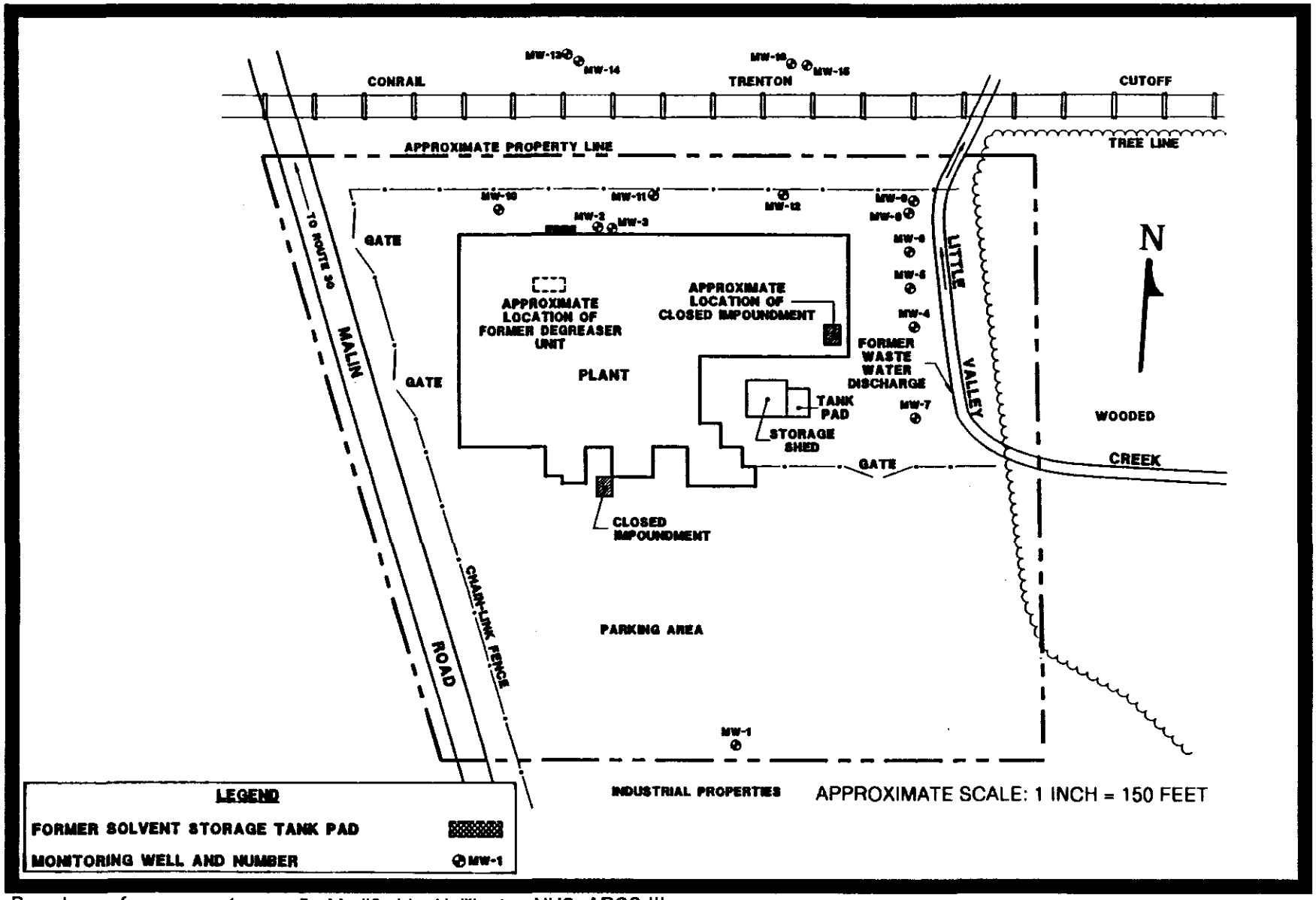
401692

ORIGINAL (Red)

REFERENCE NO. 5



Based on reference no. 4, page 5. Modified by Halliburton NUS, ARCS III.

REFERENCE NO. 5

HALLIBURTON NUS Corporation

SITE SKETCH
BISHOP TUBE COMPANY
FRAZER, CHESTER COUNTY, PENNSYLVANIA

MAY 1995

ORIGINAL
(Red)

REFERENCE NO. 6

ORIGINAL (RED)

EPA Notification of Hazardous Waste Site

United States Environmental Protection Agency
Washington DC 20460

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

810609

A Person Required to Notify:
Enter the name and address of the person or organization required to notify.

Name: Johnson Matthey Inc.
Street: 4 Malin Road
City: Malvern State: PA Zip Code: 19355

B Site Location:
Enter the common name (if known) and actual location of the site.

Name of Site: Bishop Tube Co.
Street: Route 30 and Malin Road
City: Malvern County: Chester State: PA Zip Code: 19355

PAD-08-186-8309

C Person to Contact:
Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title): Curtis, Barbara Environ. Specialist
Phone: (215) 648-8278

D Dates of Waste Handling:
Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year): 1951 To (Year): 1969 - sold to Whittaker Corp.
1979 - disposal ended by Bishop Tube Co.

E Waste Type: Choose the option you prefer to complete

Option 1: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☐ Pesticides
5. ☐ Heavy metals
6. ☒ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☐ Mixed Municipal Waste
10. ☐ Unknown
11. ☒ Other (Specify) Non EP Toxic Metals

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical, General
9. ☐ Plating/Polishing
10. ☐ Military/Ammunition
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☒ Other (Specify) Stainless Steel pickling

Option 2: This option is available to persons familiar with the Resource Conservation and Recovery Act (RCRA) Section 3001 regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous waste listed in the regulations under Section 3001 of RCRA. Enter the appropriate four-digit number in the boxes provided. A copy of the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the site is located.

RECEIVED RCRA SECTION EPA REGION 3 JUN 9 8 10 00 26

Form Approved OMB No. 2000-0138

ORIGINAL (Red)

Notification of Hazardous Waste Site — **Side Two**

F Waste Quantity

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☐ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☒ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☒ Other (Specify) to settling tanks and tile field system

Total Facility Waste Amount

cubic feet Note (A) Z

gallons Note (A)

Total Facility Area

square feet 11,500 S

acres

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected or likely releases of wastes to the environment.

☐ Known ☐ Suspected ☐ Likely ☐ None Note (B)

Note: Items H and I are optional. Completing these items will assist EPA and State and Local governments in locating and assessing hazardous waste sites. Although completing the items is not required, you are encouraged to do so

~~**H Sketch Map of Site Location: (Optional)**~~

~~Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.~~

(A) The amount of hazardous waste to be found at the site is unknown due to unavailability of data as to the amount rendered non-hazardous by natural processes. Less than 1,000 gallons of hazardous waste was discharged per year in a stream containing 3.2 million gallons of non-hazardous waste water.

~~**I Description of Site: (Optional)**~~

~~Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.~~

(B) Unknown, no release of hazardous waste from the above facility has been observed or detected.

In the absence of recorded data, it has been necessary to compile the foregoing data on the basis of personal knowledge, recollection and estimates of currently employed personnel.

J Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required to notify check "Other"

Name Johnson Matthey Inc.

Street 4 Malin Road

City Malvern State PA Zip Code 19355

Signature Howard S. Roberts Date 6/8/81

Howard S. Roberts
Senior Vice President

☒ Owner, Present
☐ Owner, Past
☐ Transporter
☒ Operator, Present
☐ Operator, Past
☐ Other

2

Notification of Hazardous Waste Site — **Side Two**

ORIGINAL (Red)

F Waste Quantity

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☐ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☒ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☐ Other (Specify) _____

Total Facility Waste Amount

cubic feet: Note (A)

gallons: Note (A)

Total Facility Area

square feet: 360 S

acres: _____

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☐ Suspected ☐ Likely ☐ None

Note (B)

Note: Items H and I are optional. Completing these items will assist EPA and State and Local governments in locating and assessing hazardous waste sites. Although completing the items is not required, you are encouraged to do so

~~H Sketch Map of Site Location: (Optional)~~

Sketch a map showing streets, ~~highways~~, routes or other ~~prominent landmarks~~ near the site. ~~Place an X on~~ the map to indicate the site ~~location~~. Draw an arrow showing the ~~direction~~ north. You may substitute a ~~publishing~~ map showing the site location.

(A) The amount of hazardous waste to be found at the site is unknown due to the unavailability of data as to the amount rendered non-hazardous by natural process. Approximately 8,000 gallons of acid waste was discharged per year in a stream containing 3.25 million gallons of non-hazardous waste water.

I Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

J. Bishop & Co. Platinum Works opened the site in 1951. The name was changed to Matthey Bishop, Inc. in 1967. Matthey Bishop sold the Plant as Bishop Tube Co. to the Whittaker Corporation on 31 March, 1969. Whittaker sold it to Christiana Metals on 7 January, 1974. The Plant is now called: Bishop Tube Co., Division of Christiana Metals Corp. Matthey Bishop changed its name to Johnson Matthey Inc. on 1 April, 1980.

(B) Unknown. No release of hazardous waste from the above facility has been observed or detected, however, the possibility of some release cannot be discounted.

In the absence of recorded data, it has been necessary to compile the foregoing data on the basis of the personal knowledge, recollection and estimates of currently employed personnel of Bishop Tube Co.

J Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required to notify check "Other"

Name: Johnson Matthey Inc.

Street: 4 Malin Road

City: Malvern State: PA Zip Code: 19355

Signature: Howard S. Roberts Date: 6/8/81

Howard S. Roberts
Senior Vice President

☐ Owner, Present
☒ Owner, Past
☐ Transporter
☐ Operator, Present
☒ Operator, Past
☐ Other

3

ORIGINAL (Red)

REFERENCE NO. 7

EPA Notification of Hazardous Waste Site

V OK

United States Environmental Protection Agency
Washington, D.C. 20460

ORIGINAL (RED)

R

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

810519 PA5-000-001-045

A Person Required to Notify:
Enter the name and address of the person or organization required to notify.

Name: BISHOP TUBE COMPANY
Street: ROUTE 30 AND MALIN RD.
City: FRAZER State: PA Zip Code: 19355

B Site Location:
Enter the common name (if known) and actual location of the site.

Name of Site: BISHOP TUBE COMPANY
Street: MALIN ROAD
City: FRAZER County: CHESTER State: PA Zip Code: 19355

PAD081868309

C Person to Contact:
Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title): THOMPSON, CHARLES, PROJ. ENGR.
Phone: 215-647-3450

D Dates of Waste Handling:
Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year): 1951 To (Year): 1979

E Waste Type: Choose the option you prefer to complete

Option 1: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☐ Pesticides
5. ☒ Heavy metals
6. ☒ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☐ Mixed Municipal Waste
10. ☐ Unknown
11. ☐ Other (Specify)

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical, General
9. ☐ Plating/Polishing
10. ☐ Military/Ammunition
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☒ Other (Specify)

stainless steel pickling

Option 2: This option is available to persons familiar with the Resource Conservation and Recovery Act (RCRA) Section 3001 regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous waste listed in the regulations under Section 3001 of RCRA. Enter the appropriate four-digit number in the boxes provided. A copy of the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the site is located.

RECEIVED
RCRA SECTION
EPA REGION III
MAY 1981 000005

Form Approved
OMB No. 2000-0138
EPA Form 8900-1

Notification of Hazardous Waste Site **Side Two**

F Waste Quantity:

ORIGINAL (RED)

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☐ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☒ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☐ Other (Specify) _____

Total Facility Waste Amount

cubic feet _____

gallons [redacted] 225,000 G

Total Facility Area

square feet 3555

acres _____

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☐ Suspected ☒ Likely ☐ None

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and assessing hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

N

I Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

Ownership history:

1951 - 1969: J. Bishop & Co.; renamed Matthey Bishop Inc. [1967] (now called Johnson Matthey Inc. [1980])

1969 - 1974: Whittaker Corp.

1974 - present: Bishop Tube Co., Div. of Christiana Metals Corp.

Site consisted of 14' dia. cesspool receiving sanitary sewage and rinse water from acid pickling of stainless steel. 16' collection tank added in 1961. Both pits were neutralized and closed in 1979.

Bishop Tube Company, in conjunction with Pa. Dept. of Environmental Resources, is currently conducting a hydrogeological groundwater study.

J Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required to notify check "Other".

Name Victor A. Barbato, President

Street Bishop Tube Company Route 30 and Malin Rd.

City Frazer State Pa Zip Code 19355

Signature Victor C. Barbato Date 5/15/81

☒ Owner, Present
☐ Owner, Past
☐ Transporter
☐ Operator, Present
☐ Operator, Past
☐ Other

ORIGINAL
(Red)

REFERENCE NO. 8

Betz · Converse · Murdoch · Inc.

TW - Bishop Tube.
E. Whiteland
Chester Co.

PROPOSAL

Received 12/10/80

TO

ORIGINAL
(Red)

BISHOP TUBE COMPANY
MALIN ROAD
FRAZER, PA 19355

FOR

HYDROGEOLOGIC STUDY

BCM PROPOSAL NO. 13-8326-41R

MAY 2, 1980

PREPARED BY:

(b) (4)

[redacted]

SENIOR GEOLOGIST

BETZ·CONVERSE·MURDOCH·INC.
ONE PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PENNSYLVANIA 19462

ORIGINAL
(Red)

INTRODUCTION

Bishop Tube Company of Frazer, Pennsylvania has been instructed by the Pennsylvania Department of Environmental Resources (PA DER) to retain a consultant to conduct a study of groundwater conditions in the vicinity of their plant site. In the past, Bishop Tube and its former owners discharged sanitary sewage, cooling water, and acid pickling rinse water to an unlined pit and cesspool located on plant property. Over the past 1-1/2 years, these discharges were diverted to a sanitary sewer, a nearby stream, and holding tanks. Consequently, the use of the pit and cesspool was discontinued.

SCOPE OF WORK

Betz·Converse·Murdoch·Inc. (BCM) proposes the following scope of work to complete the hydrogeologic study at the Frazer site:

1. Initial Data Collection

A BCM geologist will collect pertinent data at the site relative to past disposal practices, existing wells and core boring records. The number of required monitoring wells and their location will be established.

2. Monitoring Well Installation

BCM will subcontract with a reputable well driller to install monitoring wells at locations established in Section 1.

A BCM geologist will supervise installing the monitoring wells and will inspect and certify their construction and the nature of subsurface conditions. It is assumed that three (3) monitoring wells will be required.

3. Water Sampling

BCM will collect water samples from the following locations:

- Existing wells - east and west wells
- Monitoring wells
- Discharge junction box and discharge outlet
- Stream - Above and below discharge outlet

The samples will be analyzed for the following parameters:

Nitrate	Fluoride	Iron
Ammonia	Chromium	Nickel
Zinc	Manganese	pH
		Temperature

Samples will be collected once from each sampling point. If additional sampling is required, it will be done on a per diem basis, plus expenses. These parameters and sampling locations have been designated by the PA DER Bureau of Water Quality Management staff member assigned to follow-up on this investigation.

4. Report

A draft final report will be prepared and submitted to Bishop Tube upon completion of the study. This report will include an Introduction, Methods, Results, Conclusions, and Recommendations. BCM will meet with Bishop Tube to discuss the report, and to subsequently prepare a final report suitable for submission to PA DER. A meeting with the DER is also included under this task.

5. Discharge Pipe Flow Measurement (Optional)

At the discretion of the Bishop Tube Company, BCM will measure flows in the discharge pipe between the junction box and the discharge outlet. These measurements will determine if groundwater is leaking into the pipe in that interval, thereby degrading the quality of the discharge to the stream.

QUALIFICATIONS AND EXPERIENCE

BCM has the qualifications and experience necessary to perform the full range of work required for the completion of this hydrogeologic study. BCM's staff of geologists has supervised the installation of numerous monitoring wells and has completed the hydrogeologic interpretation of subsurface conditions and groundwater flow patterns. Hydrogeologic studies completed by BCM have also included groundwater sampling and negotiations with the PA DER on behalf of our clients.

The BCM geologists assigned to this study are Robert D. Buller, Senior Geologist, and William S. Neubeck, Geologist/Hydrologist. Mr. Buller has completed over twenty hydrogeologic studies in his seven years with BCM. He will be actively involved in all aspects of the project. Mr. Neubeck has extensive experience in the supervision of well drilling and sampling and will play an integral role in similar activities for this study. BCM's experienced technicians would perform the discharge pipe flow measurements, if that option is selected. Resumes of participants are attached.

REFERENCE NO. 9

HYDROGEOLOGIC INVESTIGATION

FOR

BISHOP TUBE CORPORATION
ROUTE 30 AND MALIN ROAD
FRAZER, PENNSYLVANIA 19355

OCTOBER 1981

BCM PROJECT NO. 00-5265-01

PREPARED BY

(b) (4)

[redacted]

GEOLOGIST

APPROVED BY

(b) (4)

[redacted]

ASSISTANT VICE PRESIDENT

BETZ•CONVERSE•MURDOCH•INC.
ONE PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PENNSYLVANIA 19462

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1.0	BACKGROUND	1
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	1.3 Monitoring Well Sampling Method	1
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3.0	DISCUSSION OF RESULTS	3
	3.1 Groundwater Quality	3
	3.2 Surface Water Quality	6
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APPENDICES

Appendix 1 Well Logs
Appendix 2 USGS Report on East Well

ORIGINAL
(Red)

TABLES

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Table 2	Chester County Health Department Well Water Standards for Collected Parameters	5

FIGURES

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ORIGINAL (Red)

1.0 BACKGROUND

1.1 General

The Bishop Tube Company operates a stainless steel tube manufacturing plant in Frazer, Pennsylvania. The Pennsylvania Department of Environmental Resources (DER) instructed Bishop Tube to conduct a hydrogeologic study of surface water and groundwater conditions at the plant. Betz•Converse•Murdoch•Inc. (BCM) of Plymouth Meeting, Pennsylvania, was retained to conduct the investigation, which was performed with the approval of the DER. This report describes the work performed and the results obtained, and contains recommendations for future action.

1.2 Monitoring Well Installation

Between June 3, 1981 and June 5 1981, four monitoring wells were installed on the plant site by Thomas G. Keyes, Inc. under the supervision of a BCM geologist. The well locations are shown in Figure 1; copies of the original well logs are contained in Appendix 1.

