap

Tank #	Product	Residue (gals)	Phy. State	Steam Heater Status			Comments
				Condition	Type	Pre. Washed	
1	crude tar	19,755	70% liquid	?	vertical	no	
2	crude tar	26,851	70% liquid	?	vertical	no	
3	methyl solvent	1,691	mush	leaks	horizontal	no	
4	light uncorrected creo	16,091	hard	?	horizontal	yes	
11	creosote	3,131	mush	good	vertical	yes	
17	heavy oil	425	hard	good	vertical	no	
18	NSR	2,547	hard	dead	vertical	no	
19	P & R oil	566	mush	dead	vertical	yes	
20	creosote	5,444	mush	good	vertical	yes	
23	light uncorrected creo	1,977	mush	good	vertical	yes	
34	NSR	1,585	mush	good	horizontal	yes	
39	creosote/water	????	????	dead	????	no	water added during the flood of 1996
53	creo/dirt/rock	2,400	hard	?	horizontal	no	
66	creosote	18,815	hard	dead	vertical	no	
74	mostly creo/some dirt	500	mush	?	vertical	no	
99	creosote	3,600	70% liquid	good	vertical	yes	
99	water	13,800	"	"	"	"	water added during the flood of 1996
101	creosote	169,184	hard	dead	vertical	no	

Notes:

The yes pre-washed tanks, were cleaned in 1986/87 using the same methiod now being considered, the residues shown are lower than what they were prior to this process.

Samples

All tanks have side wall suction lines, at about 12" above the bottom of the tanks, which will make it impossible to completely pump these tanks clean. Tanks T-65 and T-68 had to be cleaned using a vacuum truck before they were put into liquid pitch service.

Must of the pumps servicing these tanks are not operable.

Koppers010979

Kamerer Amos

From: Kamerer Amos
Sent: Wednesday, August 14, 2002 10:37 AM
To: Allison B Lee
Subject: RE: 2002 IUR

Lee,

Do to the Western Energy Crisis and the resulting curtailment of aluminum production through out the Pacific Northwest, we did not import any coal Tar pitch during the year 2001. What shipments that were made that year, came from inventory that was received in year 2000.

Amos

-----Original Message-----
From: Allison B Lee
Sent: Thursday, August 01, 2002 12:55 PM
To: Kamerer Amos; Probst Kevin; Geels Walt; Huschak Heath; Rutledge Ron; Shamitko Greg; Cameron William; Ultsch Thomas P
Cc: Juba Mike; Dietz Jim; Fitzgerald Kevin; Lish Steven; Weinstein Nate; Traczek Gregory; Burkhart R Jim; Tomlinson Greg
Subject: 2002 IUR
Importance: High

I wrote to each of you concerning the data development required for the 2002 on June 27th. The purpose of this note is to remind you that the required data reports for your operations must be forwarded to me no later than October 31, 2002.

Again, if you have any questions or anticipate any problems, please call me.

Post-It™ Fax Note 7671	Date 2/5/97	# of pages ▶ 1
To Amos Kamerer	From S. McKinney	
Co./Dept. Koppers Ind.	Co. Koppers Ind.	
Phone #	Phone #	
Fax # 503 285 2831	Fax # 412-826-3999	

KOPPERS INDUSTRIES

To: Amos Kamerer
From: Stacey McKinney

Location: KII-Portland
Location: KII-Harmarville

Subject: PAH's of Korean and Chinese Pitch
Date: February 5, 1997

The analyses that you requested have been completed. The following results were obtained.

Portland ID	Korean - 1	Korean - 2	Korean - 3	Korean - 4	Chinese
HTC Sample No.	Q97-159	Q97-160	Q97-161	Q97-162	Q97-167
Visc. @ 160°C, cps	1,638	1,788	1,590	1,960	1,193
Fluorene,%	ND	ND	ND	ND	ND
Phenanthrene,%	ND	ND	ND	ND	ND
Anthracene,%	1.1	.7	1.3	1.6	4.7
Fluoranthene,%	1.1	1.2	1.5	1.4	1.0
Pyrene,%	15.3	17.2	21.9	19.5	12.6
Benz (a) anthracene,%	.5	.4	.6	.5	.5
Chrysene,%	2.0	1.6	2.8	2.2	2.9
Benzo (e) pyrene,%	2.9	3.1	4.3	3.9	4.3
Benzo (b) fluoranthene,%	.6	.6	.8	.7	.6
Benzo (k) fluoranthene,%	.3	.3	.3	.3	.3
Benzo (a) pyrene,%	.8	.7	1.0	.9	.8
Dibenz anthracene,%	.1	.1	.1	.1	.1
Benzo (g,h,i) perylene,%	.3	.5	.1	.7	.1
Indeno pyrene,%	1.9	1.7	1.9	2.3	1.7

If you have any questions concerning this analysis, please call me.

Stacey

cc: E.R. McHenry
P.A. Stadel

F:\WPDOCS\MABEL\STACEY\PORTPAH.WPD

INTEROFFICE COMMUNICATION

To: J. T. Dietz
Location: K-1650
Subject: April Highlights

From: A. S. Kamerer
Location: Portland
Date: 05/04/00

PLANT OPERATIONS

S H & E

	MONTH	YTD
HOURS WORKED	1,458	8,068
LOST TIME ACCIDENTS	0	0

There were no lost time accidents or OSHA reportable incidents during the month. March completed our 21st consecutive month without any reportable incidents. The SH&E committee met this month and has begun to revise previous procedures using canned language as suggested by John Marcinowski and Traci Self. OSHA responded to last month's letter, saying that they believe the only way to remedy our air emission problems, is to install a Thermal Oxidizer. We will finish our review of this matter in early May.

SHIPMENTS/PRODUCTION

COMMODITY	UNIT	MONTH	YTD	PRIOR YTD	Inc/Dec. YTD
PENCIL PITCH	TONS	60.8	222.0	244.4	-22.4
LIQUID PITCH	TONS	2,504.2	10,359.2	12,954.7	-2,594.9
INTALCO TRANSSHIPMENT	TONS	2,070.0	8,768.9	7,741.2	+1,027.7
TOTAL LIQUID SHIPPED	TONS	4,574.2	19,128.1	20,694.8	-1,566.7
TOTAL PROCESSED	TONS	4,109.5	19,698.0	20,725.9	-1,027.9

Liquid pitch shipments were down slightly and production was down because of a 2 week delay in the liquid pitch vessel. We shipped 3 truck loads of target pencil pitch, plus 84 truck loads and 19 tank car loads of liquid pitch during the month.

MANUFACTURING COSTS (000)

MONTH			YEAR TO DATE		
ACTUAL	ESTIMATE	PROGRAM	ACTUAL	PROGRAM	+/- $
$ 164	$177	$179	$711	$721	-$10

TQM UPDATES/PRODUCTION IMPROVEMENTS

Nothing to report here.

CAPITAL PROJECTS

The radar level indicator project for tanks # T-65 and T-68 was completed during the month. As was the slow start electrical starter for the fume tank # T-102. Work on the re-insulation of tank # T-68 will start in May.

FUTURE ACTIVITIES

We are finalizing all of the activities for the semi-annual Kaiser Aluminum Quality Meeting in May, as well as our Grand Opening ceremonies on May 23rd.

SALES

ALCOA-WENATCHEE: Nothing to report here, Stickney is current with releases.

CFAC: Nothing to report here.

INTALCO: Everything is going well here, they are still adjusting to all of the changes of now being part of ALCOA.

KAISER - MEAD & TACOMA: Shipments were about normal for the month. I went to Tacoma on the 28th to take a physical inventory of the consignment pitch.

VANALCO: Nothing new to report here.

Amos S. Kamerer

cc: T.J. Turner
J. Patterson K-1600

INTEROFFICE COMMUNICATION

To: J. T. Dietz
Location: K-1650
Subject: Month Highlights
June 2000

From: A. S. Kamerer
Location: Portland
Date: 7/10/00

PLANT OPERATIONS

SAFETY/ENVIRONMENTAL

	MONTH	YTD
HOURS WORKED	1526	11133
LOST TIME ACCIDENTS	0	0

There were no lost time accidents or OSHA reportable incidents, marking our 23rd consecutive month without any reportable incidents. The SH&E committee meet during the month. We now have completed 10 of the 24 identified new procedures. We received the Notice of Noncompliance from ODEQ for last month's excursion for phenols. The ODEQ called regarding their desire that we improve the timetable for the installation of the new thermal oxidizer. We plan to respond that we will do everything possible, once we have the received the bids and place the orders for the equipment. The monthly SH&E reporting spreadsheet is attached to the cover e-mail.

SHIPMENTS/PRODUCTION

COMMODITY	UNIT	MONTH	YTD	PRIOR YTD	Inc/Dec. YTD
PENCIL PITCH	TONS	121.2	426.1	357.4	68.2
LIQUID PITCH	TONS	1931.3	14823.0	19771.4	-4948.4
INTALCO TRANSSHIPMENT	TONS	2309.7	13289.9	12612.6	-677.3
TOTAL LIQUID SHIPPED	TONS	4241.0	28112.9	32384.0	-4271.1
TOTAL PROCESSED	TONS	2938.9	28409.0	31734.3	-3325.3

Production and shipments were down as a result of Kaiser Aluminum's decision to curtail production totally at their Tacoma smelter and by about 1/3 at their Mead smelter. This will result in a 1/3 reduction of the terminal's through-put volume, for the balance of the year. As a result of this development, we have reduced our hourly staff to 4 and have gone to a 4 day work week, in an effort to reduce operating expenses. We shipped 6 truckloads of target pencil pitch, plus 78 truckloads and 18 tank carloads of liquid pitch during the month. We received a vessel with 9,446 tons of liquid pitch from Korea during the month.

MANUFACTURING COSTS (000)

MONTH			YEAR TO DATE		
ACTUAL	ESTIMATE	PROGRAM	ACTUAL	PROGRAM	+/- $
$ 175	$ 181	$ 180	$ 1,061	$ 1,080	-$ 19

TQM UPDATES/PRODUCTION IMPROVEMENTS

Work on our TQM projects have been delayed until further notice, as a result of devoting all of our efforts to the SH&E Management Program.

CAPITAL PROJECTS

Purchase orders have been placed for the back-up parts and equipment for capital # 57.

FUTURE ACTIVITIES

We are scheduled to have an internal audit the week of July 31st.

SALES

ALCOA-WENATCHEE: Nothing new to report here, Stickney is current with releases.

CFAC: Nothing to report here.

INTALCO: All is well here, they had a good June and I expect they will have a good July and August, as well. September will be off, as they will be down for 2 weeks, for maintenance purposes.

KAISER - MEAD & TACOMA: As a result of their shutdown, we are down to 3 cars per week to Mead and nothing else.

VANALCO: Nothing to report here, either.

Amos S. Kamerer

cc: T.J. Turner
J. Patterson K-1600

INTEROFFICE COMMUNICATION

To: J. T. Dietz
Location: K-1650
Subject: Monthly Highlights
May 2000

From: A. S. Kamerer
Location: Portland
Date: June 6, 2000

PLANT OPERATIONS

SAFETY/ENVIRONMENTAL

	MONTH	YTD
HOURS WORKED	1539	9607
LOST TIME ACCIDENTS	0	0

There were no lost time accidents or OSHA reportable incidents during the month. May completed our 22nd consecutive month without any reportable incidents. The SH&E committee meet during the month, revising one procedure and developing two new ones. We have now completed 7 of the 25 scheduled new procedures; the two new ones are number's 8 and 9. We submitted the Notice of Intent to Construct to ODEQ for the new thermal oxidizer during the month, there were very pleased that we have decided to proceed with this project. I expect that they will be pushing us to get this project completed as soon as possible. We had an excursion during the month on our NPDES permit. This was a result of a misunderstanding by plant personnel, regarding the actual permit limit. Thus, now that this has been clarified, I do not expect for this to happen again. The SH&E monthly reporting spreadsheet is attached.

SHIPMENTS/PRODUCTION

COMMODITY	UNIT	MONTH	YTD	PRIOR YTD	Inc/Dec. YTD
PENCIL PITCH	TONS	82.9	304.9	320.4	-15.5
LIQUID PITCH	TONS	2532.5	12891.7	15947.4	-3055.7
INTALCO TRANSSHIPMENT	TONS	2211.3	10980.2	10269.3	710.9
TOTAL LIQUID SHIPPED	TONS	4743.8	23871.9	26216.7	-2344.8
TOTAL PROCESSED	TONS	5772.1	25470.1	26409.4	-939.3

Liquid pitch shipments were right on schedule. Production was up due to getting 5 batches in for the month, which will have a negative effect on June's production. We shipped 4 truckloads of target pencil pitch, plus 91 truckloads and 17 tank carloads of liquid pitch during the month.

We held our grand opening celebration of the new liquid pitch unloading facility at the terminal on May 23rd. Fifty five guest's attended, including aluminum producers from around the Pacific Northwest, Asian pitch suppliers, local service providers, KII employee's and special guest speaker, Mike Burton, the Executive Officer of Metro, the regional government that is responsible for growth, within the metropolitan Portland area.

MANUFACTURING COSTS (000)

MONTH			YEAR TO DATE		
ACTUAL	ESTIMATE	PROGRAM	ACTUAL	PROGRAM	+/- $
$ 175	$ 173	$ 179	$ 886	$ 900	- $ 14

I have just been advised by the Tax Dept. that our monthly accrual for property taxes has been increased by $ 9,545. This is going to be a big hit for us, and will mean that we will not be able to meet our program number's, as this increase amounts to about 5.4 % of our average monthly expenses.

TQM UPDATES/PRODUCTION IMPROVEMENTS

With the grand opening celebration and all of the preparation for it, we didn't have time do anything on our TQM project during the month.

CAPITAL PROJECTS

Work was completed on the project to re-insulate the roof of tank T-68 during the month; this is the liquid pitch storage tank used for truck shipments. We are just now reviewing all of the spare part requirements, for the new liquid pitch unloading system; the PO's for this equipment should be issued within the next week.

FUTURE ACTIVITIES

We have a vessel with 9,446 tons of liquid pitch on the water, with an ETA of June 16th.

SALES

ALCOA-WENATCHEE: Don Walton came down for our grand opening. They are still getting ready for the restart of their 4th line, which is scheduled for late July. Stickney is current with releases.

CFAC: No one from CFAC was able to come to our grand opening. However, this presented the opportunity to have a couple of good talks with both purchasing and operations about how things are going with them. They are still happy with the high QI pitch from Reilly, out of Provo, however, they all acknowledge that they are concerned about the long-term situation that exists for that source. They definitely want to maintain a dialogue with us, regarding the future.

INTALCO: No one from Intalco was able to attend the grand opening, due to a conflict with some long time scheduled in-plant training requirements. Otherwise, all is going well with these folks.

KAISER - MEAD & TACOMA: We held our semi annual quality meeting with Kaiser during the month. They were nice enough to come to Portland for this meeting, to tie it into the grand opening, when it had been originally scheduled to be held at their Mead, Wash. smelter. A good meeting, nothing of any real concern developed.

VANALCO: They just announced yesterday that they would be shutting down 4 of their 5 pot lines in the coming weeks, lay off notices will be issued in the next three days. High power costs is the reason given. Vanalco gambled about five years ago and bought about 90 % of its power on the open market, and only 10 % from the BPA. Today, the open market power rates are about 3 times greater than what the BPA rates are.

Amos S. Kamerer

cc: T.J. Turner, Portland
J. Patterson, K-1600
T. Self, K-1800
M. Cilley, Stickney

INTEROFFICE COMMUNICATION

To: J. T. Dietz
Location: K-1650
Subject: Month Highlights
July 2000

From: A. S. Kamerer
Location: Portland
Date: 8/4/00

PLANT OPERATIONS

SAFETY/ENVIRONMENTAL

	MONTH	YTD
HOURS WORKED	1462	12595
LOST TIME ACCIDENTS	0	0

There were no lost time accidents or OSHA reportable incidents during the month, marking our 24th consecutive month without any reportable incidents. The SH&E committee met during the month and completed 6 new procedures, making a total of 16 completed, leaving at least 11 more to be completed by the end of the year. The monthly SH&E reporting spreadsheets are attached to the cover e-mail.