Well 1, which serves to monitor background groundwater quality conditions, is finished in the Wissahickon Schist, a lower Paleozoic metamorphic formation. Wells 2 and 4 are finished in colluvium, alluvium, or residual soils above the Conestoga Formation, an Ordovician limestone containing minor amounts of shale and phyllite. Well 2 extends into the Conestoga Formation to a depth of 24 feet. Wells 2 and 3, located on the north side of Plant Building 8, are 24 feet and 13.5 feet deep, respectively. Well 3 monitors the uppermost water-bearing zone, and Well 2 monitors a lower, apparently separate, water-bearing zone. The locations of Wells 2, 3, and 4 were selected, with the DER's agreement, to be the closest feasible downgradient sites to the deactivated and closed waste impoundments identified in Figure 1.

1.3 Monitoring Well Sampling Method

On June 16, 1981, all four monitoring wells were sampled. Because of the generally turbid conditions of the water samples, the wells were resampled on July 31, 1981. A standard procedure was followed, using a submersible pump to purge the wells and collect the samples. Also, to eliminate the uncertainties that arise from the turbid samples, all samples were filtered through an 0.45 m filter using a vacuum pump before filling the pre-fixed bottles.

All samples were transported immediately to the BCM laboratory in Norristown, Pennsylvania, where they were analyzed.

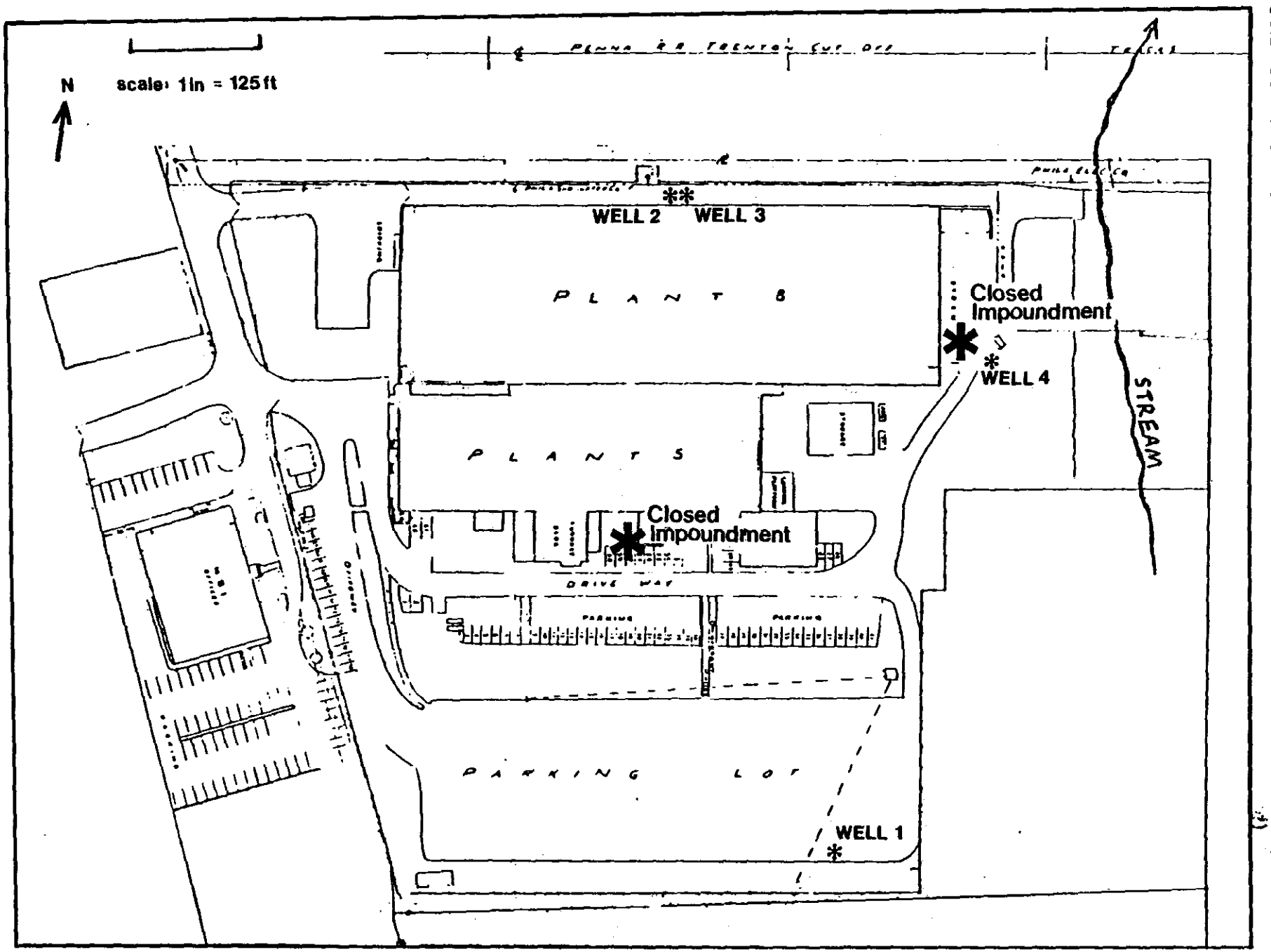

FIGURE 1. LOCATION OF MONITORING WELLS AND CLOSED IMPOUNDMENTS

Belz • Converse • Murdoch • Inc.

FINAL

On July 31, three additional monitoring points were sampled. These were all surface water stations; they were included to help ascertain the interconnection of water quality between the surface and subsurface, and to determine the effect of Bishop Tube's current discharges on the stream. The surface water stations are located as follows:

1. At the discharge line of the cooling water into the unnamed stream

2. On the unnamed stream at the upstream property line

3. On the unnamed stream at the downstream property line

2.0 PRESENTATION OF DATA

Table 1 presents the results of the laboratory analyses for the groundwater samples and the surface water samples. The analytical parameters listed in this table were recommended by BCM and approved by the DER. They were selected on the basis of materials used and wastewater generated at Bishop Tube.

3.0 DISCUSSION OF RESULTS

3.1 Groundwater Quality

To determine the significance of the data in Table 1, the concentrations should be compared to water quality standards. Because Pennsylvania has no state-wide groundwater standards, the convention is to use drinking water standards. The relevant standards are the Well Water Drinking Standards promulgated by the Chester County Health Department. These standards, which are essentially the same as the U.S. Public Health Service Drinking Water Standards are presented in Table 2.

A comparison of the data in Table 1 with the standards in Table 2 indicates that the values for zinc, chromium, and copper are significantly below the standards for all the wells. The nitrate levels in Wells 1 and 4 are also below the standards, but are at levels approaching the limit. The 6.77 ppm in the background Well 1 indicate that high nitrates are originating from upgradient, probably as a result of septic systems in the properties to the south. The only parameters that are above the standards are aluminum and fluoride in Well 4 and managanese and iron in Wells 2 and 4. Although no standard exists for nickel, the 0.454 parts per million (ppm) in Well 4 is higher than normal background levels.

TABLE 1

ANALYTICAL RESULTS FOR SAMPLES COLLECTED JULY 31, 1981
(All values except pH in mg/l)

Parameter	Sampling Station						
	Well 1	Well 2	Well 3	Well 4	Upstream	Discharge	Downstream
Total Dissolved Solids	63	303	151	353	144	205	156
Copper	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Aluminum	<0.250	<0.250	<0.250	4.10	<0.250	<0.250	<0.250
Zinc	0.057	0.050	0.050	0.065	0.046	0.073	0.046
Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Manganese	<0.014	2.22	<0.014	2.10	<0.014	<0.014	<0.014
Iron	0.054	1.01	<0.040	.173	<0.040	<0.040	<0.040
Nickel	<0.10	<0.10	<0.10	0.454	<0.10	<0.10	<0.10
Chemical Oxygen Demand	1	34	16	19	6	5	4
Nitrate - Nitrogen	6.77	<0.10	0.05	7.22	2.76	2.22	2.72
Ammonia - Nitrogen	0.02	0.16	0.10	2.1	0.02	0.12	0.07
Fluoride	<0.10	0.2	0.5	23.1	0.2	1.0	2.2
pH	6.3	7.4	8.7	6.8	7.3	7.8	7.5

Betz • Converse • Murdoch • Inc.

ORIGINAL (Red)

TABLE 2

CHESTER COUNTY HEALTH DEPARTMENT WELL WATER STANDARDS
FOR SELECTED PARAMETERS
(All values in parts per million)

Parameter	Well Water Standard
Total Dissolved Solids	500
Copper	1.0
Aluminum	Not available
Zinc	5.0
Chromium (hexavalent)	0.05
Manganese	0.05
Iron	0.3
Nickel	Not available
Carbon Oxygen Demand	Not available
Nitrate	10
Ammonia	Not available
Fluoride	0.6 to 1.7*
pH	Not available

* Depends on daily air temperature

ORIGINAL (Red) ORIGINAL (Red)

3.2 Surface Water Quality

Table 1 presents the data on the water quality samples taken from the Bishop Tube cooling water discharge and two sampling stations on the unnamed stream--one upstream and one downstream. The purpose of sampling these three points was to determine if there is a significant difference in stream water quality between the upstream and downstream points that can be attributed to the cooling water and/or groundwater discharge.

A comparison of the data from the three stations shows that only the fluoride concentration increases significantly between the upstream station and the downstream station. The 1.0 ppm of fluoride in the cooling water discharge probably is partially responsible for this increase, but it cannot completely account for the 2.2 ppm at the downstream station. Some of the fluoride contribution probably is from recharge by groundwater (that contains 23.1 ppm fluoride near Well 4).

3.3 Deep Groundwater Quality

The quality of groundwater at a depth of 300 feet below the ground surface has been determined by U.S. Geologic Survey (USGS) personnel who sampled Bishop Tube's east well on June 3, 1981 as part of a county-wide USGS study. The USGS report is contained in Appendix 2.

The USGS analyses show that all concentrations of constituents studied to be lower than the Chester County Health Department standards presented in Table 2, except for fluoride. The fluoride concentration in the well was 1.0 ppm. This level is within the range of acceptable limits, and is approximately at the recommended concentration for intentionally-fluoridated water.

It is not clear from the available data if the east well is monitoring groundwater that is potentially affected by the plant operations or if the well takes water that is upgradient from the plant. It is possible that the values shown in the USGS report are representative of regional background levels.

4.0 SUMMARY OF FINDINGS

1. Compared to background conditions (as shown in Well 1) and drinking water standards, the groundwater beneath the site exhibits no contamination for most of the parameters.

ORIGINAL (Red)

2. Well 1 exhibits generally high quality water representative of background conditions. Elevated nitrate levels are the result of upgradient influences off Bishop Tube property.

3. Well 2 exhibits levels of iron and manganese in excess of background conditions as measured in Well 1. It appears that these levels do not represent natural background conditions.

4. Well 3, which monitors the shallow groundwater zone on the north side of the plant, exhibits no contamination. No contaminants are present in this well near levels of concern.

5. Well 4 exhibits elevated concentrations of fluoride, aluminum, manganese, iron, and nickel above background levels.

6. With the exception of fluoride, the surface water samples, including the cooling water discharge, showed no problems that warrant further investigation. The fluoride levels at the downstream sampling station suggest that fluoride is being added to the stream from the cooling water discharge and from groundwater discharge.

7. The deep groundwater beneath the site exhibits no significant contamination. The highest value is for fluoride, which, at 1.0 ppm, is within the range of acceptablility for fluoridated drinking water.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

1. The groundwater near Well 4 is moving towards, and discharges into, the unnamed stream. This is evident by the increase in fluoride concentration in the stream that cannot be attributed to the cooling water discharge. In recharging the stream, the fluoride-enriched groundwater becomes greatly diluted by the stream water.

2. The groundwater conditions at Bishop Tube are not a hazard to public health. The area of high fluoride concentrations is probably limited to the immediate vicinity around Well 4 and adjacent parts of the stream. The stream is not used for water supply and it shows significantly lower values for all parameters. The nearest public water supply well is about 1.5 miles away. Any surface or groundwater traveling from the Bishop Tube area to the public well would be diluted by several orders of magnitude before it was taken up in the well, and should be within drinking water standards.

3. It is possible that the groundwater near Well 4, which was monitored in the overburden, could move downward into the limestone. If this were to happen, any contamination in the groundwater would become very diluted before being taken up in any public water supply well.

5.2 Recommendations

Based on the conditions described previously, the surface and groundwater quality at the Bishop Tube site should be periodically monitored. This monitoring should include sampling water from the stream and from all four wells, as before. The samples should be analyzed for the key parameters shown to be important: fluoride, iron, manganese, aluminum, and nickel. This periodic monitoring will determine if changes in the system occur over time. Further action beyond this is not warranted at this time.

ORIGINAL (Red)

APPENDIX 1

WELL LOGS

Betz • Converse • Murdoch • Inc. BCM

ORIGINAL

DRILLING LOG

WELL NUMBER: 1 Background

LOCATION: upper parking lot

SURFACE ELEVATION:

DRILLER:

COMPANY: Thomas Keyes
Malvern PA

LOGGED BY: (b) (4) [redacted]

COMMENTS:

WELL OWNER: Bishop Tube

ADDRESS: Malvern, PA

TOTAL DEPTH: 48 Ft

STATIC WATER LEVEL: 15' 6" DATE: 6-3-81 1100

DRILLING METHOD: air rotary

DATE DRILLED: 6-3-81 START 0818
STOP 0915

SKETCH MAP

LOCATION:

DEPTH FROM SURFACE (FEET)	GRAPHIC LOG	SAMPLES I.D. NUMBER	SAMPLES SPOON BLOWS	DESCRIPTION OF MATERIALS Wissahicken Schist
	0-20'			weathered schist; mica, quartz pebbles, lt brown, dry, iron stains
	20'			moisture encountered, waited a few minutes, no free water
	30'			hit water @ approx 30 Ft
	48'			total depth 48'
				- one soil sample taken at 30 Ft -
				20' of 4" PVC screen set from 48' to 28', gravel packed
				30' of 4" PVC pipe set above
				(b) (4) [redacted]

Betz • Converse • Murdoch • Inc. BCM

DRILLING LOG

ORIGINAL (Red)

WELL NUMBER: 2 Downgradient

LOCATION: N side of main plant building approx. midway on building ~5' from bldg

SURFACE ELEVATION:

DRILLER: (b) (4) [redacted]

COMPANY: Thomas Keynes Malvern, Pa.

LOGGED BY: (b) (4) [redacted]

COMMENTS:

WELL OWNER: Bishop Tube

ADDRESS: Malvern, Pa.

TOTAL DEPTH: 24'

STATIC WATER LEVEL: DATE:

DRILLING METHOD: air rotary, air hammer

DATE DRILLED: 6/4/81

SKETCH MAP

LOCATION:

DEPTH FROM SURFACE (FEET)	GRAPHIC LOG	SAMPLES I.D. NUMBER	SAMPLES SPOON BLOWS	DESCRIPTION OF MATERIALS
	0-6'	8" air rotary		Fill - limestone pebbles, brown "soil" matrix
	6-13'			Weathered limestone and schist(?), platy weathered limestone fragments
				~~water~~ moisture encountered at 8'
	13-19½	6" air hammer		Limestone, blue-grey, platy, dry
	19½-24			Same lithology as above, much water
				9' of 4" PVC screen set from 24'-15', gravel packed to 14'
				bentonite ~~to~~ from 14'-8', cuttings to 1', cement to surface
				15' PVC pipe set from 15 to surface +
				Development time 35 min on 6/5/81 (b) (4) [redacted]

Betz • Converse • Murdoch • Inc. BCM

DRILLING LOG

ORIGINAL

WELL NUMBER: 3 Downgradient

LOCATION: N side of main plant building approx. 4' E of well #2

SURFACE ELEVATION:

DRILLER: (b) (4) [redacted]

COMPANY: Thomas Keynes Malvern, Pa

LOGGED BY: (b) (4) [redacted]

COMMENTS:

WELL OWNER: Bishop Tube

ADDRESS: Frazier Pa

TOTAL DEPTH: 13.5

STATIC WATER LEVEL: DATE:

DRILLING METHOD: Air rotary

DATE DRILLED: 6/4/81

SKETCH MAP

LOCATION:

DEPTH FROM SURFACE (FEET)	GRAPHIC LOG	SAMPLES I.D. NUMBER	SAMPLES SPOON BLOWS	DESCRIPTION OF MATERIALS
	0-1'			Road gravel
	1'-6'			Fill - limestone + schist pebbles w/brown "soil" matrix, dry
	6'-10'			Brown matrix of silt + sand, some schist fragments, water at 8'
	10-13			Grey matrix, platy limestone fragments, moist
	13-13½			Fresh Unweathered limestone, blue-grey, dry
				4" PVC screen 13½'-8', gravel packed to 6'
				4" PVC pipe 8' to surface +, bentonite 6'-1'
				cement to surface
				Developed for 30 minutes but probably poorly due to problem w/pump

6/5/81

Betz • Converse • Murdoch • Inc. BCM [redacted]

DRILLING LOG

ORIGINAL (Red)

WELL NUMBER: 4 Downgradient

WELL OWNER: Bishop Tube

LOCATION: East of plant in finished product storage area ~20' N of SE corner of bldg

ADDRESS: Frazier Pa

TOTAL DEPTH: 20'

SURFACE ELEVATION: [redacted] (b) (4)

STATIC WATER LEVEL: _____ DATE: _____

DRILLER: [redacted]

DRILLING METHOD: Air rotary

COMPANY: Thomas Keyser

DATE DRILLED: 8/5/81

LOGGED BY: [redacted] (b) (4)

COMMENTS:

SKETCH MAP

LOCATION:

DEPTH FROM SURFACE (FEET)	GRAPHIC LOG	SAMPLES I.D. NUMBER	SAMPLES SPOON BLOWS	DESCRIPTION OF MATERIALS
	0-4'			Road gravel + finer limestone fill
	4-7.5'			More fill, encountered moisture at 4'
	7.5-20'			Combination of limestone + phyllite flakes within a finer matrix
				4" PVC screening from 20' to 7'
				4" Casing 7' to 0+'
				Gravel packed to ~5', bentonite to 1', cement to surface
				Developed for ~40 min. on 6/5/80
				[redacted] (b) (4)

Betz • Converse • Murdoch • Inc.

ORIGINAL
(Red)

APPENDIX 2

USGS REPORT ON EAST WELL

United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
35 Great Valley Parkway
Great Valley Corporate Center
Malvern, PA 19355

ORIGINAL (Red)

Bishop Tube
Route 30 & Malin Road
Frazer, PA 19355

Attention: Mr. Chuck Thompson

Dear Mr. Thompson:

Thank you for allowing us to sample your well as part of the Chester County Ground Water Quality Monitoring Program. Enclosed is a copy of the laboratory report. Your well water meets EPA's safe drinking water standards. We may wish to sample your well again in the future as part of the program.

The quantity of dissolved substances in your well water are shown in quantities of milligrams per liter (MG/L) and micrograms per liter (UG/L). One milligram per liter of dissolved substance is equivalent to one part of the substance in one million parts of water. One microgram per liter of dissolved substance is equivalent to one part of the substance in one billion parts of water.

If you have any questions concerning the sampling procedure, please call me anytime at 647-9008. If you have any questions concerning health related problems and contaminants, please call Philip Terry, Chester County Health Department, at 431-6247.

Sincerely,

Charles R. Wood
Subdistrict Chief

DKD/cdk
Encl.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CENTRAL LABORATORY ATLANTA, GEORGIA

ORIGINAL (Red)

WATER QUALITY ANALYSIS
LAB-ID # 161031 RECORD-# 58682

SAMPLE LOCATION: 2432
STATION ID: 400221075321201 LAT.LONG.SEQ.: 400221 0753212 01
DATE OF COLLECTION: BEGIN--810603 END-- TIME--1100
STATE CODE: 42 COUNTY CODE: 029 PROJECT IDENTIFICATION: 444209300
DATA TYPE: 2 SOURCE: GROUND WATER GEOLOGIC UNIT:
COMMENTS: UNIQUE-#:
OWNER BISHOP TUBE

ALDRIN, TOT (WATER)	UG/L	<	0.01
ANALYZING AGENCY			80010
ARSENIC, DISSOLVED	UG/L		1
BENZENE, TOTAL	UG/L		0.0
BROMOFORM, TOTAL	UG/L		0.0
CADMIUM, DIS.	UG/L		1
CARBON TETRA., TOT.	UG/L		0.0
CHLORDANE, T (WATER)	UG/L	<	0.1
CHLOROBENZENE, TOTAL	UG/L		0.0
CHLORODIBROMO., TOT.	UG/L		0.0
CHLOROETHANE, TOTAL	UG/L		0.0
CHLOROFORM, TOTAL	UG/L		0.0
CHROMIUM, DISSOLVED	UG/L		0
CONFIRMATION ABOVE 2	UG/L		0
CYANIDE, TOTAL			DETR. DELETED
DDD, TOTAL (WATER)	UG/L	<	0.01
DDE, TOTAL (WATER)	UG/L	<	0.01
DDT, TOTAL. (WATER)	UG/L	<	0.01
DICHLOROBROMOMETHA,T	UG/L		0.0
DICHLORODIFLUOROME,T	UG/L		0.0
DIELDRIN, T. (WATER)	UG/L	<	0.01
ENDOSULFAN I TOTAL	UG/L	<	0.01
ENDRIN, TOTAL(WATER)	UG/L	<	0.01
ETHYLBENZENE, TOTAL	UG/L		0.0
FLUORIDE, DISSOLVED	MG/L		1.0
GROSS PCBS T (WATER)	UG/L	<	0.1
GROSS PCNS T (WATER)	UG/L	<	0.1
HEPT EPOX, T (WATER)	UG/L	<	0.01
HEPTACHLOR T.(WATER)	UG/L	<	0.01
IRON, DIS.	UG/L		10

LEAD, DIS.	UG/L		1
LINDANE, TOT (WATER)	UG/L	<	0.01
MANGANESE, DISSOLV.	UG/L		1
MERCURY, DISSOLVED	UG/L		0.3
METALS DISS CHE-EXT			0
METHOXYCHLOR T.(WAT)	UG/L	<	0.01
METHYLBROMIDE, TOTAL	UG/L		0.0
METHYLENE CHLORIDE,T	UG/L		0.0
MIREX, TOT.	UG/L	<	0.01
NICKEL, DIS.	UG/L		8
PERTHANE, TOT.	UG/L	<	0.01
PH FIELD	UNITS		7.1
PHENOLS, TOTAL	UG/L		0
SP. CONDUCTANCE FLD	UMHOS		325
TETRACHLOROETHYLEN,T	UG/L		0.0
TOLUENE, TOTAL	UG/L		0.0
TOXAPHENE, T (WATER)	UG/L	<	0.1
TRICHLOROETHYLENE,T	UG/L		0.0
TRICHLOROFLUOROMET,T	UG/L		0.0
VINYL CHLORIDE, TOTA	UG/L		0.0
WATER TEMPERATURE	DEG C		12.0
1,1-DICHLORETHYLEN,T	UG/L		0.0
1,1-DICHLOROETHANE,T	UG/L		0.0
1,1,1-TRICHLOROETH,T	UG/L		0.0
1,1,2-TRICHLOROETH,T	UG/L		0.0
1,1,2,2-TETRCHLORO,T	UG/L		0.0
1,2-DICHLOROETHANE,T	UG/L		0.0
1,2-DICHLOROPROPAN,T	UG/L		0.0
1,3-DICHLOROPROPAN,T	UG/L		0.0
12TRANSDICL-ETHYLENE	UG/L		0.0
2-CL-ETHYLVINYLETHER	UG/L		0.0

CONTINUED ON NEXT PAGE

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CENTRAL LABORATORY ATLANTA, GEORGIA

ORIGINAL (Red)

WATER QUALITY ANALYSIS
LAB-ID # 162811 RECORD-# 58928

SAMPLE LOCATION: 2432
STATION ID: 400221075321201 LAT.LONG.SEQ.: 400221 0753212 01
DATE OF COLLECTION: BEGIN--810603 END-- TIME--1100
STATE CODE: 42 COUNTY CODE: 029 PROJECT IDENTIFICATION: 444240300
DATA TYPE: 2 SOURCE: GROUND WATER GEOLOGIC UNIT:
COMMENTS: UNIQUE-#:
OWNER BISHOP TUBE

ANALYZING AGENCY		80010	NITR DISS NH4 AS N	MG/L	0.02
CARBON, ORGANIC, TOT	MG/L	0.9	NITR. DIS NH4 AS NH4	MG/L	0.03
NITR DIS NO2 AS N	MG/L	< 0.01	PH FIELD	UNITS	7.1
TR DIS NO2+NO3 -N	MG/L	0.14	SP. CONDUCTANCE FLD	UMHOS	325
			WATER TEMPERATURE	DEG C	12.0

CATIONS	(MG/L)	(MEQ/L)	ANIONS	(MG/L)	(MEQ/L)
			NITR DIS NO2+N	0.14	0.010
TOTAL			TOTAL		0.010

ORIGINAL (Red)

REFERENCE NO. 10

NOTE: SEE COPY 2 BEFORE SIGNING

Spring Cr

BUREAU OF WATER QUALITY MANAGEMENT
WASTE DISCHARGE INSPECTION REPORT

TIME 8-

ESTABLISHMENT	CASE	LOCATION (STREET/STATE ROUTE)	COUNTY	MUNICIPALITY	PROGRAM
Bishop Tube Co		Malin Rd	Chester	E. White	IW

OPERATOR NAME	VALID CERTIFICATE POSTED	TELEPHONE NO.	POP SERVED	ACRES UNDER PERMIT	ACRES ALREADY MINED
Mers Johnson	YES ☐ NO ☐		—	—	—

RESPONSIBLE OFFICIAL	ADDRESS	TELEPHONE NO.	INDUSTRIAL PRODUCTS 1.	2.
V. Barbato	R.30 Malin Rd. Frazer, Pa	647 3450	Seamless tubes	

PERSON INTERVIEWED	ADDRESS	TELEPHONE NO.
Mers Johnson		

TREATMENT PROCESS	NUMBER OF UNITS TOT	NUMBER OF UNITS IN OP	REMARKS	VIOLATIONS
			Meis tied up w/ fume scrubber installation + unable to accompany me on sampling. He has received PPCP review letter but hasn't begun work on permit	
			(+) Spring discharge area on north west side of property needs immediate attention — what appears to be an oil is visible on the surface of water under the grates — oil must be removed today!! Signs of spillage in this area also refuse which must be removed! Source of oil must be determined + eliminated!	LAWS, REGULATIONS OR PERMIT NO. & COND.

5-5-83 11:10 - Checked spring area - oil + refuse have been removed, wooden weir installed to collect any debris

SAMPLING POINT	W&W QUALITY REPORT NUMBER	pH	CHLOR RES	COLOR	ODOR	TEMP	D.O.	SPEC COND.	AVG. DAILY FLOW (MGD)
effluent	105	7.5				21°C			0.08
spring	106								
Little Valley @ 30	107	7.2				10°C		190 µ/cm	

RECEIVING STREAM APPEARANCE

NAME	ABOVE DIS APP	BELOW DIS APP
Little Valley Creek		

ORIGINAL (Red)

IDENTIFICATION C	CO 4-5	MUN 6-8	T 9	EST 10-11	CASE 12-13	FAC NO. 1 14-16	FAC NO. 2 14-16	FAC NO. 3 14-16	FAC NO. 4 14-16	DATE OF INSPECTION 17-22	INSPECTING AGENCY 23-26
A										050483	WQM
X											

(b) (4) [redacted]

FACILITY NAME	DIS. VOL. (MGD) 49-52	COMPLIANCE FED 66	INT 67	FAC 68	OP 69	PERMIT COMP 70	OPER STAT 71-72
00071212				1	1	1	76

(USE BLACK INK ONLY)

CENTRAL OFFICE

Fixed Samples

ER-SL13
REV. 1-82

① Metals

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF LABORATORIES

WATER OR WASTE QUALITY REPORT

ALL CHEMICAL ANALYSES EXPRESSED IN MG/L UNLESS OTHERWISE SPECIFIED

LAB. Number [redacted]

Date Received 50[redacted]3

ORIGINAL (Red)

ESTABLISHMENT	CASE	FACILITY	COLL NUMBER
Bishop Tube Co			105

COUNTY	MUNICIPALITY	PROGRAM	COLL NAME	TYPE TR	STD ANALYSIS
Chester	E White	IW	Sheep	0	500

CARD (3) 1 / 2	ID CODE (ALL CARDS) 4-16 Cnty	Mun	T	Est	Case	Fac	LATITUDE 4-10	LONGITUDE 11-18	DATE 19-24 M	D	Y	TIME 25-28 Hr	Min	KIND 29
								0	05	04	83	8	10	2

USGS-Q 30-34	BUREAU 35-37 AMIS	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RELATIVE POINT 58
	701	011710 5	EFFLUENT	

TRIBUTARY TO:

FULL DESCRIPTION WHERE SAMPLE TAKEN outfall

2 bottles

ADDITIONAL LAB ANALYSES

FIELD ANALYSES

Type Sample	59-60	3
Source of Sample	61-62	8
Reason Sampled	63-64	1
Composite Sample — Proportional Uniform	65	
Composite Sample — Temporal Spatial	66	
Aliquots	67-68	
Flow — Estimated Measured	69	
Condition — Above - 1, Below - 3, Normal - 2, No Flow - 4, Flood - 5	80	
→ CARD (2)		
Stream Flow-CFS	(00081)	
Str[illegible]w-MGD	(50051)	
Pipe Flow-MGD	(50050)	
Gage Reading-Ft.	(00065)	
Temp (C)	(00010)	
pH	(00400)	
D.O.	(00300)	
Hal — Cl (50060)		
Hal — Br (71871)		
Hal — I (71866)		
Spec Cond	(00094)	
Appearance	(46001)	
Odor	(01330)	

LAB ANALYSES

Chemist

Date Analyzed / /

Color	(00080)	
Turb	(00070)	
pH	(00403)	
Spec. Cond	(00095)	
Alk	(00410)	
pH4	(00436)	
pH8 Hot	(70508)	
pH8 Cold	(00435)	
T.O.C.	(00680)	
C.O.D.	(00340)	
5-Day BOD	(00310)	
P T	(00665)	
P TD	(00666)	
Al-Tot ug/l	(01105)	
Cd-Tot ug/l	(01027)	
Cr-Tot ug/l	(01034)	
Cu-Tot ug/l	(01042)	
Fe-Tot ug/l	(01045)	
Mn-Tot ug/l	(01055)	
Ni-Tot ug/l	(01067)	
Pb-Tot ug/l	(01051)	
Zn-Tot ug/l	(01092)	

Total Solids	(00500)	
Susp. Solids	(00530)	
Set Solids	(00545)	
Total Diss Solids	(00515)	
NO_3N	(00615)	
NO_2N	(00620)	
NH_3N	(00610)	
Kjel-N	(00625)	
Hardness	(00900)	
Ca	(00916)	
Mg	(00927)	
SO_4	(00945)	
Cl	(00940)	
F	(00951)	
MBAS	(38260)	
Phenols ug/l — Dr. (46002)		
Phenols ug/l — Ds (32730)		
Cyanide	(00720)	
( )		
( )		
( )		

CUSTODY LOG

How Shipped Pull (Red) Date 5/4

Legal Seal No.

Received by ORIGINAL

Condition of Seal

②

ORIGINAL (Red)

WATER AND WASTEWATER REPORT
SAMPLE NUMBER - 8315406

COLLECTOR - (b) (4) [redacted] COLLECTOR NO - 0117105
ESTAB - BISHOP TUBE CO
CASE NAME -
FACILITY -
ID CODE - NONE WQN STATION NUMBER -.000
SAMPLING DATE - 5/04/83 TIME - 8:10 LAT - 00:00:00.0 LONG - 00:00:00.0

TYPE - 03 SOURCE - 08 STD ANAL - 500 RECEIVED ON - 5/05/83
REPORT REVIEWED BY DATE - 5/16/83

STORET	DESCRIPTION		RESULT	CONC	VERIFY BY		VERIFY DATE	COMM CODE
LABORATORY ANALYSIS :								
00095	SPEC COND		301.0000		G	REW	5/06/83	
00310	BOD 5 DAY	<	0.4000	MG/L	G	RLS	5/12/83	
00403	PH LAB		7.8000		G	LCC	5/10/83	
00410	T ALK CACO3		70.0000	MG/L	G	LCC	5/10/83	
00530	RES TOT NONF		2.0000	MG/L	G	HWJ	5/06/83	
00610	T NH3-N		0.0900	MG/L	G	ICB	5/05/83	
00615	T NO2-N		0.0240	MG/L	G	ICB	5/06/83	
00620	T NO3-N		2.4200	MG/L	G	ICB	5/06/83	
00665	PHOS-T MG/L		0.2400	MG/L	G	LBS	5/11/83	
00940	CHLORIDE		22.0000	MG/L	G	ICB	5/05/83	
00945	SO4 TOT		36.0000	MG/L	G	LBS	5/09/83	
00951	F,TOTAL		0.5000	MG/L	G	ICB	5/10/83	
01027	CD TOT UG/L	<	0.2000	UG/L	G	BHL	5/06/83	
01034	CR TOT UG/L		10.0000	UG/L	G	MRO	5/11/83	
01042	CU TOT UG/L		20.0000	UG/L	G	MRO	5/11/83	
01045	FE TOT		70.0000	UG/L	G	MRO	5/11/83	
01051	PB,TOTAL	<	5.0000	UG/L	G	BHL	5/06/83	
01055	MN TOTAL		40.0000	UG/L	G	MRO	5/11/83	
01067	NI,TOTAL		20.0000	UG/L	G	MRO	5/11/83	
01092	ZN,TOT UG/L		60.0000	UG/L	G	MRO	5/11/83	
01105	AL,TOTAL		270.0000	UG/L	G	MRO	5/10/83	

SAMPLE COMMENTS
NO SAMPLE COMMENTS

TOTAL NUMBER TEST FOR THIS SAMPLE 21

ORIGINAL (Red)

3

Fixed Samples

ER-8L13
REV. 1-82

① metals

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF LABORATORIES

WATER OR WASTE QUALITY REPORT

ALL CHEMICAL ANALYSES EXPRESSED IN MG/L UNLESS OTHERWISE SPECIFIED

LAB. Number [illegible]407

Date Received [illegible]058

ORIGINAL (Red)

ESTABLISHMENT	CASE	FACILITY	COLL NUMBER
Bishop Tube Co			106

COUNTY	MUNICIPALITY	PROGRAM	COLL NAME	TYPE TR	STD ANALYSIS
Chester	E White	1W	M Sharp	0	500

CARD (3) 1 / 2	ID CODE (ALL CARDS) 4-16 Cnty Mun T Est Case Fac	LATITUDE 4-10	LONGITUDE 11-18	DATE 19-24 M D Y	TIME 25-28 Hr Min	KIND 29
			0	05 04 83	18 30	1

USGS-Q 30-34	BUREAU 35-37 AMIS	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RELATIVE POINT 58
	701	011710 6	SPRING	

TRIBUTARY TO:

FULL DESCRIPTION WHERE SAMPLE TAKEN at fence on n. side property

2 bottles

ADDITIONAL LAB ANALYSES

FIELD ANALYSES

Type Sample	59-60	7
Source of Sample	61-62	4
Reason Sampled	63-64	1
Composite Sample — Proportional Uniform	65	
Composite Sample — Temporal Spatial	66	
Aliquots	67-68	
Flow — Estimated Measured	69	
Condition — Above - 1, Below - 3, Normal - 2, No Flow - 4, Flood - 5	80	
→ CARD (2)		
Stream Flow-CFS	(00081)	
Stream Flow-MGD	(50051)	
Pipe Flow-MGD	(50050)	
Gage Reading-Ft.	(00065)	
Temp (C)	(00010)	
pH	(00400)	
D.O.	(00300)	
Hat — Cl (50060), Br (71871), I (71866)		
Spec Cond	(00094)	
Appearance	(46001)	
Odor	(01330)	