SHIPMENTS/PRODUCTION

COMMODITY	UNIT	MONTH	YTD	PRIOR YTD	Inc/Dec. YTD
PENCIL PITCH	TONS	79.0	505.1	456.4	48.7
LIQUID PITCH	TONS	1048.2	15871.2	22692.8	-6821.6
INTALCO TRANSSHIPMENT	TONS	2131.3	15421.2	14442.1	979.1
TOTAL LIQUID SHIPPED	TONS	3179.5	31292.4	37134.9	-5842.5
TOTAL PROCESSED	TONS	3960.0	32369.0	34607.2	-2238.2

Production and shipments were off as a result of Kaiser's curtailments. During my visit to the Mead smelter yesterday, the feeling was that the earliest that Mead would have any re-starts would be after the first of next year, plus, they had no feeling for when Tacoma might have any re-starts. So, for the month, we shipped 4 truckloads of target pencil pitch, plus 65 truckloads and only 12 tank carloads of liquid pitch. Effective the week starting July 16th, we reduced the hourly staff to 4 and went to a 4-day workweek. We had an internal audit the week of July 31st.

MANUFACTURING COSTS (000)

MONTH			YEAR TO DATE		
ACTUAL	ESTIMATE	PROGRAM	ACTUAL	PROGRAM	+/- $
$ 169	$ 177	$ 179	$ 1235	$ 1262	- $ 27

TQM UPDATES/PRODUCTION IMPROVEMENTS

Work on our TQM projects have been delayed until further notice, as a result of devoting all of our efforts to the SH&E Management program.

CAPITAL PROJECTS

The Spare Parts capital should be completed in September. The bids for the new thermal oxidizer are due on August 11th.

FUTURE ACTIVITIES

We have a 7,570-ton vessel of liquid pitch due in on August 18th. J. Marcinowski and T. Self will be here Tuesday the 8th for an SH&E Management meeting.

SALES

ALCOA-WENATCHEE: They re-started their 4th line during the month, bring them up to an 80 % production level. They say that they are still hearing rumors about the possible re-start of the 5th line, sometime next year.

CFAC: Nothing to report here.

INTALCO: They had a good month, as a result of them building up their green anode inventory in case of a work stoppage, their contract expires at the end of September. However, August will be off, due to their annual 2 week shut down for maintenance.

KAISER - MEAD & TACOMA: The good news here, is the signing of the one-year contract extension with a price increase and the elimination of consignment inventory.

VANALCO: They are still looking for a power contract for the future, only time will tell if they will be successful and can survive.

Amos S. Kamerer

cc: T.J. Turner
J. Patterson K-1600

MONTHLY REPORT

Safety, Health and Environmental Issues

FACILITY: Northwest Terminal, Portland, OR.

MONTH/YEAR: Jul-00

DID ANY OF THE FOLLOWING OCCUR DURING THE PAST MONTH? PROVIDE A BRIEF DESCRIPTION, WHERE APPLICABLE

This form is provided for the plant manager's use in organizing information for the monthly report. Complete and attach this form to the monthly report. If you need more room, expand in the monthly report.

	YES	NO	BRIEF DESCRIPTION OF EVENT
Accidents		X	(1)
Near Misses		X	
Odor/Noise Complaints		0	
Regulatory Agency Inspections/Inquiries/NOV's		0	
Releases		0	(1)
Permit Exceedances		0	(1)
Property Damage		0	
Crisis Management Exercises/Events		0	
Changes in plant operations impacting SH&E		0	
New best management practices established		0	
SH&E Committee meeting		X	(2)
SH&E Training Conducted		0	
SH&E Projects (please report status)		0	
New operating procedures developed	X		6 new issued, making a total of 16, with 11 remaining to be completed over the balance of the
SH&E Successes		X	
Awards received from external sources		X	
Other compliance issues			

Notes:
(1) Attach report or indicate date of prior submittal
(2) If minutes have not already been submitted, please attach them to this report

KOPPERS INDUSTRIES

Koppers Industries, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219-1800

Telephone: (412) 227-2001
Fax: (412) 227-2423

August 4, 2000

To: Amos Kamerer
Portland

From: Jim Dietz

RE: Stormwater Management Costs

Dear Amos:

As a part of the EY2K Program, we have identified stormwater management as an issue that requires your input in order to accurately place the former owner on notice. While KII's operations of our plants require Clean Water Act compliance, KII is also burdened by pre-Asset Purchase contamination as it relates to our stormwater management requirements. The former owner, Beazer East, has enjoyed the use of our capital expenditures, O&M, monitoring, and corrective actions associated with stormwater management activities, at no cost or risk to them. In many instances, the regulators have recognized the benefits of our stormwater management activities as part of Beazer's site-wide cleanup obligations.

We have decided to recoup some of these costs. In order to do so, I need your help in developing the costs that have been incurred by KII to identify KII's stormwater management activities at your plant since December 1988. You should include costs to:

- plan
- install
- operate and maintain
- monitor
- report
- pay for violations, and
- pay for corrective actions.

Some portion of these costs will then be requested from Beazer.

Please provide an itemized listing and associated costs to me by September 1, so that we may support our notice to Beazer. If you should have any questions, give me a call.

Cc:	John Kunkle	K-1600
	Randy Collins	K-1700
	Leslie Hyde	K-1800
	Rob Smith	KU Resources

INTEROFFICE COMMUNICATION

To: J. T. Dietz
Location: K-1650
Subject: Month Highlights
September 2000

From: A. S. Kamerer
Location: Portland
Date: 10/3/00

PLANT OPERATIONS

SAFETY/ENVIRONMENTAL

	MONTH	YTD
HOURS WORKED	1146	15321
LOST TIME ACCIDENTS	0	0

There were no lost time accidents or OSHA reportable incidents during the month, marking our 26th consecutive month without any reportable incidents. The SH&E committee met during the month and continued working on new procedures, completing three more; Refueling Equipment with diesel, gasoline and propane. The SH&E monthly reporting spreadsheets are attached, to the cover e-mail.

SHIPMENTS/PRODUCTION

COMMODITY	UNIT	MONTH	YTD	PRIOR YTD	Inc/Dec. YTD
PENCIL PITCH	TONS	79.5	664.6	597.1	67.5
LIQUID PITCH	TONS	1057.9	18252.5	30888.2	-12635.7
INTALCO TRANSSHIPMENT	TONS	2544.3	19684.4	18725.7	958.7
TOTAL LIQUID SHIPPED	TONS	3602.2	37936.9	49613.9	-11677.0
TOTAL PROCESSED	TONS	3789.7	40152.4	47601.7	-7449.3

Production and shipment were at expected levels, with Intalco taking a little more than normal, while building some green anode and pitch inventory. We shipped 4 truckloads of target pencil pitch, plus, 74 truckloads and 12 tank carloads of liquid pitch during the month. I expect that our actual monthly expenses will be below estimate the of $175,000.

TQM UPDATES & PRODUCTION IMPROVEMENTS

Again, work on our TQM projects have been delayed until further notice, as a result of devoting all of our efforts to the SH&E Management program.

CAPITAL PROJECTS

Both of the open capital projects; Spare Parts and New Storm Water Discharge Pump should be closed in October. Bill Meisinger is still working on the review of the bids for the new thermal oxidizer unit. We provided the ODEQ with the newly calculated air emission data for the terminal, based on the new T. O. unit. This was a requirement part of the Notice of Intent to Construct process with them. Bill is scheduled to be in Portland the w/o 10/9 to get started with the local engineering work that needs to be done, in preparation of putting the CER together.

FUTURE ACTIVITIES

We have a 9,975-ton vessel of liquid pitch that is due in late October.

SALES

ALCOA-WENATCHEE: Stickney is current with releases. We need to start working with Wenatchee now, on the scheduled switch back to Portland at the first of the year.

CFAC: Chuck has received their annual pitch supply inquiry for 2001. This is due the middle of October.

INTALCO: They had a big month, due to building some green anode and pitch inventory, in preparation of a possible work stoppage. Their labor contract expires at midnight, this Friday the 6th.

KAISER - MEAD & TACOMA: All shipments to Mead were on schedule. They have fallen behind a little with their tank car unloading and as a result have asked us to cut back shipments for the first 2 weeks of October, to 2 cars per week.

VANALCO: They closed there 5th, and last, pot line on the 15th of the month. They are still negotiating a new electrical supply contract, said to be for 5 years. This process should take several months to complete; thus any re-starts could be delayed until after the first of the next year.

Goldendale & Northwest Aluminum CO's: Both of these companies have announced production curtailments, due to the cost of electrical power. Goldendale will close 1 of 3 lines and Northwest will close 1 of 2 lines.

Amos S. Kamerer

cc: K. J. Fitzgerald, K-1600
T. J. Turner, Portland
J. Patterson, K-1650

INTEROFFICE COMMUNICATION

To: J. T. Dietz
Location: K-1650
Subject: Monthly Highlights
November 2000

From: A. S. Kamerer
Location: Portland
Date: 12/4/00

PLANT OPERATIONS

SAFETY/ENVIRONMENTAL

	MONTH	YTD
HOURS WORKED	1359	17994
LOST TIME ACCIDENTS	0	0

There were no lost time accidents or OSHA reportable incidents during the month, marking our 28th consecutive month without any reportable incidents. Also, November marked the completion of our 6th year without a lost time accident. All of us here at the terminal are very proud of this accomplishment. The SH&E committee met during the month and continued working on new procedures, completing three more; Pressure Testing of the Liquid Pitch Unloading Line, Pressure Testing of the Liquid Pitch Unloading Hoses and Tank Car Electrical Maintenance. The SH&E monthly reporting spreadsheets are attached, to the cover e-mail.

SHIPMENTS/PRODUCTION

COMMODITY	UNIT	MONTH	YTD	PRIOR YTD	Inc/Dec. YTD
PENCIL PITCH	TONS	41.3	725.9	737.9	12.0
LIQUID PITCH	TONS	1062.1	20455.1	36308.5	-15853.4
INTALCO TRANSSHIPMENT	TONS	2161.6	23805.2	22682.6	1122.6
TOTAL LIQUID SHIPPED	TONS	3223.7	44260.3	58991.1	-14730.8
TOTAL PROCESSED	TONS	3206.9	45848.6	58047.9	-12199.3

Production and shipment were pretty much as expected for the month. We shipped 2 truckloads of target pencil pitch, plus, 63 truckloads and 12 tank carloads of liquid pitch during the month. As everyone knows, our production and shipments will be further reduced in the future by 1 tank car per week, with the new cutbacks at Kaiser Aluminum. We received a 6,696 ton vessel of liquid pitch during the month. We also performed the annual required Coast Guard pressure testing of the new liquid pitch unloading line and discharge hoses during the month, without any problems. I expect that our actual monthly expenses will be slightly below our estimate of $183,000.

TQM UPDATES & PRODUCTION IMPROVEMENTS

Again, work on our TQM projects have been delayed until further notice, as a result of devoting all of our efforts to the SH&E Management program.

CAPITAL PROJECTS

We only have one open capital at this time, the New Storm Water Discharge Pump that will be completed by the end of the year. I have submitted the capital expenditure pre-authorization for the local engineering and permit issuing work that needs to be done on the new thermal oxidizer unit. Bill is still working on the review of the bids, in preparation of putting together the final CER.

FUTURE ACTIVITIES

We have a 4,700-ton vessel of liquid pitch that is due in the last week of December.

SALES

ALCOA-WENATCHEE: Stickney is current with releases. T. J. and I visited Wenatchee, separately, during the month to address the remaining issues with getting our electrical sub-contractor approved for work at the smelter. This problem will be behind us very shortly, now.

CFAC: These folks have decided to keep Reilly, Provo as their pitch supplier for next year.

INTALCO: No real issues to report here. They did call during the month to say that they noticed a drop in CH – pitch & QI data back in June and could we explain this. It turns out that they bough a new CHN analyzer in June and their results and now matching ours, when they were higher than ours with the old analyzer.

KAISER - MEAD & TACOMA: All shipments to Mead were on schedule. As I have already stated, Mead has had a further cutback in production, that will reduce our shipments to them from 3 cars to 2 cars per week.

VANALCO: It looks like these folks are headed for bankruptcy. We have worked out a deal with Reilly to store some 4,000 metric tons of Chinese pencil pitch for them here at the terminal, that is coming to us from Vanalco's storage.

Goldendale & Northwest Aluminum CO's: Nothing new to report here.

Amos S. Kamerer

cc: K. J. Fitzgerald, K-1600
T. J. Turner, Portland
J. Patterson, K-1650

KOPPERS INDUSTRIES

INTEROFFICE CORRESPONDENCE

To:	Kevin J. Fitzgerald	From:	J. T. Dietz
Location:	K-1600	Location:	K-1650
Subject:	May, 1999 Operating Report	Date:	June 10, 1999

This report summarizes the operating activities of the CM&C Division for May 1999. Each location manager's report is attached.

Safety Report:

There were six (6) lost time accidents and three (3) additional OSHA recordable incidents in the month of May. Year-to-date in 1999 there have been fourteen (14) lost time accidents and twelve (12) OSHA recordables compared to seven (7) LWD and a total of seventeen (17) recordables YTD 1998.

One lost time accident at Stickney was a back sprain from lifting that was previously counted as only an OSHA recordable in April but resulted in a lost work day in May. There were two other Stickney LWD injuries relating to an employee who fractured his ankle tripping over his own shoelace and a burn received when a carried pitch sample was spilled. We are invesitigating the burn injury sample carrying and route taken for marked hazards.

The three other LWD injuries were at Follansbee where two workers developed foot blisters and a tar stillman strained his back. We are examining the blister cases and injuring reporting procedures at Follansbee.

Monessen had two OSHA recordable involving a fall with a back injury. All other plants had no recordable or lost time injuries. Woodward had a near-miss accident when tar was splashed on an employee's face preparing to unload a railcar. First-aid was administered on site. Follansbee had a near-miss event while performing improper hot work related to maintenance. We continue to promote near-miss accident reporting/investigation as a means of learning to avoid unsafe acts or conditions prior to an event with more severe results.

As part of the Clairton Safety Team process review, the team led by Mike Juba and Steve Lish will be distributing a draft in June of revised Safe Job Procedure form with combined hot work, safe entry, and hazard recognition investigation/signoff.

Production Volumes:

The following total material was produced and shipped at all locations:

Feedstocks and Products		May 99 Prod.	May 99 Ship.	YTD Prod. Total	May 98 Prod.	YTD 1998 Totals
Coal Tar Distilled, incl. tolling	Gallons	13,683,386		58,078,386	11,695,000	55,751,000
Naphthalene Produced	Pounds	13,860,000		61,440,000	14,824,000	61,184,000
Naphthalene Processed to PA	Pounds	10,710,000		55,652,000		
Orthoxylene Processed to PA	Pounds	7,491,000		33,291,000		
Phthalic Anhydride Produced	Pounds	17,163,000	16,257,000	84,914,000	18,348,000	79,537,000
Carbon Pitch Produced	Short Tons	29,854	29,254	134,624	24,076	106,527
Carbon Pitch Melted	Short Tons	5,684	5,521	26,410	2,413	22,155
Coke Produced	Short Tons	30,319	26,958	144,182	29,985	145,301

Actual pitch shipments are reported in this table as received or production tons are used. Starting in June, all plants will report actual shipments.

Pitch shipments for the month through May 31st finished 1 car behind for orders, 15 cars behind on consignments with no realized inventory risk, and 11 cars preshipped. Reilly tolling finished 4 cars behind for each Alcan plant as a result of rail car availability and pitch silicon specs (see below). Truck shipments were made to Sebree to rebuild inventory after the outage and silicon problems were worked out. Portland and Monessen shipments were on schedule.

Stickney had to take both tar units down the second week of May to perform major repairs to No. 2 tar column and decoke No. 1 Unit tubeheater. All plant personnel are to be congratulated for their great effort in assisting and coordinating the outside repair contractors on a 24 hour basis. In addition, thanks go to Dominicque Clair for coordinating additional roofing business over the Memorial holiday weekend.

Woodward had a plugged pitch line below the flash chamber mid-week of May 14th resulting during a temporary shutdown. The plant was able to drain the pitch and waterblast the line. An additional day was taken to inspect the tar column trays for build-up. Consigment shipments to Lake Charles Carbon were delayed but cars were enroute so no inventory problems resulted.

Follansbee ran well finishing one hopper car behind for Rockdale having to catch up following the Ashland A-240 pencilling toll run. Ormet pitch was preshipped in anticipation of a strike which we have not received notification of as yet. We continue to track American Stone PSB delivery temperature following customer

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Manufacturing Costs:

The total manufacturing costs for the six CM&C operating locations was $6,479,504. This is 3.4% lower than the May estimate of $6,711,000 and 3.4% lower than program. This includes $60M in plant clean-up accrual that will be spent over the next four months.