LAB ANALYSES

Chemist _____ Date Analyzed ___/___/___

Color	(00080)		Total Solids	(00500)	
Turb	(00070)		Susp. Solids	(00530)	
pH	(00403)		Set Solids	(00648)	
Spec. Cond	(00095)		Total Diss Solids	(00615)	
Alk	(00410)		NO_3N	(00615)	
pH4	(00436)		NO_2N	(00620)	
pH8 Hot	(70508)		NH_3N	(00610)	
pH8 Cold	(00435)		Kjel-N	(00625)	
T.O.C.	(00680)				
C.O.D.	(00340)		Hardness	(00900)	
5-Day BOD	(00310)		Ca	(00916)	
P T	(00665)		Mg	(00927)	
P TD	(00666)		SO_4	(00945)	
Al-Tot ug/l	(01105)		Cl	(00940)	
Cd-Tot ug/l	(01027)		F	(00951)	
Cr-Tot ug/l	(01034)		MBAS	(38260)	
Cu-Tot ug/l	(01042)		Phenols ug/l — Dr. (46002), Ds (32730)		
Fe-Tot ug/l	(01045)		Cyanide	(00720)	
Mn-Tot ug/l	(01055)		____	(____)	
Ni-Tot ug/l	(01067)		____	(____)	
Pb-Tot ug/l	(01051)		____	(____)	
Zn-Tot ug/l	(01092)		____	(____)	

④

CUSTODY LOG

How Shipped _____ (Red) Date _____

Legal Seal No. _____ ORIGINAL

Received by _____

Condition of Seal _____

ORIGINAL (Red)

WATER AND WASTEWATER REPORT
SAMPLE NUMBER - 8315407

COLLECTOR - (b) (4) [redacted] COLLECTOR NO - 0117106
ESTAB - BISHOP TUBE CO
CASE NAME -
FACILITY -
ID CODE - NONE WQN STATION NUMBER - 000
SAMPLING DATE - 5/04/83 TIME - 8:30 LAT - 00:00:00.0 LONG - 00:00:00.0

TYPE - 07 SOURCE - 04 STD ANAL - 500 RECEIVED ON - 5/05/83
REPORT REVIEWED BY DATE - 5/16/83

STORET	DESCRIPTION		RESULT	CONC	VERIFY BY		VERIFY DATE	COMM CODE
LABORATORY ANALYSIS :								
00095	SPEC COND		447.0000		G	REW	5/06/83	
00310	BOD 5 DAY		1.0000	MG/L	G	RLS	5/12/83	
00403	PH LAB		7.8000		G	LCC	5/10/83	
00410	T ALK CACO3		174.0000	MG/L	G	LCC	5/10/83	
00610	T NH3-N		0.0400	MG/L	G	ICB	5/05/83	
00615	T NO2-N		0.1300	MG/L	G	ICB	5/06/83	
00620	T NO3-N		0.4700	MG/L	G	ICB	5/06/83	
00665	PHOS-T MG/L		0.2600	MG/L	G	LBS	5/11/83	
00940	CHLORIDE		29.0000	MG/L	G	ICB	5/05/83	
00945	SO4 TOT		22.0000	MG/L	G	LBS	5/09/83	
00951	F,TOTAL		0.2400	MG/L	G	ICB	5/10/83	
01027	CD TOT UG/L		0.2100	UG/L	G	BHL	5/11/83	
01034	CR TOT UG/L		60.0000	UG/L	G	MRO	5/11/83	
01042	CU TOT UG/L		40.0000	UG/L	G	MRO	5/11/83	
01045	FE TOT		2930.0000	UG/L	G	MRO	5/11/83	
01051	PB,TOTAL		12.8000	UG/L	G	BHL	5/06/83	
01055	MN TOTAL		560.0000	UG/L	G	MRO	5/11/83	
01067	NI,TOTAL	<	10.0000	UG/L	G	MRO	5/11/83	
01092	ZN,TOT UG/L		60.0000	UG/L	G	MRO	5/11/83	
01105	AL,TOTAL		190.0000	UG/L	G	MRO	5/10/83	

SAMPLE COMMENTS
NO SAMPLE COMMENTS

TOTAL NUMBER TEST FOR THIS SAMPLE 20

ORIGINAL (Red)

5

ER-BL13
REV. 1-82

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF LABORATORIES

WATER OR WASTE QUALITY REPORT

ALL CHEMICAL ANALYSES EXPRESSED IN MG/L UNLESS OTHERWISE SPECIFIED

LAB. Number

Date Received

ORIGINAL (Red)

ESTABLISHMENT	CASE	FACILITY	COLL. NUMBER
Bishop Tube C			107

COUNTY	MUNICIPALITY	PROGRAM	COLL NAME	TYPE TR	STD ANALYSIS
Chester	E White	1W	Shaw	0	500

CARD (3)	ID CODE (ALL CARDS) 4-16	LATITUDE 4-10	LONGITUDE 11-18	DATE 19-24 (M D Y)	TIME 25-28 (Hr Min)	KIND 29
1 / 2	Cnty Mun T Est Case Fac		0	05 04 83	10 50	6

USGS-Q 30-34	BUREAU 35-37 AMIS	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RELATIVE POINT 58
	7 0 1	0 1 4 7 1 0 7	LITTLE MALLEY	

TRIBUTARY TO:

ADDITIONAL LAB ANALYSES

FULL DESCRIPTION WHERE SAMPLE TAKEN N. Side Rt 30

2 bottles

FIELD ANALYSES

Type Sample	59-60	5
Sc Sample	61-62	1
Reason Sampled	63-64	1
Composite Sample — Proportional Uniform	65	
Composite Sample — Temporal Spatial	66	
Composite Sample — Aliquots	67-68	
Flow — Estimated Measured	69	1
Condition — Above - 1, Below - 3, Normal - 2, No Flow - 4, Flood - 5	80	
CARD (2)		

Stream Flow-CFS	(00061)	
Stream Flow-MGD	(50051)	
Pipe Flow-MGD	(50050)	
Gage Reading-Ft	(00065)	
Temp (C)	(00010)	
pH	(00400)	
D.O.	(00300)	
Hal — Cl	(50060)	
Hal — Br	(71871)	
Hal — I	(71866)	
Spec Cond	(00094)	
Appearance	(46001)	
Odor	(01330)	

LAB ANALYSES

Chemist

Date Analyzed / /

Color	(00080)	
Turb	(00070)	
pH	(00403)	
Spec. Cond	(00095)	
Alk	(00410)	
pH4	(00436)	
pH8 Hot	(70508)	
pH8 Cold	(00435)	
T.O.C.	(00680)	
C.O.D.	(00340)	
5-Day BOD	(00310)	
P T	(00665)	✓
P TD	(00666)	
Al-Tot ug/l	(01105)	
Cd-Tot ug/l	(01027)	
Cr-Tot ug/l	(01034)	
Cu-Tot ug/l	(01042)	
Fe-Tot ug/l	(01045)	
Mn-Tot ug/l	(01055)	
Ni-Tot ug/l	(01067)	
Pb-Tot ug/l	(01051)	
Zn-Tot ug/l	(01092)	

Total Solids	(00500)	
Susp. Solids	(00530)	
Set Solids	(00545)	
Total Diss Solids	(00515)	
NO_2N	(00615)	
NO_3N	(00620)	
NH_3N	(00610)	
Kjel-N	(00625)	
Hardness	(00900)	
Ca	(00916)	
Mg	(00927)	
SO_4	(00945)	
Cl	(00940)	
F	(00951)	
MBAS	(38260)	
Phenols ug/l — Dr.	(46002)	
Phenols ug/l — Ds	(32730)	
Cyanide	(00720)	
____	(____)	
____	(____)	
____	(____)	

CUSTODY LOG

How Shipped truck Date 5/4 (day)

Legal Seal No.

Received by

Condition of Seal

ORIGINAL (Red)

WATER AND WASTEWATER REPORT
SAMPLE NUMBER - 8315408

COLLECTOR - (b) (4) [redacted]1 COLLECTOR NO - 0117107
ESTAB - BISHOP TUBE CO
CASE NAME -
FACILITY -
ID CODE - NONE WQN STATION NUMBER - 000
SAMPLING DATE - 5/04/83 TIME - 10:50 LAT - 00:00:00.0 LONG - 00:00:00.0

TYPE - 05 SOURCE - 01 STD ANAL - 500 RECEIVED ON - 5/05/83
REPORT REVIEWED BY DATE - 5/16/83

STORET	DESCRIPTION		RESULT	CONC	VERIFY BY		VERIFY DATE	COMM CODE
LABORATORY ANALYSIS :								
00310	BOD 5 DAY	<	0.2000	MG/L	G	RLS	5/12/83	
00403	PH LAB		7.6000		G	LCC	5/10/83	
00410	T ALK CACO3		38.0000	MG/L	G	LCC	5/10/83	
00530	RES TOT NONF		2.0000	MG/L	G	HMJ	5/06/83	
00610	T NH3-N		0.0100	MG/L	G	ICB	5/05/83	
00615	T NO2-N		0.0240	MG/L	G	ICB	5/06/83	
00620	T NO3-N		2.8600	MG/L	G	ICB	5/06/83	
00665	PHOS-T MG/L		0.0400	MG/L	G	LBS	5/11/83	
00940	CHLORIDE		25.0000	MG/L	G	ICB	5/05/83	
00945	SO4 TOT		24.0000	MG/L	G	LBS	5/09/83	
00951	F,TOTAL		0.8600	MG/L	G	ICB	5/10/83	
01027	CD TOT UG/L	<	0.2000	UG/L	G	BHL	5/11/83	
01034	CR TOT UG/L	<	10.0000	UG/L	G	MRO	5/11/83	
01042	CU TOT UG/L		10.0000	UG/L	G	MRO	5/11/83	
01045	FE TOT		110.0000	UG/L	G	MRO	5/11/83	
01051	PB,TOTAL	<	5.0000	UG/L	G	BHL	5/06/83	
01055	MN TOTAL		50.0000	UG/L	G	MRO	5/11/83	
01067	NI,TOTAL	<	10.0000	UG/L	G	MRO	5/11/83	
01092	ZN,TOT UG/L		15.0000	UG/L	G	MRO	5/11/83	
01105	AL,TOTAL		190.0000	UG/L	G	MRO	5/10/83	

SAMPLE COMMENTS
NO SAMPLE COMMENTS

TOTAL NUMBER TEST FOR THIS SAMPLE 20

ORIGINAL (Red)

7

Fixed Samples

SR-BL13
REV. 1-82

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF LABORATORIES

WATER OR WASTE QUALITY REPORT

ALL CHEMICAL ANALYSES EXPRESSED IN MG/L UNLESS OTHERWISE SPECIFIED

LAB. Number 35804

Date Received [redacted]

ORIGINAL (Red)

ESTABLISHMENT	CASE	FACILITY	COLL NUMBER
Bishop Tube Co			371

COUNTY	MUNICIPALITY	PROGRAM	COLL NAME	TYPE TR	STD ANALYSIS
Chester	E White	IW	Shrup	0	500

CARD (3)	ID CODE (ALL CARDS) 4-16	LATITUDE 4-10	LONGITUDE 11-15	DATE 19-24	TIME 25-28	KIND 29
1 / 2	Cnty Mun T Est Case Fac		0	M D Y: 12 09 82	Hr Min: 18 10	2

USGS-Q 30-34	BUREAU 35-37 AMIS	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RESERVE POINT 58
	701	011731	EFFLUENT	

TRIBUTARY TO:

FULL DESCRIPTION WHERE SAMPLE TAKEN

ADDITIONAL LAB ANALYSES

RECEIVED JAN 03 1983 ENVIRONMENTAL RESOURCES WATER QUALITY MANAGEMENT NORRISTOWN REGIONAL OFFICE

FIELD ANALYSES

Type Sample	59-60	3
Source of Sample	61-62	8
Reason Sampled	63-64	1
Composite Sample — Proportional Uniform	65	
Composite Sample — Temporal Spatial	66	
Aliquots	67-68	
Flow — Estimated Measured	69	
Condition (Above - 1, Below - 3, Normal - 2, No Flow - 4, Flood - 5)	80	
CARD (2)		

Stream Flow-CFS	(00061)	
Stream-MGD	(50051)	
Pipe Flow-MGD	(50050)	
Gage Reading-Ft	(00065)	
Temp (C)	(00010)	
pH	(00400)	
D.O.	(00300)	
Hal — Cl (50060)		
Hal — Br (71871)		
Hal — I (71866)		
Spec Cond	(00094)	
Appearance	(46001)	
Odor	(01330)	

LAB ANALYSES

Chemist

Color	(00080)	
Turb	(00070)	
pH	(00403)	
Spec. Cond	(00095)	
Alk	(00410)	
pH4	(00436)	
pH8 — Hot	(70508)	
pH8 — Cold	(00435)	
T.O.C.	(00680)	
C.O.D.	(00340)	
5-Day BOD	(00310)	
P — T	(00665)	✓
P — TD	(00666)	
Al-Tot ug/l	(01106)	
Cd-Tot ug/l	(01027)	
Cr-Tot ug/l	(01034)	
Cu-Tot ug/l	(01042)	
Fe-Tot ug/l	(01045)	
Mn-Tot ug/l	(01055)	
Ni-Tot ug/l	(01067)	
Pb-Tot ug/l	(01051)	
Zn-Tot ug/l	(01092)	

Date Analyzed

Total Solids		
Susp. Solids	(00530)	
Set Solids	(00545)	
Total Diss Solids	(00515)	
NO_3N	(00615)	
NO_2N	(00620)	
NH_3N	(00610)	
Kjel-N	(00625)	
Hardness	(00900)	
Ca	(00916)	
Mg	(00927)	
SO_4	(00945)	
Cl	(00940)	
F	(00951)	
MBAS	(38260)	
Phenols ug/l — Dr. (46002)		
Phenols ug/l — Ds (32730)		
Cyanide	(00720)	
____	(____)	
____	(____)	
____	(____)	

(8)

CUSTODY LOG

How Shipped Pump Date 12/9

Legal Seal No.

Received by

Condition of Seal

ORIGINAL

ORIGINAL (Red)

WATER AND WASTEWATER REPORT
SAMPLE NUMBER - 8235804

COLLECTOR - (b [redacted] COLLECTOR NO - 0117371
ESTAB - BISHOP TRIBE CO
CASE NAME -
FACILITY -
ID CODE - NONE WQN STATION NUMBER - 000

SAMPLING DATE - 12/09/82 TIME - 8:00 LAT - 00:00:00.0 LONG - 00:00:00.0
TYPE - 03 SOURCE - 08 STD ANAL - 500 RECEIVED ON - 12/10/82
SEAL NO(S)

REPORT REVIEWED BY _____ DATE - 12/21/82

STORET	DESCRIPTION	RESULT	CONC	VERIFY BY		VERIFY DATE	COMM CODE
LABORATORY ANALYSIS :							
00095	SPEC COND	341.0000		G	LCC	12/13/82	
00403	PH LAB	7.9000		G	HWS	12/13/82	
00530	RES TOT NONF	18.0000	MG/L	G	HMJ	12/15/82	
00610	T NH3-N	0.2500	MG/L	G	ICB	12/10/82	
00615	T NO2-N	0.0700	MG/L	G	ICB	12/13/82	
00620	T NO3-N	2.1300	MG/L	G	ICB	12/13/82	
00665	PHOS-T MG/L	0.2700	MG/L	G	BLF	12/16/82	
00940	CHLORIDE	27.0000	MG/L	G	ICB	12/13/82	
00951	F,TOTAL	0.4000	MG/L	G	ICB	12/15/82	

SAMPLE COMMENTS

NO SAMPLE COMMENTS
TOTAL NUMBER TEST FOR THIS SAMPLE 9

.700:509 CANDE 32.400; YOU ARE LABAP04(88)

ER-BL13
REV. 1-82

(1) Metals

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF LABORATORIES

WATER OR WASTE QUALITY REPORT

ALL CHEMICAL ANALYSES EXPRESSED IN MG/L UNLESS OTHERWISE SPECIFIED

LAB. Number [redacted]

Date Received

ORIGINAL (Red) 31883

ESTABLISHMENT	CASE	FACILITY	COLL NUMBER
Bishop Tube			52

COUNTY	MUNICIPALITY	PROGRAM	COLL NAME	TYPE TR	STD ANALYSIS
Chester	E White	10	Sump	0	500

CARD (3) 1/2	ID CODE (ALL CARDS) 4-16 Cnty / Mun / T / Est / Case / Fac	LATITUDE 4-10	LONGITUDE 11-18	DATE 19-24 M D Y	TIME 25-28 Hr Min	KIND 2
			0	03 17 83	8 30	6

USGS-Q 30-34	BUREAU 35-37 AMIS	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RELATIVE POINT 58
	701	0117052	CITTIE MALLEY	

TRIBUTARY TO:

FULL DESCRIPTION WHERE SAMPLE TAKEN

2 bottles

ADDITIONAL LAB ANALYSES

FIELD ANALYSES

Type Sample	59-60	5
S. of Sample	61-62	1
Reason Sampled	63-64	1
Composite Sample — Proportional Uniform	65	
Composite Sample — Temporal Spatial	66	
Aliquots	67-68	
Flow — Estimated Measured	69	
Condition — Above - 1, Below - 3, Normal - 2, No Flow - 4, Flood - 5	80	
→ CARD (2)		
Stream Flow-CFS	(00061)	
St flow-MGD	(50051)	
Pipe Flow-MGD	(50050)	
Gage Reading-Ft.	(00065)	
Temp (C)	(00010)	
pH	(00400)	
D.O.	(00300)	
Hal — Cl (50060) / Br (71871) / I (71866)		
Spec Cond	(00094)	
Appearance	(46001)	
Odor	(01330)	

LAB ANALYSES

Chemist

Date Analyzed / /

Color	(00080)	
Turb	(00070)	
pH	(00403)	
Spec. Cond	(00095)	
Alk	(00410)	
pH4	(00436)	
pH8 — Hot / Cold	(70508) (00435)	
T.O.C.	(00680)	
C.O.D.	(00340)	
5-Day BOD	(00310)	
P — T ✓ / TD	(00665) (00666)	
Al-Tot ug/l	(01106)	
Cd-Tot ug/l	(01027)	
Cr-Tot ug/l	(01034)	
Cu-Tot ug/l	(01042)	
Fe-Tot ug/l	(01045)	
Mn-Tot ug/l	(01055)	
Ni-Tot ug/l	(01067)	
Pb-Tot ug/l	(01051)	
Zn-Tot ug/l	(01092)	