Year-to-date manufacturing costs are $33,257,037 , or 1.1% below program and 2.4% below 1998 year-to date.

Environmental Compliance:

The were two reportable spills in May. One at Follansbee occurred when approximately 2 gallons of low boiling tar bases leaked out of a pump seal. The other spill was at Woodward when 600 gallons of roofing pitch leaked from a truck trailer split.

Clairton plant and Traci Self met with the PA DEP to propose forming a COA program for the PA tank regs. John Cox of Sweeney-Metz has completed a draft agreement for internal review and subsequent proposal to PA DEP. In-service inspections have begun the week of June 7th for completion in October.

We are continuing to review permit options at Monessen. Jim Burkhart and crew have performed steam load versus electric power study to see if boiler loads can be reduced and provide other permitting options.

I have received the spill risk assessments from each plant and are reviewing them individually for cross-risk prioritization. I should complete a total list by the end of June.

All plants filed their monthly DMRs without exceedances and no odor complaints weere received.

Personnel / Labor/ Training/ Gainsharing:

We welcome Steve Wass to Stickney as tar plant production supervisor.

George Sleime and Amos Kamerer successfully negotiated a four-year labor contract that was ratified.

CONFIDENTIAL

The Gainsharing Programs at both Clairton and Follansbee continue to yield positive results for both employees and operations. Stickney has submitted a draft of their program for company review.

Supervisor leadership training is scheduled for June 29th and 30th.

Plant TQM Activities:

Follansbee's TQM Assessment Team reviewed the acid washing system for EH&S problems. The Naphthalene Planning Team met in May.

Ollie Olvena continues to train new Stickney tar plant personnel.

Woodward started a TQM teams for waste minimization and the distillation process.

The Division Maintenance Team under Frank Brown's coordination is scheduled to restart June 17th and 18th. This team will include starting a tank car maintenance training team for customers and preparing a planned maintenance schedule for tar stills.

Capital Projects:

- Portland Liquid Pitch Ship Receiving System

Piling of the tanks started May 17th and will be completed the week of June 7th. The effect of the NW Natural/DEQ delays is the overall project is six weeks behind schedule. The mechanical work is on or slightly ahead of schedule and the electrical contractor is now working. Charlie Norris has accepted the position of construction superintendent and is closely following the contractor performance.

- USX Gary Tar Centrifuge

The system is scheduled for testing and start-up the week of June 14th with operations the week of June 21st. Stickney personnel and A&C employees have been training with Dave Wible. We are preparing the capital overrun for approval.

- Stickney PA Lonza Residue Concentrator

The basic engineering package was delivered to Stickney on schedule at the end of May. Exhauster motors were delivered to the fabricator in Italy. The civil engineering firm is contracted for the site work. Project completion is scheduled for operation 1st quarter, 2000.

- Follansbee Benzene Emissions Abatement System

The storage tank improvements and vent system upgrades still remain on budget and schedule for completion the 2nd quarter. The effluent system ventiing is fully on-line and working well. Details on the flare system rehab design remain to be completed. We have WVDEP approval for completion end of 3rd quarter. 55 Tank has been emptied and repair work is underway, however additionally requires roof rafter replacment.

- Follansbee Solvent Debenzolization Column

Column is set in place awaiting issuance of air permit by West Virginia, which became past due on April 30th. The conditions of the draft permit received in May is under dispute by KII and we have submitted a counter modification proposal. The work should be completed within two weeks given official approval. We have replaced and moved the tar acid washer controls to the 31 Still main control room and combined these duties with the 31 Still operator.

Other capitals approved in May are the Woodward API Separator Rebuild, Woodward Pump and Power Upgrade, and Replacment 31 Still Exchangers.

Year 2000 Compliance of Manufacturing Systems:

Survey of operations have been completed and remediation has started with the Follansbee Fisher-Provox DCS system with the Stickney system to be contracted in May for upgrade. All efforts are on schedule for completion for late 2nd Quarter-early 3rd Quarter, including testing.

If you have any questions, please advise.

J. T. Dietz

cc: Jim Burkhart - Monessen
Tom Golubic - Follansbee
Amos Kamerer - Portland
Mike Mancione - Stickney
Jerry Morris - Woodward
Bob Melville - Clairton

CONFIDENTIAL

11-18-97

Jim Dietz
Harmarville

Jim,
Attached is a copy of the three year pitch supply agreement we signed with the Koreans. Please review the physical and mechanical requirements pertaining to receiving liquid pitch in year 3 of the contract. Please let me know if any of these requirements presents us problems.

Thanks,

Ken

COAL TAR PITCH PURCHASE AGREEMENT

This Coal Tar Pitch Purchase Agreement is made and entered into as of 31 October 1997, by and between KEOPYUNG STEEL CHEMICAL CO., LTD, a company duly incorporated under the laws of the Republic of Korea (hereinafter called "Seller") and KOPPERS INDUSTRIES, INC., a corporation duly incorporated under the laws of the State of Pennsylvania, United States of America (hereinafter called "Buyer").

Seller hereby agrees to sell and deliver and Buyer hereby agrees to purchase and accept Coal Tar Pitch (hereinafter called "Pitch") under the following terms and conditions.

I. TERMS

This Agreement shall become effective on 1 January 1998 and remain in force through 31 December 2000, unless sooner terminated as hereinafter provided.

II. TYPE AND QUALITY OF PITCH

1. The parties agree that from 1 January 1998 to a date yet to be determined in 1999 all Pitch supplied by Seller shall be Solid Pencil Pitch. Buyer shall then give six (6) months advance notice to Seller when delivery should be switched to Liquid Pitch in 1999 to the end of this Agreement.

2. The Quality of Pitch to be supplied hereunder shall meet the specifications of the annexed Appendix "A" for Solid Pencil Pitch and Appendix "B" for Liquid Pitch.

III. WARRANTY

Seller warrants and covenants with Buyer as follows:

Seller shall deliver to Buyer title to each cargo of Pitch free and clear of all security interests, liens, charges, restrictions or encumbrances of any kind, nature or description and each cargo of Pitch shall conform to the specifications referred to under Clause II (2) of this Agreement. SELLER MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH RESPECT TO PITCH. SPECIFICALLY EXCLUDED IS ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OF PITCH SUPPLIED HEREUNDER.

IV. QUANTITY

1. Seller shall sell and Buyer shall purchase approximately 25000 metric tons of Pitch during each calendar year within the term of this Agreement.

2. Buyer herewith grants to Seller the right of first refusal before acquiring any Pitch from other parties, except from sources in the Peoples Republic of China, for resell in solid or liquid form to customers on the U.S. West Coast. Buyer also agrees not to offer or sell any Pitch in solid or liquid form to existing customers of Seller in North America.

3. Buyer shall, by notice to Seller, give an estimate of its required cargo lots and delivery dates for each calendar year by 31 October of the preceding year. This estimate may be amended by Buyer from time to time thereafter upon sixty (60) days prior written notice to Seller. Seller shall supply quantities of Pitch in accordance with Buyer,s notice as far as it is practical and provided the cargoes are evenly spread throughout the calendar year.

V. PRICE AND PAYMENT

1. The price of Pitch to be sold and purchased hereunder shall be determined under INCOTERMS 1990 in U.S. Dollars per metric ton CIF vessel in bulk at Portland OR or Longview WA, U.S.A. (hereinafter called "Discharge Port") for Solid Pencil Pitch; and in U.S. Dollars per metric FOB vessel in Kwangyang or Pohang, Korea (hereinafter called "Load Port") for Liquid Pitch.

2. The price of Pitch for each calendar year during the term of this Agreement shall be the lowest of the prices charged by Seller to its other customers in the U.S.A. for the same calendar year. Seller shall notify this price to Buyer latest by 15 January in the year when the Pitch is to be delivered. The independent, external auditor of Seller shall verify each year the above mentioned lowest price from Seller,s records and confirm this price to Buyer if so requested.

3. As soon as practical after loading the Pitch on the vessel in the Load Port, Seller shall furnish to Buyer the following documents:

   Seller,s Commercial Invoice (one original and two copies)
   Customs Invoice (One original and two copies)
   Ocean Bill of Lading (Two original B/L and two Non-negotiable B/L)
   Certificate of Origin (One Original)
   Certificate of Analysis (One original)
   Quantification Certificate (One original)
   Marine Insurance (in case of CIF delivery)

4. Buyer shall make payment against these documents in U.S. Dollars within forty-five (45) days from the date of the bill of lading by telegraphic transfer to the bank and account number indicated by Seller on the commercial invoice.

VI. DELIVERY OF PITCH , TRANSFER OF TITLE , SHIPPING AND LOADING CONDITIONS

1. Delivery of Pitch shall be made at the Load or Discharge Port as the case may be in cargo lots of 3000 to 6000 metric tons upon mutual agreement between the parties . Seller has the right to combine Solid Pencil Pitch cargoes for Buyer and other parties on the same vessels in a joint delivery schedule .

2. Title to Solid Pencil Pitch and all risks of loss or damage to such Pitch shall pass to and be borne by Buyer when the Solid Pencil Pitch crosses the ship,s rail of the Seller,s vessel at the Discharge Port .

Title to Liquid Pitch and all risks of loss and damage to such Pitch shall pass to and be borne by Buyer when the Liquid Pitch flows into the Buyer,s vessel permanent manifold at the Load Port .

3. On Solid Pencil Pitch Buyer shall be responsible to provide a safe berth in the Discharge Port for discharging the Pitch from Seller,s vessel at a minimum rate of 2000 metric tons per weather working day of twenty-four consecutive hours , Sundays and holidays included , except for non working port holidays .

Pt. of Load Use

Notice of readiness to discharge shall be tendered in free pratique during office hours after the vessel has arrived in port and is ready to discharge , whether in berth or not .

If the vessel is detained longer , Buyer shall pay demurrage to Seller and if the vessel is dispatched sooner , Seller shall pay dispatch money to Buyer as per charterparty .

Buyer's Charter?

4. On Liquid Pitch Seller shall initially assist Buyer,s contract carrier in securing from the Authority of the Load Port , approval of Buyer,s contract carrier vessel which shall be designated to load Pitch at the Load Port . After such approval has been granted Seller shall provide a safe berth for this vessel at the Load Port which has a draft of 11 meters and a total length overall of approximately 250 meters .

Vessel Limitation in Korea.

5. Seller shall provide Buyer with information known to Seller and relevant to Buyer concerning :
   (a) Restrictions applicable to Buyer,s vessels at the Load Port ;
   (b) Terminal Conditions relevant to the operations of the Buyer,s vessels ;
   (c) Requirements of any Governmental Agency with respect to the operations of the Buyer,s vessels and with respect to the safe handling and loading of Pitch at the Load port and all Load Port Regulations .

6. For each cargo of Liquid Pitch , Buyer shall nominate a vessel and laydays to Seller at least thirty (30) days before the proposed date of arrival of such nominated vessel at the Load Port . Upon Seller,s written acceptance of Buyer,s vessel and laydays , Buyer or its agent shall , not later than ten (10) days prior to the anticipated date of arrival of such vessel at the Load Port , notify Seller by facsimile transmission of the estimated time of arrival ("ETA") of Buyer,s vessel at the Load Port and thereafter shall cause the Master of such vessel to give Seller by facsimile transmission six (6) notices of ETA at the Load Port . The first such notice shall be given seven (7) days prior to the ETA The second notice shall be given five (5) days prior to the ETA , the third fourth , fifth and sixth such notice shall be given seventy-two (72) , forty-eight (48) , twenty-four (24) and twelve (12) hours , respectively , prior to the ETA . The vessel shall be liable for any direct consequences as a result of a change of ETA if such change occurs after any vessel has advised its 72 hours notice of ETA .

WHAT'S INTO PRESENT CONTRACT

7. Provided Buyer,s vessel (i) has arrived within the agreed laydays , (ii) is within the commercial limits of the Load Port , (iii) is in all respects ready to load Liquid Pitch , and (iv) has been granted free pratique , notice of readiness (NOR) may be tendered by the Master of Buyer,s vessel , and shall be accepted by Seller or its designated agents at the Load Port during office hours Sundays and holidays included , but non working port holidays are excluded .

8. Laytime at the Load Port shall commence upon whichever of the following events shall occur first :

   (a) at 1:00 p.m. if NOR is tendered during office hours prior to 12:00 p.m.
   (b) at 8:00 a.m. the next working day if NOR is tendered during office hours after 12:00 p.m. , or
   (c) upon commencement of loading of Buyer,s vessel .

   Laytime allowed for loading of Liquid Pitch shall be 300 metric tons per running hour , weather permitting , Sundays and holidays included except for non-working holidays at the Load Port . Laytime or , if the vessel is on demurrage , time on demurrage shall continue until the loading hose has been completely disconnected upon the final termination of the loading operation . Time spent at the load port proceeding from anchorage to load berth and obtaining free pratique shall not count as used laytime .

9. Seller shall pay Buyer demurrage at the rate agreed in Buyer,s charterparty with the vessel per day of twenty-four (24) hours or pro rata for any part thereof for all time used in excess of laytime allowed . For all laytime saved , Buyer shall pay Seller despatch at a rate equal to one half of the charterparty,s demurrage rate .

CONTRACT

10. Upon completion of loading , the vessel,s agent shall provide a statement of facts (SOF) which shall be signed by the Master and a representative of the Seller . Such SOF shall be conclusive evidence of the details relating to the

10. loading of such vessel and shall be used for the calculation of laytime between the parties . If the laytime calculations are found to be correct , payment of demurrage or despatch shall be made by one party to the other within a reasonable time from receipt of the laytime statement .

11. Buyer shall nominate its agent and representative at the Load Port and shall notify Seller of such nomination .

12. Seller shall deliver and load each cargo of Liquid Pitch to Buyer,s vessel,s permanent manifold as follows :

(a) All lifting and rigging equipment required for stringing the Liquid Pitch loading hoses aboard Buyer,s vessel shall be provided by Seller at its own cost , except that the device required for the support of such flexible hoses shall be installed on Buyer,s vessel in a manner that complies with the Load Port regulations .

SWIVEL CONNECTION

(b) Seller shall provide adequate pumps at the terminal to enable cargoes of Liquid Pitch to be loaded within the time allowed and shall maintain an average flow rate of not less than 300 metric tons per hour of Liquid Pitch to Buyer,s vessel storage tanks .

(c) Seller shall load Liquid Pitch at a temperature of not less than 180 C and not more than 240 C . The exact loading temperature shall be agreed to by the parties and communicated by Buyer to Buyer,s vessel .

(d) Seller shall comply with all laws of Korea for the safe loading of Liquid Pitch . In addition , both parties shall cooperate to ensure full compliance with the requirements of any environmental laws or regulations or any governmental requirements in connection with the control of pitch fume emissions or health and safety and other requirements of Liquid Pitch loading . The Buyer shall supply a vessel equipped with a system to control pitch fume emissions during loading .

KITIMAT VESSEL?

(e) If an oil based fume scrubbing system is used , and if requested by Buyer or Buyer,s vessel , Seller shall supply fresh scrubber oil and remove and dispose of pitch fume laden scrubber oil free of expense to Buyer or Buyer,s vessel . Time spent to load and to unload scrubber oil shall not count as laytime used .

BUT COUNTS IN CHARTER TIME.

(f) Seller shall maintain up-to-date Material Safety Data Sheets for Solid Pencil Pitch and Liquid Pitch and Scrubber Oil (if supplied) , including references therein to the International Maritime Organization , Korean Regulations and Classifications on Pitch and Scrubber Oil . Prior to loading Pitch , Seller shall ensure that the latest versions of such Material Safety Data Sheets are available at the Load Port and supplied to Buyer and the Master of Buyer,s vessel .

Seller guarantees its employees responsible for handling Pitch and Scrubber Oil are fully trained and knowledgeable in the loading and stowage of Pitch and Scrubber Oil . The Master of Buyer,s vessel shall be fully responsible to ensure that the crew on board such vessel shall wear adequate safety equipment when handling Pitch and Scrubber Oil . If any regulation or any applicable law relating to the loading of Pitch and Scrubber Oil is not observed at the Load Port , Seller,s Dockmaster , after sufficient warning to Buyer,s vessel , shall have the right to stop all loading operations . Time lost for any such loading stoppage shall be for Buyer,s account and laytime shall cease until recommencement of loading .