Total Solids	(00500)	
Susp. Solids	(00530)	
Set Solids	(00545)	
Total Diss Solids	(00515)	
NO_2N	(00615)	
NO_3N	(00620)	
NH_3N	(00610)	
Kjel-N	(00625)	
Hardness	(00900)	
Ca	(00916)	
Mg	(00927)	
SO_4	(00945)	
Cl	(00940)	
F	(00951)	
MBAS	(38260)	
Phenols ug/l — Dr. (46002) / Ds (32730)		
Cyanide	(00720)	
____	(____)	
____	(____)	
____	(____)	

(10)

CUSTODY LOG

How Shipped Pure Date 3/17

Legal Seal No. (Red)

Received by

Condition of Seal

ORIGINAL

ORIGINAL

ORIGINAL (Red)

WATER AND WASTEWATER REPORT
SAMPLE NUMBER - 8308749

COLLECTOR - (b) (4) [redacted]1 COLLECTOR NO - 0117052
ESTAB - BISHOP TUBE
CASE NAME -
FACILITY -
ID CODE - NONE WQN STATION NUMBER - 000
SAMPLING DATE - 3/17/83 TIME - 8:30 LAT - 00:00:00.0 LONG - 00:00:00.0

TYPE - 05 SOURCE - 01 STD ANAL - 500 RECEIVED ON - 3/18/83
REPORT REVIEWED BY DATE - 3/28/83

STORET	DESCRIPTION		RESULT	CONC	VERIFY BY		VERIFY DATE	COMM CODE
LABORATORY ANALYSIS :								
00095	SPEC COND		270.0000		G	HWS	3/21/83	
00403	PH LAB		7.3000		G	HWS	3/19/83	
00515	RES DISS/105		224.0000	MG/L	G	HMJ	3/22/83	
00610	T NH3-N		0.0700	MG/L	G	WET	3/19/83	
00615	T NO2-N		0.0260	MG/L	G	WET	3/19/83	
00620	T NO3-N		2.8300	MG/L	G	WET	3/19/83	
00665	PHOS-T MG/L		0.0800	MG/L	G	ICB	3/22/83	
00940	CHLORIDE		29.0000	MG/L	G	WET	3/19/83	
00945	SO4 TOT		20.0000	MG/L	G	ICB	3/22/83	
00951	F,TOTAL		1.5000	MG/L	G	ICB	3/22/83	
01027	CD TOT UG/L	<	0.2000	UG/L	G	BHL	3/22/83	
01034	CR TOT UG/L	<	10.0000	UG/L	G	WET	3/25/83	
01042	CU TOT UG/L		10.0000	UG/L	G	WET	3/25/83	
01045	FE TOT		110.0000	UG/L	G	WET	3/25/83	
01051	PB,TOTAL	<	5.0000	UG/L	G	BHL	3/22/83	
01055	MN TOTAL		50.0000	UG/L	G	WET	3/25/83	
01067	NI,TOTAL		10.0000	UG/L	G	WET	3/25/83	
01092	ZN,TOT UG/L		20.0000	UG/L	G	WET	3/25/83	
01105	AL,TOTAL		220.0000	UG/L	G	ICB	3/23/83	

SAMPLE COMMENTS
NO SAMPLE COMMENTS

TOTAL NUMBER TEST FOR THIS SAMPLE 19

ORIGINAL (Red)

11

Fixed Samples

ER-BL13
REV. 1-82

① Metals

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF LABORATORIES

WATER OR WASTE QUALITY REPORT

ALL CHEMICAL ANALYSES EXPRESSED IN MG/L UNLESS OTHERWISE SPECIFIED

35805

LAB. Number [redacted]

Date Received 121[redacted]

ORIGINAL

ESTABLISHMENT	CASE	FACILITY	COLL NUMBER
Bishop Tube			372

COUNTY	MUNICIPALITY	PROGRAM	COLL NAME	TYPE TR	STD ANALYSIS
Chester	E White	IW	Sheep	0	500

CARD (3) 1/2	ID CODE (ALL CARDS) 4-16 Cnty Mun T Est Case Fac	LATITUDE 4-10	LONGITUDE 11-18	DATE 19-24 M D Y	TIME 25-28 Hr Min	KIND 29
			0	12 09 82	8 45	6

USGS-Q 30-34	BUREAU 35-37 AMIS	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RELATIVE POINT 58
	701	0117372	LITTLE VALLEY	

TRIBUTARY TO:

FULL DESCRIPTION WHERE SAMPLE TAKEN Clouses

2 bottles

ADDITIONAL LAB ANALYSES

RECEIVED JAN 03 19[illegible]

ENVIRONMENTAL WATER QUALITY MANAGEMENT NORRISTOWN REGIONAL OFFICE

FIELD ANALYSES

Type Sample	59-60	5
Type of Sample	61-62	1
Season Sampled	63-64	1
Composite Sample — Proportional Uniform	65	
Temporal Spatial	66	
Aliquots	67-68	
Flow — Estimated Measured	69	
Condition — Above - 1, Below - 3, Normal - 2, No Flow - 4, Flood - 5	80	
→ CARD (2)		
Stream Flow-CFS	(00061)	
Flow-MGD	(50051)	
Pipe Flow-MGD	(50050)	
Gage Reading-Ft.	(00065)	
Temp (C)	(00010)	
pH	(00400)	
D.O.	(00300)	
Cl (50060)		
Br (71871)		
I (71866)		
Spec Cond	(00094)	
Appearance	(46001)	
Color	(01330)	

LAB ANALYSES

Chemist

Color	(00080)	
Turb	(00070)	
pH	(00403)	
Spec. Cond	(00095)	
Alk	(00410)	
pH4	(00436)	
pH8 Hot	(70508)	
pH8 Cold	(00435)	
T.O.C.	(00680)	
C.O.D.	(00340)	
5-Day BOD	(00310)	
P T ✓	(00665)	
P TD	(00668)	
Al-Tot ug/l	(01105)	
Cd-Tot ug/l	(01027)	
Cr-Tot ug/l	(01034)	
Cu-Tot ug/l	(01042)	
Fe-Tot ug/l	(01045)	
Mn-Tot ug/l	(01055)	
Ni-Tot ug/l	(01067)	
Pb-Tot ug/l	(01051)	
Zn-Tot ug/l	(01092)	

Date Analyzed

Total Solids	(00500)	
Susp. Solids	(00530)	
Set Solids	(00545)	
Total Diss Solids	(00515)	
NO_3N	(00615)	
NO_2N	(00620)	
NH_3N	(00610)	
Kjel-N	(00625)	
Hardness	(00900)	
Ca	(00916)	
Mg	(00927)	
SO_4	(00945)	
Cl	(00940)	
F	(00951)	
MBAS	(38260)	
Phenols ug/l Dr. (46002)		
Phenols ug/l Ds (32730)		
Cyanide	(00720)	
____	(____)	
____	(____)	
____	(____)	

CUSTODY LOG

Flow Shipped Purol Date 12/9

Legal Seal No.

Received by

Condition of Seal

ORIGINAL

(12)

ORIGINAL (Red)

WATER AND WASTEWATER REPORT
SAMPLE NUMBER - 8235805

COLLECTOR - (b) (4) [redacted] COLLECTOR NO - 0117372
ESTAB - BISHOP TRIBE
CASE NAME -
FACILITY -
ID CODE - NONE WQN STATION NUMBER - 000

SAMPLING DATE - 12/09/82 TIME - 8:15 LAT - 00:00:00.0 LONG - 00:00:00.0
TYPE - 05 SOURCE - 01 STD ANAL - 500 RECEIVED ON - 12/10/82
SEAL NO(S)

REPORT REVIEWED BY _____ DATE - 12/21/82

STORET	DESCRIPTION		RESULT	CONC	VERIFY BY	VERIFY DATE	COMM CODE
LABORATORY ANALYSIS :							
00095	SPEC COND		326.0000		G	LCC	12/13/82
00403	PH LAB		7.7000		G	HWS	12/13/82
00610	T NH3-N		0.3000	MG/L	G	ICB	12/10/82
00615	T NO2-N		0.0360	MG/L	G	ICB	12/13/82
00620	T NO3-N		2.8200	MG/L	G	ICB	12/13/82
00665	PHOS-T MG/L		0.1300	MG/L	G	BLF	12/16/82
00940	CHLORIDE		31.0000	MG/L	G	ICB	12/13/82
00951	F,TOTAL		2.1000	MG/L	G	ICB	12/15/82
01027	CD TOT UG/L	<	0.2000	UG/L	G	BHL	12/14/82
01034	CR TOT UG/L		30.0000	UG/L	G	LBS	12/17/82
01042	CU TOT UG/L		20.0000	UG/L	G	LBS	12/17/82
01045	FE TOT		90.0000	UG/L	G	LBS	12/17/82
01051	PB,TOTAL	<	5.0000	UG/L	G	BHL	12/14/82
01055	MN TOTAL		100.0000	UG/L	G	LBS	12/17/82
01067	NI,TOTAL		80.0000	UG/L	G	LBS	12/17/82
01092	ZN,TOT UG/L		40.0000	UG/L	G	LBS	12/17/82
01105	AL,TOTAL		450.0000	UG/L	G	ICB	12/20/82

SAMPLE COMMENTS

NO SAMPLE COMMENTS
TOTAL NUMBER TEST FOR THIS SAMPLE 17

#B6700:509 CANDE 32.400; YOU ARE LABAP04(88)

ORIGINAL (Red)

ER-BL13
REV. 1-82

① initials

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF LABORATORIES

WATER OR WASTE QUALITY REPORT

ALL CHEMICAL ANALYSES EXPRESSED IN MG/L UNLESS OTHERWISE SPECIFIED

LAB. Num[redacted] 2815

Date Rec[redacted]

ORIGINAL (Red)

ESTABLISHMENT	CASE	FACILITY	COLL NUMBER
Bishop Tube Co			348

COUNTY	MUNICIPALITY	PROGRAM	[redacted]	TYPE TR	STD ANALYSIS
Chester	E White	IW	(b) (4)	0	500

CARD (3)	ID CODE (ALL CARDS) 4-16 Cnty	Mun	T	Est	Case	Fac	LATITUDE 4-10	LONGITUDE 11-18	DATE 19-24 M D Y	TIME 25-28 Min	KIND 29
1 / 2								0	11 15 82	14 40	6

USGS-Q 30-34	BUREAU 35-37 AMIS	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RELATIVE POINT 58
	7 0 1	0 1 1 7 3 4 8	L I T T L E M A G L E	

TRIBUTARY TO:

FULL DESCRIPTION WHERE SAMPLE TAKEN No. of Rt 30

2 bottles

RECEIVED DEC 29 1982 ENVIRONMENTAL RESOURCES WATER QUALITY MANAGEMENT NORRISTOWN REGIONAL OFFICE

ADDITIONAL LAB ANALYSES

FIELD ANALYSES

Type Sample	59-60	5
So[illegible] Sample	61-62	1
Reason Sampled	63-64	1
Composite Sample — Proportional Uniform	65	
Composite Sample — Temporal Spatial	66	
Composite Sample — Aliquots	67-68	
Flow — Estimated Measured	69	
Condition — Above - 1, Normal - 2, Flood - 5, Below - 3, No Flow - 4	80	

CARD (2)

Stream Flow-CFS	(00061)	
Sur[illegible] -MGD	(50051)	
Pipe Flow-MGD	(50050)	
Gage Reading-Ft.	(00065)	
Temp (C)	(00010)	
pH	(00400)	
D.O.	(00300)	
Hal — Cl (50060)		
Hal — Br (71871)		
Hal — I (71866)		
Spec Cond	(00094)	
Appearance	(46001)	
Odor	(01330)	

LAB ANALYSES

Chemist _____ Date Analyzed ___/___/___

Color	(00080)	
Turb	(00070)	
pH	(00403)	
Spec. Cond	(00095)	
Alk	(00410)	
pH4	(00436)	
pH8 Hot	(70508)	
pH8 Cold	(00435)	
T.O.C.	(00680)	
C.O.D.	(00340)	
5-Day BOD	(00310)	
P T	(00665)	✓
P TD	(00666)	
Al-Tot ug/l	(01105)	
Cd-Tot ug/l	(01027)	
Cr-Tot ug/l	(01034)	
Cu-Tot ug/l	(01042)	
Fe-Tot ug/l	(01045)	
Mn-Tot ug/l	(01055)	
Ni-Tot ug/l	(01067)	
Pb-Tot ug/l	(01051)	
Zn-Tot ug/l	(01092)	

Total Solids	(00500)	
Susp. Solids	(00530)	
Set Solids	(00545)	
Total Diss Solids	(00515)	
NO_2N	(00615)	
NO_3N	(00620)	
NH_3N	(00610)	
Kjel-N	(00625)	
Hardness	(00900)	
Ca	(00916)	
Mg	(00927)	
SO_4	(00945)	
Cl	(00940)	
F	(00951)	
MBAS	(38260)	
Phenols ug/l — Dr.	(46002)	
Phenols ug/l — Ds	(32730)	
Cyanide	(00720)	
_____	(_____)	
_____	(_____)	
_____	(_____)	

(14)

ORIGINAL (Red)

CUSTODY LOG

How Shipped Rush Date 11/15

Legal Seal No. _____

Received by _____

Condition of Seal _____

ORIGINAL

ORIGINAL (Red)

WATER AND WASTEWATER REPORT
SAMPLE NUMBER - 8232815

COLLECTOR - (b) (4) [redacted] COLLECTOR NO - 0117348
ESTAB - BISHOP TUBE CO
CASE NAME -
FACILITY -
ID CODE - NONE WQN STATION NUMBER - 000

E. White, Chem Co

SAMPLING DATE - 11/15/82 TIME - 14:40 LAT - 00:00:00.0 LONG - 00:00:00.0
TYPE - 03 SOURCE - 01 STD ANAL - 500 RECEIVED ON - 11/16/82
SEAL NO(S)

REPORT REVIEWED BY [signature] DATE - 12/01/82

STORET	DESCRIPTION		RESULT	CONC	VERIFY BY	VERIFY DATE	COMM CODE
ABORATORY ANALYSIS :							
00095	SPEC COND		348.0000		G	LCC	11/16/82
00403	PH LAB		8.0000		G	HWS	11/17/82
00410	T ALK CACO3		78.0000	MG/L	G	HWS	11/19/82
00610	T NH3-N		0.3600	MG/L	G	ICB	11/16/82
00615	T NO2-N		0.0320	MG/L	G	ICB	11/16/82
00620	T NO3-N		3.2800	MG/L	G	ICB	11/16/82
00665	PHOS-T MG/L		0.1100	MG/L	G	BLF	11/26/82
00900	T HARD CACO3		110.0000	MG/L	G	ICB	11/18/82
00916	CA,TOTAL		33.4000	MG/L	G	MRO	11/23/82
00927	MG TOT MG/L		10.9000	MG/L	G	MRO	11/23/82
00940	CHLORIDE		32.0000	MG/L	G	ICB	11/16/82
00945	SO4 TOT		25.0000	MG/L	G	ICB	11/18/82
00951	F,TOTAL		3.4000	MG/L	G	ICB	11/22/82
01027	CD TOT UG/L		0.2000	UG/L	G	BHL	11/19/82
01034	CR TOT UG/L		30.0000	UG/L	G	LBS	11/30/82
01042	CU TOT UG/L		10.0000	UG/L	G	LBS	11/30/82
01045	FE TOT		70.0000	UG/L	G	LBS	11/30/82
01051	PB,TOTAL	<	5.0000	UG/L	G	BHL	11/19/82
01055	MN TOTAL		80.0000	UG/L	G	LBS	11/30/82
01067	NI,TOTAL		30.0000	UG/L	G	LBS	11/30/82
01092	ZN,TOT UG/L		20.0000	UG/L	G	LBS	11/30/82
01105	AL,TOTAL		600.0000	UG/L	G	MRO	11/24/82

SAMPLE COMMENTS
NO SAMPLE COMMENTS

#B6700:509 CANDE 32.400; YOU ARE LABAP04(88)

ORIGINAL (Red)

ORIGINAL (Red)

REFERENCE NO. 11

ORIGINAL
(Red)

HAZARDOUS WASTE INSPECTION REPORT
TSD Facilities - Part A

Date of inspection 10/25/83 Time start 0800 Time finish

Name of inspector Frank Holmes

Company, installation name Bishop Tube Co.

Location Rt 30 and Malin Rd. Frazer

County Chester Municipality E. Whiteland Twp

Identification number PAD086309

Name of responsible official Melissa Johnson

Title Project Engineer

Mailing address Rt 30 + Malin Rd. Frazer, Pa 19355

Area code and phone no. 215-647-3450

Name of person interviewed (b) (4) [redacted]

Title

Mailing address (if different from above)

Area code and phone no.