VII. WEIGHT DETERMINATION

The quantity of Pitch delivered by Seller to Buyer into each vessel shall be determined by the Korea Marine Surveyors and Sworn Measurers Corporation (KOMSA) in accordance with standard and internationally accepted practices . Each party shall be entitled , at its expense , to have a representative present during such quantity determination at the Load Port . The total quantity of Pitch loaded as determined by KOMSA shall be deemed to be prima facia correct . However , in the event that either party suspects a discrepancy or error in the measurements as determined by KOMSA , such party may request the other party to meet in good faith to determine the cause of the suspected discrepancy and to agree on the appropriate remedy or correction .

1. The gross weight of each Solid Pencil Pitch cargo shall be determined by KOMSA in the Load Port based on truck scale weights and ship,s draft survey . KOMSA will issue certificates of the official weight , cargo loading holds , and vessel cleanliness for each cargo . Seller shall cover the costs of these services by KOMSA .

2. Prior to the first delivery of Liquid Pitch under this Agreement , Buyer shall provide Seller and KOMSA the officially approved volume calibration tables of Buyer,s vessel storage tanks for the nominated quantification temperature range , so as to facilitate KOMSA,s measurements of quantities of Liquid Pitch in such storage tanks .

3. KOMSA shall ensure that Buyer,s vessel storage tanks are empty before loading of Liquid Pitch commences . Both before and after each cargo of Liquid pitch is loaded into Buyer,s vessel storage tanks , KOMSA shall measure the height of Liquid Pitch above and below the reference points in each tank as well as the temperature of the Liquid Pitch loaded into each storage tank .

4. The volume of Liquid Pitch delivered into Buyer,s vessel storage tanks shall be determined by KOMSA immediately following the loading of each cargo of Pitch at the Load Port . In determining the volume of the Liquid Pitch

4. loaded , KOMSA shall apply the height and temperature measurements for each tank taken in accordance with Clause VII. 3 above and with the calibration tables specified in Clause VII. 2 , and shall comply with the internationally recognized pitch industry standards agreed to by the parties for making such determinations .

5. Seller and Buyer agree that the relationship between density and temperature of Liquid Pitch between 180 C and 240 C will be represented by graphs agreed to by the parties . Seller shall provide KOMSA with such graphs .

6. The mass of Liquid Pitch delivered in metric tons shall be determined by KOMSA immediately following the loading of each cargo of Liquid Pitch by multiplying the volume (as determined in accordance with Clause VII. 4 above) by the applicable density taken from the density and temperature relationship graphs referred to in Clause VII. 5 above or by such other method applicable in accordance with operating procedures at the Load Port provided such other methods have been agreed to in writing by the parties .

7. Upon determination of the volume and mass of any cargo of Liquid Pitch delivered by Seller to Buyer , KOMSA shall inform Buyer of the quantity of Liquid Pitch delivered within 24 hours after Buyer,s vessel sails from the Load Port . KOMSA shall prepare a "Quantification Certificate" . Measurements in such Quantification Certificates shall be expressed in metric tons . Within four (4) business days of completion of delivery of each Liquid Pitch cargo KOMSA shall send Buyer a signed copy of the Quantification Certificate by facsimile transmission , and shall send Seller the original Quantification Certificate by express courier . Seller shall submit to Buyer the original Quantification Certificate with all other documents required by Buyer to effect payment as set forth in Clause V . of this Agreement . KOMSA,s cost and expense in preparing each Quantification Certificate for Liquid Pitch shall be borne by Seller and Buyer in equal share .

8. Notwithstanding the method of measurement and determination of volume temperature and mass stated hereunder , should future developments in technology indicate that a more accurate method is being , or may be , used by the industry for determination of the mass of Liquid Pitch delivered , then such method shall be investigated by the parties and , subject to mutual agreement by them , shall then be used by KOMSA in determining the quantity of Liquid Pitch delivered by Seller to Buyer .

VIII. SAMPLING AND ANALYSIS OF PITCH

1. Seller shall monitor the production of each cargo of Pitch and send to Buyer its "Daily Lot Test Results " in accordance with the agreed specifications based on daily liquid pitch samples taken during the distillation process .

2. During the loading of Solid Pencil Pitch into the Buyer,s vessel , Seller shall draw one increment sample from every 1000 m.t. of Pitch being emptied in the vessel holds . All these samples must be then combined into one large composite which , after thorough mixing , is to be split into three portions : the first consisting of about 4 kg shall be dispatched to Buyer , the second shall be given to KOMSA as independent reserve sample in case of a dispute and the third is to be analyzed by the Seller,s laboratory in the presence of a KOMSA representative who will also verify the final " Certificate of Analysis " issued by Seller for the whole Pitch cargo . This " Certificate of Analysis" shall be submitted to Buyer with the other documents required for payment under Clause V . Seller shall retain the remainder of its sample portion as reference for at least six months .

3. During the loading of Liquid Pitch into the Buyer,s vessel storage tanks samples shall be taken in the presence of a KOMSA representative who shall retain one portion of the final composite as independent reserve sample in case of a dispute . The sample shall be taken in accordance with procedures defined in ISO Standard 6257 - 1980 (E) and as modified and agreed to by the parties . The second portion of this composite shall be dispatched to Buyer and a third portion thereof shall be kept by Seller as reference sample for at least six months . The remainder of the samples taken shall be analyzed by the Seller,s laboratory in the presence of a KOMSA representative who will also verify the final " Certificate of Analysis " issued by Seller for the whole Pitch cargo . The costs and expenses of KOMSA for the sampling of Liquid Pitch shall be borne by Seller and Buyer in equal shares .

IX. CLAIMS

Seller shall not be liable for any claims relating to the quality of Pitch delivered unless they are made not later than three (3) months after receipt of the Pitch and due opportunity has been given for investigation by Seller,s own representatives .

Buyer reserves the right to reject any Pitch failing to conform to the specifications listed in the annexed Appendix "A' or "B" , as the case requires , and to return such off -specification Pitch at Seller,s expense . In case of a disagreement on the analysis an independent analyst shall be selected by the parties whose findings shall be accepted as final and binding ; the costs thereof are to be borne by the party with the results furthest from the independent analysis .

X. ASSIGNMENT

This Agreement shall not be assignable by either party without prior written consent of the other , except that either party may assign this Agreement to any affiliated company (i.e. , one in which the assignor or its parent company controls the majority of voting stock) provided that in such event the assignor shall remain bound by the terms of the Agreement together with the assignee .

XI. FORCE MAJEURE

1. Neither Buyer nor Seller shall be liable for any delay or failure in fulfilling its obligations under this Agreement for any cause not reasonably under its control , including (but without prejudice to the generality of the foregoing) accident breakdown of plant , riot , rebellion , civic commotion , sabotage , order or judgment of any court granted in any legal proceedings , interference by labour , strikes , lockouts , stoppages of labour , fire , wind , lightning , flood , shortage of water or energy or raw materials or act of God .

2. Any event described above which affects all Buyer,s customers of Pitch in the U.S. Pacific Northwest region , including cutbacks of aluminum production by all of them , shall be deemed to be force majeure for the purpose of excempting , on a pro rata basis , Buyer from its obligations hereunder .

3. If , by reason of any such cause , Seller,s supply is curtailed or cut off , then Seller,s obligation during such period shall be reduced to the extent necessary to apportion its available supply of Pitch among its customers pro rata to annual contract commitments .

4. Either party affected by the above mentioned circumstances beyond its control shall immediately notify the other of such inability or failure . The parties shall then decide in good faith whether and at what times the scheduled deliveries of Pitch affected by the Force Majeure situation shall be made subsequently or whether they shall be cancelled . If the Force Majeure situation lasts for six months the parties shall meet to attempt to find a resolution to reduce the cost impact of this Force Majeure situation on the unaffected party . If no reasonable solution is found within thirty (30) days after the six months period either party may immediately terminate this Agreement by giving prior written notice to the other party .