1. Site characterization:

a. ☐ Treatment - ☐ surface impoundments, ☐ chemical, ☐ physical, ☐ biological

b. ☒ Storage - ☒ containers, ☒ tanks, ☐ surface impoundments, ☐ waste piles

c. ☐ Disposal - ☐ land treatment, ☐ landfill, ☐ incineration, ☐ thermal treatment

d. ☐ Use, ☐ reuse, ☐ recycle, ☐ reclaim

2. Does the facility generate hazardous wastes? ☐ Yes ☒ No

3. Types of hazardous waste produced by Hazardous Waste Number:

N/A

4. Are hazardous wastes transported off-site by the facility? ☐ Yes ☒ No

HAZARDOUS WASTE INSPECTION REPORT
TSD FACILITIES - PART B General p.1

ORIGINAL (Red)

1- NON-COMPLIANCE, 2- COMPLIANCE, 3- NOT APPLICABLE, 4- NOT DETERMINED

COMPLIANCE STATUS 1	2	3	4	REQUIREMENT	CHAPTER CITATION 75.265
	X			Part A permit application submitted	(a) (2), (z)
	X			Identification number	(b)
		X		Wastes accepted at facility transported by haulers licensed to transport hazardous waste by the Department	(b) (1)
		X		Waste streams not covered by permit approved by the Department before acceptance	(c) (
		X		Chemical and physical analyses repeated as required	(c) (1)
		X		All waste shipments inspected and sampled	(c) (2)
		X		Waste analysis plan on-site	(c) (3)
	X			24 hr. surveillance at active portion	(d) (2) (i
	X			Artificial barrier at active portion	(d) (2) (i
	X			Proper signs posted and legible at a distance of at least 25 ft.	(d) (3)
	X			Inspection schedule on-site	(e) (2)
	X			Maintenance schedule on-site for equipment or structures which reveal deterioration or malfunction	(e) (4)
	X			Immediate remedial action taken where a hazard is imminent or has already occurred	(e) (4)
	X			On the job or classroom personnel training program	(f)
	X			Records retained for each employee at facility of training, job title, and job description	(f) (6), (
		X		Ignitable or reactive wastes separated from source of ignition or reaction	(g) (1)
		X		No smoking signs displayed where there are hazards from ignitable or reactive wastes	(g) (1)
		X		Treatment, storage, disposal of ignitable or reactive wastes or mixing of incompatible wastes or materials conducted according to requirements	(g) (2)
	X			Facility equipped with internal alarm system capable of providing immediate emergency instruction to personnel	(h) (2) (
	X			Facility equipped with a device for summoning outside emergency assistance	(h) (2) (
	X			Facility equipped with fire control, spill control, and decontamination equipment	(h) (2) (
	X			Facility equipped with water at adequate volume and pressure to supply fire control equipment	(h) (2) (
	X			Facility communications or alarm systems, fire control, spill control, and decontamination equipment tested and maintained.	(h) (3)
	X			Adequate aisle space maintained to allow unobstructed movement of personnel and equipment during emergencies	(h) (6)
	X			Contingency plan on-site and implemented	(i) (1)
	X			Contingency plan describes action taken by personnel in the event of an emergency	(i) (3)

HAZARDOUS WASTE INSPECTION REPORT
TSD FACILITIES - PART B General p.2.

ORIGINAL (Red)

1-NON-COMPLIANCE, 2-COMPLIANCE, 3-NOT APPLICABLE, 4-NOT DETERMINED

COMPLIANCE STATUS 1	2	3	4	REQUIREMENT	CHAPTER CITATION 75.265
	X			Contingency plan contains an up-to-date list of names, addresses and phone numbers of all persons qualified to act as emergency coordinator.	(i) (6)
	X			Contingency plan contains list of emergency equipment including location, physical description and capabilities of each item	(i) (7)
	X			Contingency plan contains an evacuation plan if there is a possibility that evacuation could be necessary	(i) (8)
	X			One employee designated as the primary emergency coordinator either on the premises or on call.	(i) (11)
		X		Facility accepting only PA manifests	(j)
	X			Manifests properly completed and routed within time limits (24 hrs.)	(j) (2) (3
		X		Manifest discrepancies resolved or reported within time limits	(j) (10)
	X			Written operating record maintained on the premises	(k)
	X			Written operating record contains description and quantity of wastes and method of treatment, storage or disposal	(k) (2) (i
	X			Written operating record contains location and quantity of each hazardous waste	(k) (2) (i
		X		Written operating record contains results of waste analyses and treatability tests	(k) (2) (i
	X			Written operating record contains reports and details of all incidents	(k) (2) (i
	X			Written operating record contains records and results of all inspections	(k) (2) (i
		X		Written operating record contains required monitoring, testing, and analytical data	(k) (2) (i
		X		Written operating record contains closure and post-closure cost estimates	(k) (2) (i
	X			All records retained on premises and available for inspection	(l)
	X			Quarterly reports submitted to the Department	(m)
	X			Emissions, discharges, fires, explosions, and groundwater contamination reported as required	(m) (2)
		X		Groundwater monitoring wells located at approved sites	(n) (2)
		X		Adequate protection of groundwater monitoring wells	(n) (7)
		X		Groundwater sampling and analysis plan on the premises	(n) (8)
		X		Groundwater quality assessment and abatement outline on the premises	(n) (14)
	X			Closure plan on the premises and up-to-date	(o) (2) -
		X		Post-closure plan on the premises and up-to-date	(o) (10)
	X			Annual closure cost estimate on the premises and up-to-date	(p) (2) -
		X		Annual post-closure cost estimate on the premises and up-to-date	(p) (5) -

④

TREATMENT, STORAGE, DISPOSAL FACILITIES - STORAGE (Containers and Tanks) 10/25/83

ORIGINAL (Red)

75.265

1-NON-COMPLIANCE, 2-COMPLIANCE, 3-NOT APPLICABLE, 4-NOT DETERMINED

ORIGINAL (Red)

COMPLIANCE STATUS 1	2	3	4	REQUIREMENT	CHAPTER CITATION
	X			Containers managed to prevent leaks and spills	(q)(1),(
	X			Containers are compatible with waste stored.	(q)(2)
	X			Containers are closed during storage	(q)(3)
	X			Container storage area inspected weekly for leaks, deterioration, etc.	(q)(5)
		X		Containers holding ignitable or reactive wastes are set back 15 m (50 ft) from property line.	(q)(6)
		X		Satisfactory procedures followed for handling incompatible wastes.	(q)(7),(
		X		Incompatible wastes separated or protected from other materials.	(q)(9)
	X			Containers and tanks labeled to identify accurately hazardous waste contained.	Act 97 Section 403(b)
		X		Precautions taken for tanks holding ignitable, reactive, or incompatible waste or material	(r)(2)
	X			Tanks managed to prevent leaks, rupture, corrosion, or otherwise failing.	(r)(3)
		X		Uncovered tanks operated to ensure at least 60 cm (2 ft) of freeboard.	(r)(4)
		X		Uncovered tanks equipped with an overflow alarm and an overflow device to a standby tank with a capacity equal to or exceeding the freeboard requirement	(r)(4)
		X		Continuously fed tanks equipped with a means to stop the inflow.	(r)(5)
X				Containment structure with a capacity that equals or exceeds the largest above ground tank volume plus a reasonable allowance for precipitation based on local weather conditions and plant operations provided for liquid storage in above ground or partially above ground tanks.	(r)(6)
		X		Waste analyses and/or trial tests conducted on hazardous wastes substantially different from wastes previously treated or stored; or chemically treat hazardous waste with a substantially different process than any previously used in that tank.	(r)(7)
	X			Discharge control equipment inspected once each operating day.	(r)(8)(
		X		Monitoring equipment data inspected once each operating day.	(r)(8)(
	X			Liquid level of tanks inspected once each operating day.	(r)(8)(
	X			Construction materials of tanks inspected weekly.	(r)(8)(
		X		Construction materials of discharge confinement structures and area immediately surrounding inspected weekly.	(r)(8)(
		X		All hazardous waste removed from tanks and related appurtenances at closure.	(r)(9)
		X		Placement of ignitable or reactive waste only with the Department's approval	(r)(10)
		X		Covered tanks in which ignitable or reactive waste is treated or stored meets NFPA buffer zone requirements.	(r)(11)

[redacted] (5)

ORIGINAL (Red)

HAZARDOUS WASTE INSPECTION REPORT
Part C - Comments

Date of inspection 10/25/83 Identification number PAD081868309

Company, Installation name Bishop Tube Co.

County Chester Municipality E. Whiteland

ORIGIN. (Red)

The following violations were observed at the time of my inspection

1. The outside hazardous waste storage tank are not contained. This will be contained by Jan. 1984

2. A small valve is leaking on one of the acid rinse water tank. It will be replaced with a locking valve by Nov. 15, 1983.

This inspection report is official notification that a representative of the Department of Environmental Resources, Bureau of Solid Waste Management, inspected the above installation. The findings of this inspection are shown in this report. Any violations which were uncovered during the inspection are indicated. Violations may also be discovered upon examination of the results of laboratory analyses and review of Department records. Notification will be forthcoming, confirming any violations indicated herein and listing any additional violations.

Person Interviewed (signature) [redacted] (b) (4) Date 10/25/83

Inspector (signature) [signature] Date 10/25/83

ORIGINAL
(Red)

REFERENCE NO. 12

ORIGINAL (Red)

Department of Environmental Resources

1875 New Hope Street
Norristown, PA 19401
215 631-2420

November 3, 1983

Mr. Hiers Johnson
Bishop Tube Company
Route 30 and Malin Road
Frazer, PA 19355

Re: Hazardous Waste Inspection
October 25, 1983

NOTICE OF VIOLATION

Dear Mr. Johnson:

This letter is to confirm the findings of the Department's referenced inspection of your hazardous waste activities. Requirements for hazardous waste facilities are contained in Chapters 75.260 through 75.267 of the Rules and Regulations of the Department. Violations of applicable sections of these regulations found during our inspection are as follows:

1. The outside hazardous waste storage tanks are not contained. 75.265(r)(6).

2. A small valve leaking on one of the acid rinse water tanks. 75.265(h)(1).

You are hereby notified of both the existence of these violations as well as the need to provide for their prompt correction. Toward this end, you are to submit to the Department within fourteen (14) days a proposed program and schedule for abatement of these violations. The Department's inspection report contains time periods of completion of remedial actions. These reports are either enclosed or have been previously supplied to you. If your proposed abatement program indicates certain corrections cannot be completed within these time periods, you are requested to supply justification for any extensions.

This letter does not waive, either expressly or by implication, the power or authority of the Commonwealth of Pennsylvania to prosecute for any and all violations of law arising prior to or after the issuance of this letter or the conditions upon which the letter is based. This letter shall not be construed so as to waive or impair any rights of the Department of Environmental Resources, heretofore or hereafter existing.

ORIGINAL (Red)

This letter shall also not be construed as a final action of the Department of Environmental Resources.

If you have any questions concerning this matter, please feel free to contact me at 631-2420.

Very truly yours,

FRANK HOLMES
Solid Waste Specialist

cc: D. Beitler
M. Shup, Water Quality Management
Division of Hazardous Waste
Re FR6-35

ORIGINAL
(Red)

REFERENCE NO. 13

Bishop Tube Co.

ROUTE 30 AND MALIN ROAD
FRAZER, PENNSYLVANIA 19355

PHONE: (215) 647-3450 TWX 510-668-5428 TELEX 83-4511

DER-R
NORRISTOWN
NOV 22 1983
ORIGINAL
(Red)

ORIGINAL
(Red)

November 18, 1983

Pennsylvania Department of Environmental Resources
1875 New Hope Street
Norristown, PA 19401

Attention: Mr. Frank Holmes

Reference: Notice of Violation re Hazardous Waste Inspection on October 25, 1983

Gentlemen:

The referenced letter was not received until November 15, as I told Mr. Victor Janosik by telephone today.

The leaking valve was turned off upon discovery and was corrected right after Mr. Holmes departed. The plastic valve that was dripping had the handle installed backwards, so that the valve could be rotated past the OFF position. I turned the valve off, removed the handle and put it into my desk drawer. I am the only person who uses that sampling valve.

Workman had been working in that area on October 26, installing a filler pipe for the new hydrofluoric acid storage tank. Evidentially someone bumped into that sampling valve and moved the handle just enough to cause it to drip. We are confident that removing the valve handle will prevent reoccurrence.

Containment of the outside hazardous waste storage tanks will be proposed by a plan to be submitted by Bishop Tube by December 15, 1983.

Bishop Tube's Part B application to D.E.R. is due by December 1, only six working days from today. In that application we shall state that a plan for

ORIGINAL (Red)

ORIGINAL
(Red)

containment will be submitted by December 15. There is just not enough time to submit that plan earlier.

We respectfully request that the additional time for submission of the plan for containment be approved.

Very truly yours,

BISHOP TUBE COMPANY

Miers C. Johnson

Miers C. Johnson
Project Engineer

ORIGINAL
(Red)

REFERENCE NO. 14

ORIGINAL (Red)

Department of Environmental Resources
1875 New Hope Street
Norristown, PA 19401
215 631-2415

February 10, 1982

Christiana Metals Corporation
200 East Rosedale Avenue
West Chester, PA 19380

Attention: Mr. D.W. Hedges
President

CONSENT ORDER AND AGREEMENT

NOW, THEREFORE, on this _____ day of February, 1982 after full and complete negotiations of all matters set forth in this Consent Order and Agreement, both the Department and Bishop Tube Company ("Bishop Tube"), upon mutual exchange of covenants herein and intending to be legally bound by this Consent Order and Agreement, agree as follows:

1. Bishop Tube, Route 30 and Malin Road, Frazer, Chester County, Pennsylvania, is a Division of Christiana Metals Corporation, 200 East Rosedale Avenue, West Chester, Chester County, Pennsylvania; and,

2. Bishop Tube is a corporation qualified to do business in the Commonwealth of Pennsylvania; and,

3. On June 9, 1981 nitric acid from a storage tank outside of Bishop Tube entered an adjacent hydrofluoric acid storage tank through a common piping connection and caused the release of acid fumes from the vent for the hydrofluoric acid tank. These fumes were carried by the prevailing winds eastward toward the General Warren Village housing development. About 500 residents of the village were evacuated from their homes for about four hours to escape the effects of the fumes. Eleven people were treated at Paoli Memorial Hospital for various respiratory ailments, nausea, etc. and released. One fireman was admitted for further treatment and released on June 13, 1981; and,

4. On June 10, 1981 the mixed acid sludge remaining in the hydrofluoric acid storage tank after it was drained following the fuming incident on June 9, 1981 ate through the bottom of the tank and caused a second release of acid fumes. Residents of General Warren Village were again evacuated from their homes as a precautionary measure. Five people were treated for respiratory problems at Paoli Memorial Hospital and released; and,

ORIGINAL (Red)

5. The Commonwealth of Pennsylvania, Department of Environmental Resources ("Department") has determined that the above mentioned fuming incidents caused injury to trees downwind of Bishop Tube; and,

6. The Department has determined that the fugitive and malodorous emissions from Bishop Tube's hydrofluoric acid storage tank on June 9 and 10, 1981 were in violation of Sections 8 and 13 of the Air Pollution Control Act, 35 P.S. Section 4001, et seq ("Act") and Sections 121.7, 123.1 and 123.31 of Chapters 121 and 123 of the Rules and Regulations of the Department, 25 Pa. Code Chapters 121 and 123 ("Rules and Regulations"); and,

7. Subsequent to the two fuming incidents in June, 1981 the Department determined that malodorous emissions from Bishop Tube's "pickle house" enter the outdoor atmosphere under normal operating conditions in violation of Section 123.31 of the Department's Rules and Regulations; and,

8. Bishop Tube has indicated its willingness to comply with the Act and the air pollution regulations promulgated thereunder; and,

9. The Department and Bishop Tube met on October 5, 1981 and agreed to settle voluntarily the Department's claim for civil penalties against Bishop Tube for the fugitive and malodorous emissions that occurred on June 9 and 10, 1981 on the basis of Bishop Tube's payment of Ten Thousand Dollars ($10,000.00) to the Clean Air Fund of Pennsylvania.

10. Bishop Tube shall make payment of Four Hundred Dollars ($400.00) immediately upon execution of this agreement. The remaining Nine Thousand Six Hundred Dollars ($9,600.00) shall be payable in monthly installments of Eight Hundred Dollars ($800.00) each due on the tenth day of the month. The first monthly payment is due March 10, 1982. All checks shall be made payable to "Clean Air Fund of Pennsylvania" and be forwarded to:

Mr. Morris Malin, Chief
Division of Abatement and Compliance
Bureau of Air Quality Control
18th Floor, Fulton Building
200 North Third Street
Harrisburg, PA 17120

Payments shall be acompanied by form No. ER-AQ-3, a copy of which is attached hereto.

ORIGINAL (Red)

11. In order to bring its "pickle house" into compliance with the Air Pollution Control Act and all applicable provisions of the Department's Rules and Regulations during normal operations, Bishop Tube shall:

    a. On or before February 28, 1982 submit to the Department's Norristown Regional Office two (2) copies of an application for Plan Approval to construct and operate a new packed tower scrubber to control acid fumes from the "pickle house". By issuing any such Plan Approval, the Department does not represent, guarantee or stipulate that said installation will bring Bishop Tube's "pickle house" into compliance with the Air Pollution Control Act and the Rules and Regulations of the Department. Vents from the outside storage tanks for hydrofluoric acid and nitric acid shall be tied into the new packed tower scrubber along with all acid pickling tanks located inside the plant.

    b. On or before April 30, 1982 place purchase orders for the new packed tower scrubber to be installed on the "pickle house". Proof thereof by confirming letter shall be submitted to the Department within ten (10) days after such orders are placed.

    c. On or before July 31, 1982 begin on-site construction or installation of the new packed tower scrubber for the "pickle house' that has been given Plan Approval by the Department.

    d. On or before September 30, 1982 complete on-site construction or installation of the new packed tower scrubber for the "pickle house" that has been given Plan Approval by the Department.

    e. On and after October 31, 1982 operate the "pickle house" in compliance with all applicable provisions of the Air Pollution Control Act and all applicable Rules and Regulations of the Department.

12. In the event that Bishop Tube fails to comply with the final compliance date of October 31, 1982 specified in Paragraph 11(e) above, Bishop Tube shall make an additional payment of Eight Hundred Dollars ($800.00) per month to the Clean Air Fund of Pennsylvania until final compliance is achieved. In no event shall final compliance be delayed beyond December 31, 1982. Payment shall be made in the same manner as described in Paragraph 10 above.

13. Commencing on January 1, 1982, Bishop Tube shall prepare to submit to the Department's Norristown Regional Office quarterly progress reports

ORIGINAL (Red)

including, inter alia, information on the availability of equipment and materials, until such time as Bishop Tube is notified in writing by the Department that such reports are no longer necessary to effectuate the purposes of this Order. Progress reports shall be due on April 15, 1982; July 15, 1982; October 15, 1982; and January 15, 1983, at a minimum.

14. During the time period covered by this Consent Order and Agreement, Bishop Tube shall take all reasonable interim measures suggested by the Department to keep the above-described malodorous emissions to a minimum.

15. Nothing herein shall be construed to preclude Bishop Tube from discontinuing the operation of any source of air pollution which is the subject of this Consent Order and Agreement. Any such discontinuance shall, for the duration thereof, have the same effect as compliance with the Department's Regulations. However, if Bishop Tube does discontinue said source's operation, it shall promptly so notify the Department in writing. Notwithstanding any provisions of this Consent Order and Agreement, if a source is out of operation for one year or more, it shall be subject to Section 127.11 of the Department's Regulations.

16. In the event that Bishop Tube fails to comply with Paragraph 11 by the dates specified therein and said failure is caused by strikes, lockouts, floods, fire, explosions, extraordinary weather conditions, vandalism, riots, wars, sabotage, civil disturbances, or any other cause beyond the control of Bishop Tube, Acts of God, or delays in the construction, installation, or delivery of equipment or material, which delays are not within the control of Bishop Tube, its agents, servants, employees, successors and assigns, or which Bishop Tube by exercising reasonable diligence is unable to prevent, then Bishop Tube shall be relieved of its obligations to comply with Paragraph 11 within the times specified therein and the time for compliance shall be extended one day for each day of delay so incurred. Bishop Tube shall be entitled to the benefits of this paragraph only if it submits a written report within fifteen (15) days of the occurrence of each delay to the Regional Air Pollution Control Engineer explaining the reasons for such delay.

17. This Consent Order and Agreement shall have the force, effect and be enforceable as an Order of the Department issued pursuant to the Pennsylvania Air Pollution Control Act. Bishop Tube, recognizing its right to appeal any Order of the Department, hereby waives its right to appeal this Order.

ORIGINAL (Red)

18. So long as Bishop Tube complies with the provisions and requirements set forth in this Consent Order and Agreement within the times specified for such performance, unless otherwise excused hereunder, the Department shall not institute any action at law or in equity for the violations of the laws of the Commonwealth alleged in Paragraph 3-7 hereof; but, if Bishop Tube fails to fully comply with the provisions and requirements hereof in a timely manner, unless otherwise excused hereunder, the Department reserves the right to institute any appropriate action based upon any violation whether or not said violation predates Bishop Tube's failure to fully comply with this Consent Order and Agreement.

19. The Department reserves all rights to enforce this Consent Order and Agreement and to prosecute any violations of the Air Pollution Control Act and/or the Rules and Regulations promulgated thereunder, except those explicitly waived in this Consent Order and Agreement. This Consent Order and Agreement shall not be considered as a limitation or abridgement of the Department's rights and duties pursuant to emergency control strategies under Section 6.2 of the Act, 35 P.S. Section 4006.2.

20. In the event of a material breach, the Department may, at its option, in addition to the remedies prescribed herein, proceed with any action at law or in equity to bring about compliance with the Pennsylvania Air Pollution Control Act and the Rules and Regulations of the Department.

21. It is the intent of the parties herein that the clauses are severable and should any part of the clauses herein be declared by a court of law to be invalid and unenforceable, the other clauses shall remain in full force and effect as between the parties, their successors, assigns, agents and servants.

22. Nothing herein contained shall be construed to relieve or limit Bishop Tube from complying with the terms and conditions of any plan approval or permit existing, or hereafter issued to Bishop Tube by the Department.

23. It is agreed that any changes, additions or amendments to this Consent Order and Agreement shall be set out in writing as an amendment and signed by the parties hereto.

24. This Consent Order and Agreement does not grant a variance from any requirement of the Air Pollution Control Act (35 P.S. Section 4001,

ORIGINAL

et seq), the Clean Air Act (42 U.S.C. Section 7401 et seq.), or any regulations promulgated thereunder, nor does it purport to modify any requirement of Pennsylvania's State Implementation Plan as approved under Section 110 of the Clean Air Act. Further, this Consent Order and Agreement does not constitute a Consent Order and Agreement under the provisions of Section 113(d) of the Clean Air Act. Notice is hereby provided to Bishop Tube that it may be subject to additional penalties for non-compliance with the Pennsylvania State Implementation Plan under Section 120 of the Clean Air Act.

25. Attached hereto as Exhibit A is evidence of a resolution of the Board of Directors of Christiana Metals Corporation authorizing the signatures for Bishop Tube Company to enter into this Consent Order and Agreement in behalf of the Bishop Tube Company.

FOR: COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

DATE

N. Rao Kona
Regional Air Pollution Control Engineer

Ken Gelburd
Attorney for the Commonwealth

FOR: BISHOP TUBE COMPANY

DATE

Corporate President or Vice-President

Corporate Seal

Corporate Secretary or Treasurer

Attorney for the Corporation

MJ171/.1

ORIGINAL
(Red)

REFERENCE NO. 15

EPA

POTENTIAL HAZARDOUS WASTE SITE
IDENTIFICATION AND PRELIMINARY ASSESSMENT

REGION

SITE NUMBER (EPA use only) ORIGINAL PA(Reg) 84 86209

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The information submitted on this form is based on available records and may be updated on subsequent forms as a result of additional inquiries and on-site inspections.

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely as possible before Section II (*Preliminary Assessment*). File this form in the Regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (*EN-335*); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: Bishop Tube Company

B. STREET (*or other identifier*): Rt 30 and Malin Rd.

C. CITY: Frazer

D. STATE: Pa

E. ZIP CODE: 19355

F. COUNTY NAME: Chester

G. OWNER/OPERATOR (*if known*)

1. NAME: Bishop Tube Company

2. TELEPHONE NUMBER: 215-647-3450

H. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE ☐ 6. UNKNOWN

I. SITE DESCRIPTION: The company manufactures and sells special seamless tubing for industrial use.

J. HOW IDENTIFIED (*i.e., citizen's complaints, OSHA citations, etc.*): The company notified us hazardous waste generator and RCRA-Fed in Fall of 80. First inspection on 6/23/81

K. DATE IDENTIFIED (*mo., day, & yr.*)

L. PRINCIPAL STATE CONTACT

1. NAME: Frank Holmes

2. TELEPHONE NUMBER: 215-631-2420

II. PRELIMINARY ASSESSMENT (*complete this section last*)

A. APPARENT SERIOUSNESS OF PROBLEM

☐ 1. HIGH ☐ 2. MEDIUM ☒ 3. LOW ☐ 4. NONE ☐ 5. UNKNOWN

B. RECOMMENDATION

☐ 1. NO ACTION NEEDED (*no hazard*)

☐ 2. IMMEDIATE SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

☐ 3. SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

☒ 4. SITE INSPECTION NEEDED (*low priority*)

C. PREPARER INFORMATION

1. NAME: Frank Holmes

2. TELEPHONE NUMBER: 215-631-2420

3. DATE (*mo., day, & yr.*): 11/29/83

III. SITE INFORMATION

A. SITE STATUS

☒ 1. ACTIVE (*Currently in operation or temporarily shut down. Includes sites undergoing waste treatment, storage, or disposal on a continuing basis. Includes intermittent sites.*)

☐ 2. INACTIVE (*Sites which no longer receive wastes.*)

☐ 3. OTHER (*Specify*) (*Includes sites that include a variety of operations over the lifetime of the site, where no regular or continuing use of the site for waste disposal has occurred.*)

B. IS GENERATOR ON SITE?

☐ 1. NO ☒ 2. YES (*If yes, provide the four-digit SIC Code*): 3317, 3356

C. AREA OF SITE (*in acres*): 5 acres

D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES

1. LATITUDE (*degrees, min., sec.*):

2. LONGITUDE (*degrees, min., sec.*):

E. ARE THERE BUILDINGS ON THE SITE?

☐ 1. NO ☒ 2. YES (*specify*): One very large building - office

EPA

POTENTIAL HAZARDOUS WASTE SITE IDENTIFICATION AND PRELIMINARY ASSESSMENT

REGION

SITE NUMBER (to be assigned by [redacted]): PAD08[redacted]09

ORIGINAL (Red)

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The information submitted on this form is based on available records and may be updated on subsequent forms as a result of additional inquiries and on-site inspections.

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely as possible before Section II *(Preliminary Assessment)*. File this form in the Regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force *(EN-335)*; 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: Bishop Tube Company

B. STREET *(or other identifier)*: Rt 30 and Malin Rd.

C. CITY: Frazer

D. STATE: Pa

E. ZIP CODE: 19355

F. COUNTY NAME: Chester

G. OWNER/OPERATOR *(if known)*

1. NAME: Bishop Tube Company

2. TELEPHONE NUMBER: 215-647-3450

H. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE ☐ 6. UNKNOWN

I. SITE DESCRIPTION

The company manufactures and sells special seamless tubing for industrial use.

J. HOW IDENTIFIED *(i.e., citizen's complaints, OSHA citations, etc.)*

The company notified as a hazardous waste generator and stores in Fall of 1980. First RCRA inspection on 6/23/81

K. DATE IDENTIFIED *(mo., day, & yr.)*

L. PRINCIPAL STATE CONTACT

1. NAME: Frank Holmes

2. TELEPHONE NUMBER: 215-631-2420

II. PRELIMINARY ASSESSMENT *(complete this section last)*

A. APPARENT SERIOUSNESS OF PROBLEM

☐ 1. HIGH ☐ 2. MEDIUM ☒ 3. LOW ☐ 4. NONE ☐ 5. UNKNOWN

B. RECOMMENDATION

☐ 1. NO ACTION NEEDED *(no hazard)*

☐ 2. IMMEDIATE SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

☐ 3. SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

☒ 4. SITE INSPECTION NEEDED *(low priority)*

C. PREPARER INFORMATION

1. NAME: Frank Holmes

2. TELEPHONE NUMBER: 215-631-2420

3. DATE *(mo., day, & yr.)*: 11/29/83

III. SITE INFORMATION

A. SITE STATUS

☒ 1. ACTIVE *(Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)*

☐ 2. INACTIVE *(Those sites which no longer receive wastes.)*

☐ 3. OTHER *(specify)* *(Those sites that include such incidents like [illegible] where no regular or continuing use of the site for waste disposal has occurred.)*

B. IS GENERATOR ON SITE?

☐ 1. NO ☒ 2. YES *(specify generator's four-digit SIC Code)*: 3317, 3356

C. AREA OF SITE *(in acres)*: 5 acres

D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES

1. LATITUDE *(deg.-min.-sec.)*

2. LONGITUDE *(deg.-min.-sec.)*

E. ARE THERE BUILDINGS ON THE SITE?

☐ 1. NO ☒ 2. YES *(specify)*: One very large building - mfg. process + office

Continued From Front

IV. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

ORIGINAL (Red)

X	A. TRANSPORTER	X	B. STORER	X	C. TREATER	X	D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION		1. LANDFILL
	2. SHIP		2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE	X	3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
	4. TRUCK	X	4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY		4. SURFACE IMPOUNDMENT
	5. PIPELINE		5. TANK, BELOW GROUND		5. CHEM./PHYS. TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER (specify):		6. OTHER (specify):		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY		8. OTHER (specify):
					9. OTHER (specify):		

E. SPECIFY DETAILS OF SITE ACTIVITIES AS NEEDED

Solvent waste is generated from metal cleaning and stored in 55 gal. drums in a shed. Fresh solvent TCE is stored in a 4000 gal. above ground tank. Waste acid is produced from a metal treating process. This is stored in an above ground tank. Fresh acids (HNO_3 + HF) are stored in the above ground tank.

V. WASTE RELATED INFORMATION

A. WASTE TYPE

[ ] 1. UNKNOWN [X] 2. LIQUID [ ] 3. SOLID [ ] 4. SLUDGE [ ] 5. GAS

B. WASTE CHARACTERISTICS

[ ] 1. UNKNOWN [X] 2. CORROSIVE [ ] 3. IGNITABLE [ ] 4. RADIOACTIVE [ ] 5. HIGHLY VOLATILE
[X] 6. TOXIC [ ] 7. REACTIVE [ ] 8. INERT [ ] 9. FLAMMABLE

[ ] 10. OTHER (specify):

C. WASTE CATEGORIES

1. Are records (if waste available) Specify items such as manifests, inventories, etc. below.

F001, D002, F062

2. Estimate the amount (specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT	AMOUNT N/A	AMOUNT 3600	AMOUNT 120,000	AMOUNT	AMOUNT
UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE Kg	UNIT OF MEASURE Kg	UNIT OF MEASURE	UNIT OF MEASURE
X (1) PAINT, PIGMENTS	X (1) OILY WASTES	X (1) HALOGENATED SOLVENTS	X (1) ACIDS	X (1) FLYASH	X (1) LABORATORY PHARMACEUT.
(2) METALS SLUDGES	X (2) OTHER (specify) at least 5-55 gal. drums on site at any one time	(2) NON-HALOGENATED SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW		X (3) OTHER (specify) The above qty. is what is generated per month	(3) CAUSTICS	(3) MILLING/MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMELTG. WASTES	(4) MUNICIPAL
(5) OTHER (specify)			(5) DYES/INKS	(5) NON-FERROUS SMELTG. WASTES	(5) OTHER (specify):
			(6) CYANIDE	(6) OTHER (specify):	
			(7) PHENOLS		
			(8) HALOGENS		
			(9) PCB		
			(10) METALS		
			X (11) OTHER (specify) The above qty is generated per month		

Continued From Page 2

ORIGINAL (Red)

V. WASTE RELATED INFORMATION (continued)

3. LIST SUBSTANCES OF GREATEST CONCERN WHICH MAY BE ON THE SITE (place in descending order of hazard).

Solvents
Acids

4. ADDITIONAL COMMENTS OR NARRATIVE DESCRIPTION OF SITUATION KNOWN OR REPORTED TO EXIST AT THE SITE.

On June 9+10, 1981 the company had an incidents where acid vapors were released. Bishop Tube is involved in a ground water study because of ground water contamination. PaDER Water Quality is the lead agency

VI. HAZARD DESCRIPTION

A. TYPE OF HAZARD	B. POTENTIAL HAZARD (mark 'X')	C. ALLEGED INCIDENT (mark 'X')	D. DATE OF INCIDENT (mo., day, yr.)	E. REMARKS
1. NO HAZARD				
2. HUMAN HEALTH		X	6/9/81 6/10/81	Acid vapors were emitted from a above ground acid storage tank
3. NON-WORKER INJURY/EXPOSURE				See letter of July 10, 1981 attached
4. WORKER INJURY				
5. CONTAMINATION OF WATER SUPPLY				
6. CONTAMINATION OF FOOD CHAIN				
7. CONTAMINATION OF GROUND WATER	X			
8. CONTAMINATION OF SURFACE WATER	X			
9. DAMAGE TO FLORA/FAUNA		X	6/9/81 6/10/81	"
10. FISH KILL				
11. CONTAMINATION OF AIR		X	6/9/81 6/10/81	"
12. NOTICEABLE ODORS		X	6/9/81 6/10/81	"
13. CONTAMINATION OF SOIL				
14. PROPERTY DAMAGE				
15. FIRE OR EXPLOSION				
16. SPILLS/LEAKING CONTAINERS/RUNOFF/STANDING LIQUIDS		X	6/9/81 6/10/81	"
17. SEWER, STORM DRAIN PROBLEMS				
18. EROSION PROBLEMS				
19. INADEQUATE SECURITY				
20. INCOMPATIBLE WASTES				
21. HIDDEN DRUMS				
22. OTHER (specify)				

Continued From Front

ORIGINAL (Red)

VII. PERMIT INFORMATION

A. INDICATE ALL APPLICABLE PERMITS HELD BY THE SITE.

- [x] 1. NPDES PERMIT
- [ ] 2. SPCC PLAN
- [ ] 3. STATE PERMIT (specify): NPDES PA0013641 / Solid Waste PAD081863091 / Air Quality 15-399-017
- [x] 4. AIR PERMITS
- [ ] 5. LOCAL PERMIT
- [ ] 6. RCRA TRANSPORTER
- [x] 7. RCRA STORER
- [ ] 8. RCRA TREATER
- [ ] 9. RCRA DISPOSER
- [ ] 10. OTHER (specify):

B. IN COMPLIANCE?

- [ ] 1. YES
- [x] 2. NO
- [ ] 3. UNKNOWN

4. WITH RESPECT TO (list regulation name & number): Containment of above ground storage tanks 75.265(rXC)

VIII. PAST REGULATORY ACTIONS

- [ ] A. NONE
- [x] B. YES (summarize below)

IX. INSPECTION ACTIVITY (past or on-going)

- [ ] A. NONE
- [x] B. YES (complete items 1,2,3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
See attached Copies	6/17/81 + Present	Solid Waste	RCRA Inspection - Gen. + TSD
See Attached Copies	1970's + Present	Water Quality	NPDES - Water Quality

X. REMEDIAL ACTIVITY (past or on-going)

- [ ] A. NONE
- [x] B. YES (complete items 1, 2, 3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
RCRA Compliance	See Attached Sheets	Solid Waste	Gen + TSD Compliance
Ground Water Study	May 2, 1980	Betz-Converse Murdoch	Proposal attached - Cont + find Report
Consent Order + Agreement	2/10/82	Air Quality	Attached

NOTE: Based on the information in Sections III through X, fill out the Preliminary Assessment (Section II) information on the first page of this form.

(4)

ORIGINAL (Red)

REFERENCE NO. 16

ORIGINAL
(Red)

ORIGINAL
(Red)

R-585-11-4-16

SITE INSPECTION OF BISHOP TUBE COMPANY PREPARED UNDER

TDD NO. F3-8405-15
EPA NO. PA-568
CONTRACT NO. 68-01-6699

FOR THE

HAZARDOUS SITE CONTROL DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

JUNE 25, 1985

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY	REVIEWED BY	APPROVED BY
(b) (4) [redacted]	(b) (4) [redacted]	(b) (4) [redacted]
ENVIRON. TECHNICIAN	ASSISTANT MANAGER	MANAGER, FIT III

Site Name: Bishop Tube Company
TDD No.: F3-8405-15

ORIGINAL (Red)

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Site Name: Bishop Tube Company
TDD No.: F3-8405-13

ORIGINAL (Red)

APPENDICES

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(Red)

ORIGINAL
(Red)

SECTION I

ORIGINAL (Red)

1.0 INTRODUCTION

1.1 Authorization

NUS Corporation performed this work under Environmental Protection Agency Contract No. 68-01-6699. This specific report was prepared in accordance with Technical Directive Document No. F3-8405-15 for the Bishop Tube Company site located in Frazer, Pennsylvania.