XII. TERMINATION

Either party may immediately terminate this Agreement by giving prior written notice to the other party upon occurrence of any of the following :

1. If the other party fails to make delivery or accept and pay for delivery in accordance with this Agreement or fails to perform within the time specified herein or any extension thereof , or

2. If the other party fails to perform any other material obligation in accordance with the provisions of this Agreement , or

3. If the other party becomes insolvent or a trustee or receiver of such party,s business or assets is appointed by any court , or

4. If the other party shall make an assignment for the benefit of creditors .

XIII. ENTIRE AGREEMENT

No terms or conditions , other than those stated herein , and no agreement or understanding , oral or written , in any way purporting to modify these terms and conditions , shall be binding on either party unless hereafter made in writing and signed by the authorized representatives of both parties . All proposals , negotiations , and representations , if any , made prior and with reference hereto , are merged herein .

XIV. ARBITRATION

1. This Agreement is subject to the International Rules for the Interpretation of Trade Terms " Incoterms 1990 " as fixed by the International Chamber of Commerce .

2. In the event of any dispute , claim , question , or disagreement arising out of or relating to this Agreement or the breach thereof , the parties hereto shall use their best efforts to settle such disputes , claims , questions , or disagreement . To this effect , they shall consult and negotiate with each other , in good faith and , recognizing their mutual interests , attempt to reach a just and equitable solution satisfactory to both parties . If they do not reach such a solution within a period of sixty (60) days , then upon notice by either party to the other , disputes , claims , questions , or differences shall be finally settle by arbitration administered by the American Arbitration Association in accordance with the provisions of its International Arbitration Rules . Judgment upon the award rendered by the arbitrators may be entered in any court having jurisdiction thereof .

   Notice of the existence of a dispute shall be given in writing and must be furnished to the other party within one year of the date the dispute arose ; otherwise the right to refer the dispute to arbitration shall be prescribed .

   The arbitration proceedings shall be conducted in Portland , Oregon , U.S.A. and the language of arbitration shall be English .

   The arbitration proceedings shall be conducted before a panel of three neutral arbitrators , all of whom shall be commercial men . the arbitrator selected by the claimant and the arbitrator selected by the respondent shall , within ten days of their appointment , select a third neutral arbitrator who will act as chair of the panel . In the event that they are unable to do so , the parties or their attorneys may request the American Arbitration Association to appoint a third neutral arbitrator . Prior to the commencement of the hearings , each of the abritrators appointed shall take an oath of impartiality .

   The decision of the arbitrators or that of any two of them shall be final and binding on the parties .

XV. JURISDICTION

This Agreement shall be governed by and interpreted in accordance with the laws of the State of Oregon , U.S.A. and both parties hereby accept such jurisdiction . the parties expressly exclude the United Nations Convention on Contracts for the International Sale of Goods and any law giving effect thereto .

XVI. SECRECY

The parties hereto understand and acknowledge that any information and/ or data obtained by the other under this Agreement shall be considered a trade secret , confidential or proprietary property of the other . Any such information and/or data shall be solely used in performance of the respective obligations of the parties hereto , and shall be maintained in confidence by each party .

XVII. NOTICES

All notices which are to be given under this Agreement shall be in writing and shall take effect when deposited in the mail , registered , with return receipt requested , with postage fully prepaid and addressed :

To Seller :

Keopyung Steel Chemical Co., Ltd
Samdo Bldg. 13th Floor
1-170 Sunhwa - Dong , Chung - Gu
Seoul , Korea
Attention : Managing Director
Sales & Marketing
Fax : 822 753 5070

To Buyer :

Koppers Industries , Inc.
436 Seventh Avenue
Pittsburgh , PA 15219 - 1800
U.S.A.
Attention : Vice President
Carbon Materials and Chemical Division
Fax : 412 227 2202

Any such notice may also be served by telefax and shall be deemed to have been served 24 hours after it was sent provided it is confirmed in writing by the notifying party within 48 hours in the manner described above for notice by mail .

Nominations of vessels and notices from vessels may be served by telex or telefax and shall be deemed to have been send when transmitted .

IN WITNESS WHEREOF the parties hereto have duly executed this Agreement in duplicate, as of the day and year first above written.

KEOPYUNG STEEL CHEMICAL CO., LTD	KOPPERS INDUSTRIES, INC.
By: T. S. Yum	By: Walter W. Turner
Title: President, CEO	Title: V.P. GENERAL MANAGER
Date: OCTOBER 31, 1997	Date: OCTOBER 31, 1997

APPENDIX "A"
SOLID PITCH

PROPERTIES	TEST METHODS	SPECIFICATIONS
Softening Point	ASTM D 3104	108 - 112 Deg. C (Target 108 - 109 C)
Toluene Insoluble	ASTM D 4072	28 % minimum
Quinoline Insoluble	ASTM D 2318	8 - 12 % (Target 10 - 12 %)
Coking Value	ASTM D 2416	55 % minimum
Specific Gravity	ASTM D 2320	1.31 minimum
Distillation to 360 Deg. C	ASTM D 20	3 % maximum (Target 2 %)
Ash	ASTM D 2415	0.3 % maximum
Sodium		220 ppm maximum (Target 120 ppm)
Moisture	ASTM D 95	0.3 % maximum

Any mesophase content of the total quinoline insoluble shall not exceed 2 % and have a maximum micron size of 10 .

APPENDIX " B "
LIQUID PITCH

PROPERTIES	TEST METHODS	SPECIFICATIONS
Softening Point	ASTM D 3104	108 - 112 Deg. C (Target 108 - 109 C)
Toluene Insoluble	ASTM D 4072	28 % minimum
Quinoline Insoluble	ASTM D 2318	8 - 12 % (Target 10 - 12 %)
Coking Value	ASTM D 2416	55 % minimum
Specific Gravity	ASTM D 2320	1.31 minimum
Distillation to 360 Deg. C	ASTM D 20	3 % maximum (Target 2 %)
Ash	ASTM D 2415	0.3 % maximum
Sodium		220 ppm maximum (Target 120 ppm)

Any mesophase content of the total quinoline insoluble shall not exceed 2 % and have a maximum micron size of 10 .

Date: 6/14/00 10:17 AM
Sender: Amos Kamerer
To: Kevin Fitzgerald; Jim Dietz; Don Evans; Wayne Plovic; Drew Bachman; Chuck Kraynik
Priority: Normal
Subject: Portland Pitch Supply

Gentlemen,

I light of the recent developments regarding the probable closure of some of the production at Kaiser, Tacoma, I'm wondering how this might effect the planned cut back of import pitch and the use of Stickney pitch in the Portland blend. My thought is, would this cutback effect our ability to meet the minimum contractual requirements with Kosco and Gearbulk, and still use Stickney in the blend? Or, is this a Force Majeure situation with these contracts and we can make the cutbacks, regardless.

The Gearbulk contract is for 24,000 MT in a running year. The vessel that is due in on Friday will be the 4th, with 2 remaining in the running year. After this receipt we will have received 18,492 MT's, leaving a balance of 5,508 MT's to meet the contract. Or, 2,755 MT's per vessel, on the next 2 voyages.

The Kosco contract is for approx. 25,000 MT in a calendar year. The vessel due Friday is the 3rd, with 3 remaining in the calendar year. After this receipt we will have received 13,811 MT's, leaving a balance of 11,189 MT's to meet the contract. Or, 3,730 MT's per vessel, on the next 3 voyages.

Tacoma has been taking 820 ST per month, YTD. For calculating purposes, I'm figuring that their cutback will be 2/3's of the current production level, thus, they will take 300 ST per month. Using this I am figuring that the total Kaiser usage per month to both locations, will be 2,150 ST's.

Inventory/usage comparison:

May KII closing inventory - all types	8,300 ST
Est. shipments - KII only - June/ Dec.	-15,000 ST
Kosco min. qty. to meet contract	12,330 ST
Additional Chinese for blend	1,100 ST
December KII closing inventory - all types	6,730 ST

Based on this comparison, meeting the minimum contract requirement for Kosco, which will also meet the Gearbulk minimum, there is no room for any Stickney pitch. If we use the Force Majeure option with Kosco, the projected estimated Tacoma reduction would be about 3,500 ST's, or 3,175 MT's. This would reduce the above numbers, accordingly and we would have room for some of the Stickney pitch.

Also, you need to remember that the Kosco contract requires 60 day advance notice of a change in the volume for the next loading, which has already been given to them as 4,300 MT's, +/- 5 %. I now estimate that the next loading will be in about 45 days.

Let me know if I can provide any additional Info.

Amos