1.2 Scope of Work

NUS FIT III was tasked to conduct a site inspection of the subject site. FIT III conducted the site inspection on June 6, 1984.

1.3 Summary

A hydrogeologic study of surface water and groundwater conditions at the plant was conducted by Betz, Converse, Murdock, Incorporated in October 1981. The Bishop Tube Company site is located in Frazer, in the southeastern portion of Pennsylvania. In the past, the Bishop Tube Company and the site's former owners have discharged sanitary sewage, cooling water, and acid pickling rinse water into an unlined pit and cesspool that were located on the plant property. Area no. 1 is an unlined pit which was approximately 200 square feet in size and was filled with lime, and covered by a concrete floor. Area no. 2 is a cesspool which was approximately 160 square feet in size and is now closed; it was filled with limestone and covered with concrete.

A hydrogeologic study of surface water and groundwater conditions at the plant was conducted by Betz, Converse, Murdock, Incorporated. Betz, Converse, Murdock, Incorporated installed 4 monitoring wells at the site as part of this study. During the NUS site inspection on June 6, 1984, these 4 wells were sampled, along with some surface water in the site area. In 1981, the deep groundwater quality at the site was checked by a representative of the United States Geological Survey (U.S.G.S.), who was doing a county-wide study. All concentrations from this analysis were below the Chester County Health Department's standards, according to the Betz, Converse, Murdock Report.

ORIGINAL
(Red)

ORIGINAL
(Red)

SECTION 2

ORIGINAL
(Red)

2.0 THE SITE

2.1 Location

The Bishop Tube Company site is located in the southeastern portion of Pennsylvania, in the borough of Frazer. The site is located off Route 30 and Malin Road, and is surrounded by residential areas.

2.2 Site Layout

The Bishop Tube Company site is comprised of 2 sites (closed impoundments) situated in a manufacturing plant complex. The sites (area nos. 1 and 2) were once used for the dumping of process waste and sanitary sewage. Area no. 2, which is approximately 160 square feet in size, is located to the west and is directly in front of Plant no. 5. It is filled with lime and covered with concrete. Area no. 1 is located to the west of Plant no. 8, which has been extended in order to cover all of area no. 1 with a concrete floor (see appendix B, figure 2).

2.3 Ownership History

J. Bishop and Company, Platinum Works, opened the site in 1951. The name of the company was changed to Matthey Bishop and Company in 1967. Matthey Bishop sold the plant, as Bishop Tube Company, to the Whittaker Corporation on March 31, 1969. The Whittaker Corporation sold it to Christiana Metals on January 7, 1974. The plant is now called Bishop Tube Company, Division of Christiana Metals Corporation (see appendix D).

2.4 Site Use History

The site was opened in 1951 and was used for the processing of platinum. In 1967, the plant changed ownership and with this change came a switch in the process at the plant. At that time, the purpose of the plant was changed to the manufacturing of special seamless tubing, used for industrial purposes. The plant has been used for this purpose since that time. The present name of the company is Bishop Tube Company, Division of Christiana Metals Corporation.

ORIGINAL (Red)

2.5 Permit and Regulatory Action History

The following table summarizes past inspection activities at the site and permits held for the site:

Date	Activity	Conducted by	Findings
05/02/80	Consultant Report	Betz, Converse, Murdoch, Inc.	PA DER instructed Bishop Tube to conduct a study of groundwater. This study indicated that groundwater flow is in the direction of the tributary of the Little Valley Creek, to the northeast of the site.
06/09/81	Release of Acid Fumes	PA DER	A mixture of nitric acid and hydrofluoric acid was released into the air.
10/25/83	Hazardous Waste Inspection Report	PA DER	Violations were found in both containment and housekeeping practices.
11/29/83	Preliminary Assessment	PA DER	Identification of hazardous materials on site.
06/06/84	Site Inspection	FIT III	Sampling of wells and surface water in the site area.

Permits	Number
NPDES Permit	PA 0013641
Air Permit	15-399-017
RCRA	PAD081868309

2.6 Remedial Action To Date

In 1979, the Bishop Tube Company ceased the use of the unlined pit and on-site cesspool for waste disposal. These 2 sites were then packed with limestone and covered with concrete to enclose the impoundments.

ORIGINAL (Red)

SECTION 3

ORIGINAL (Red)

3.0 ENVIRONMENTAL SETTING

ORIGINAL (Red)

3.1 Water Supply

The water supply for the area surrounding the site is provided by 2 sources: the Philadelphia Suburban Water Company and the Malvern Borough Water Authority. The source for the Philadelphia Suburban Water Company supply is the Springton Reservoir located 7 miles to the southeast of the subject site. The reservoir is fed by the (b) (9) [redacted]. The Malvern Borough System is supplied by (b) (9) [redacted] according to Ira Dutter, Malvern Public Works foreman. The wells and springs are (b) (9) [redacted] The wells are 140, 190, and 196 feet deep, respectively, and produce from the Wissahickon Formation. Also, in the Wissahickon Formation there is at least 1 (b) (9) [redacted]. (b) (9) [redacted] (see appendix G).

3.2 Surface Waters

The unnamed tributary which is adjacent to the Bishop Tube Company is the upper tributary of the Little Valley Creek. The Little Valley Creek runs to the northeast for 4 miles where it meets with the Valley Creek. The Valley Creek is used for recreational purposes, but not as a drinking water supply. It runs to the northeast for 2-1/2 miles until it reaches the Schuylkill River (see appendix B).

3.3 Geology and Soils

Native soil, according to the Chester and Delaware Counties Soil Survey, is classified as the Manor loam (see appendix F). These loams are derived from the weathering of mica, schist, and gneiss parent materials. However, these soils have been disturbed. In addition, fill material was brought in prior to the plant construction.

ORIGINAL (Red)

The study area is located in the Piedmont Physiographic Province. The Atlas of Preliminary Geologic Quadrangles, 1981 (see appendix G) indicates that rocks in the region have been both faulted and intruded. The Atlas shows the site area to be straddling the contact of the lower Paleozoic-aged Wissahickon and the Ordovician-aged Conestoga Formations. The Conestoga Formation, characterized as a micaceaus limestone, is located beneath the northern section of the property.

The Wissahickon Formation, a schist, underlies the southern site boundary. This is confirmed by well logs from the Betz, (b) (9) [redacted] Well no. 4 is finished in colluvium, alluvium, or residual soils above the Conestoga Formation at a depth of 20 feet. Well nos. 2 and 3 extend into the Conestoga Formation to depths of 13.5 to 24 feet.

3.4 Groundwaters

On-site well nos. 2, 3, and 4 (see table 1, appendix G) monitor groundwater within the overburden. Well nos. 2 and 3 are in the Conestoga Limestone. Depth to groundwater in these wells ranges from 5 to 10 feet. Several wells and springs used by Malvern Borough, on-site well no. 1, and at least 1 home well are using groundwater from the Wissahickon Formation. Depth to groundwater in these wells is from 6 to 9.5 feet from the surface, based on home well no. 2917 and monitoring well no. 1. Water level elevations in these wells indicate groundwater flow to be northeast toward the unnamed tributary of the Little Valley Creek. Using the groundwater elevations from available wells and the data presented in appendix H, (Betz, Converse, Murdock Consultants Report), it appears that the Wissahickon and Conestoga formations are interconnected in this area.

ORIGINAL
(Red)

3.5 Climate and Meterology

The average annual temperature of the area is 53°F. The coldest month is generally January with a mean temperature of 30.3°F. The hottest month is July with a mean temperature of 67.4°F. The average annual precipitation is 43.05 inches. The month of highest precipitation is August with 4.30 inches; the lowest is January with 2.74 inches. The average snowfall is 22 inches. The highest snowfall is in February with 7 inches; the lowest in November with .9 inches.

3.6 Land Use

To the east of the Bishop Tube Company is the General Warren Village Housing Development. This development consists of 228 single family homes. To the west is an industrial complex, while to the south and north are residential properties.

3.7 Population Distribution

There are approximately 228 housing units bordering the Bishop Tube Company site. The total population in these units is approximately 860 persons.

3.8 Critical Environments

There are no critical environments, as defined by the HRS Model, in close proximity to the site. However, Valley Forge National Park is located about 5 miles downstream on Valley Creek.

SECTION 4

ORIGINAL
(Red)

4.0 WASTE TYPES AND QUANTITIES

The amount of material disposed of in area no. 1, the unlined pit which was approximately 200 square feet in size, and area no. 2, a sanitary cesspool approximately 160 square feet, is unknown. Known wastes disposed of included cooling water and acid pickling rinse, according to the Betz, Converse, Murdock, Incorporated proposal of work for Bishop Tube Company. Approximately 8,000 gallons of acid waste per year were discharged into an on-site waste stream. In early 1978, the disposals into the cesspool and unlined pit were halted and the discharges were diverted to a sanitary sewer, a nearby stream, and holding tanks (see appendix E).

At present, the site consists of a 4,000-gallon TCE storage tank and five 55-gallon, on-site drums at the Bishop Tube site. The following is a list of wastes that were detected in the groundwater monitoring wells, as well as surface water adjacent to the site:

vinyl chloride	trichloroethylene
1,1,1-trichloroethane	1,1-dichloroethane
1,1-dichloroethylene	trans-1,2-dichloroethylene
tetrachloroethene	toluene
chloroform	

SECTION 5

Site Name: Bishop Tube Company
TDD No.: F3-8405-15

ORIGINAL
(Red)

5.0 FIELD TRIP REPORT

5.1 Summary

On Wednesday, June 6, 1984, FIT III staff members David Walker, James Strickland, Mark Volatile, Richard Gorrell, Barry Schlesinger, and Thomas Fromm visited the Bishop Tube Company site in Frazer, Pennsylvania. The purpose of the visit was to conduct a site inspection. The team was on site from 11:15 AM to 1:50 PM. The weather at the time of the inspection was sunny, with temperatures in the mid-80s.

5.2 Persons Contacted

5.2.1 Prior to Field Trip

Meirs Johnson
Project Manager
Bishop Tube Company
Frazer, PA 19355
(215) 647-3450

Frank Holmes
PA DER
1875 New Hope Street
Norristown, PA 19401
(215) 270-1920

5.2.2 At The Site

Meirs Johnson
Project Manager
Bishop Tube Company
Frazer, PA 19355
(215) 647-3450

TDD Number F3-8405-15
EPA Number PA-568

5.3 SAMPLE LOG

Site Name Bishop Tube Company

TRAFFIC REPORTS Organic	Inorganic	High Hazard	SAMPLING LOCATION	PHASE	SAMPLE DESCRIPTION	DATE	TIME	pH	COMMENTS/OBSERVATIONS	LABORATORY
C 7083			Monitering Well #1	Aq	Monitering Well #1	6/6/84	12:30	5.93		
C 7084			Monitering Well #2	Aq	Monitering Well #2	6/6/84	12:40	6.75	High HNu readings when First Uncapped	
C 7085			Monitering Well #3	Aq	Monitering Well #3	6/6/84	12:42	6.61		
C 7086			Monitering Well #4	Aq	Monitering Well #4	6/6/84	12.45	6.15		
C4490			Upstream	Aq	Upstream	6/6/84	13.08	7.38		
C 7087			Down stream	Aq	Downstream	6/6/84	13.35	7.60		
C4491			Tributary From Site	Aq	Tributary From Site	6/6/84	13.17	7.74		
C4492			Swale Along Railroad	Aq	Swale along Railroad	6/6/84	13.38	7.17		
C4493			Blank	Aq	Blank	6/6/84	13.50			

ORIGINAL (Red)

ORIGINAL

5.4 Site Observations

- The confluence of the swale along the railroad and the tributary revealed that there was more discoloration of the water on the swale side.

- There were lawn mowers and other debris on the side of the tributary.

- Downstream from the site, approximately 100 yards, there was a small business pumping water from the tributary.

- When well no. 2 was initially uncapped, solvent odors were noticed and a reading of 6 ppm was recorded on the HNU.

5.5 PHOTOGRAPH LOG

Photo 1 -
Monitoring well no. 1 - samplers are Thomas Fromm and Mark Volatile.

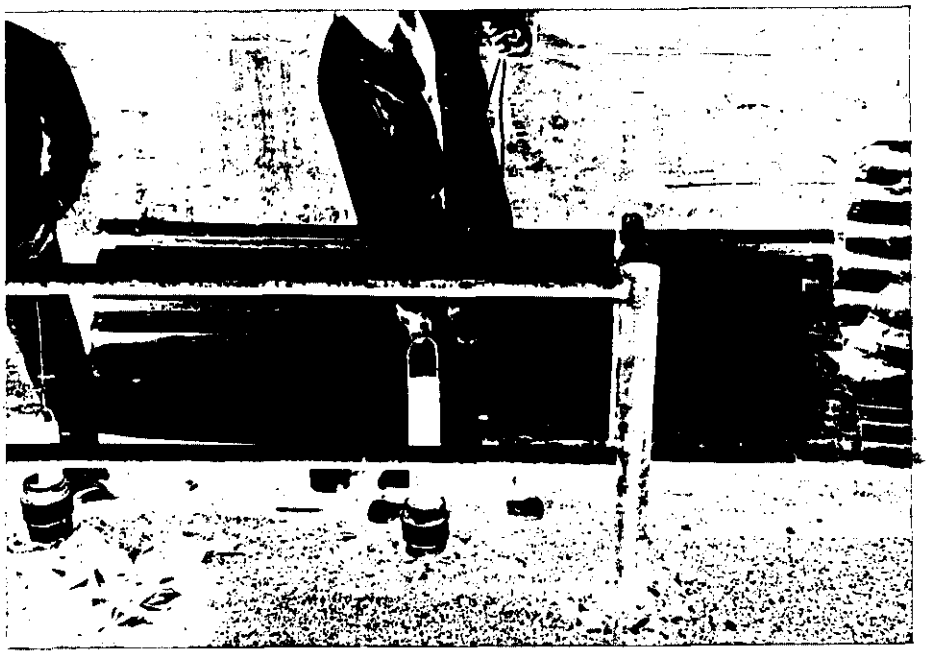


Photo 2 -
Monitoring well no. 2 - sampler is James Strickland.

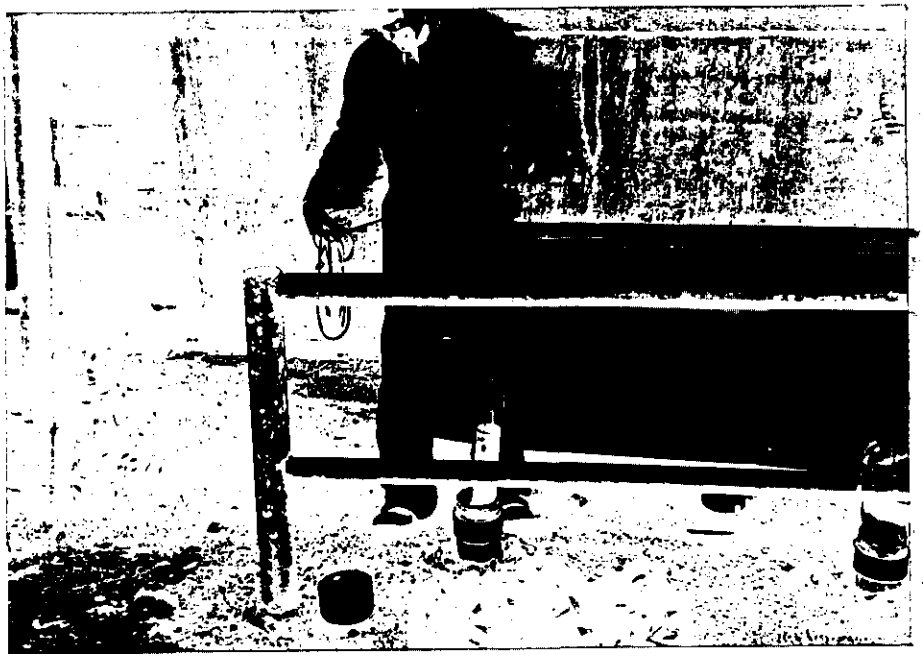


Photo 3 -
Monitoring well no. 3 - sampler is Richard Gorrell.

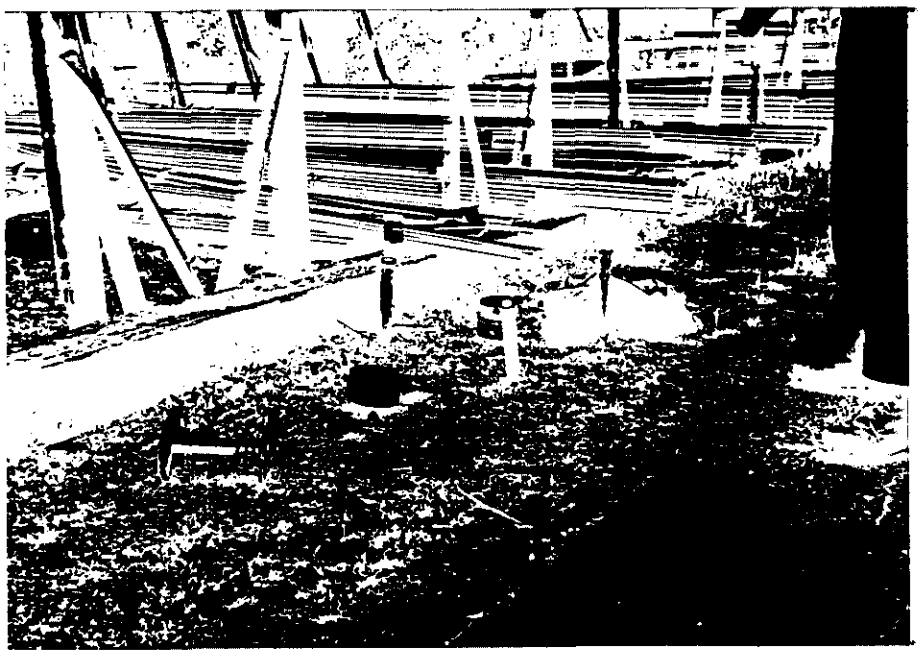


Photo 4 -
Monitoring well no. 4 - sampler is Thomas Fromm.

Photo 5 -
Upstream Little Valley Creek - sampler is Thomas Fromm.

Photo 6 -
Tributary from the site - sampler is Thomas Fromm.

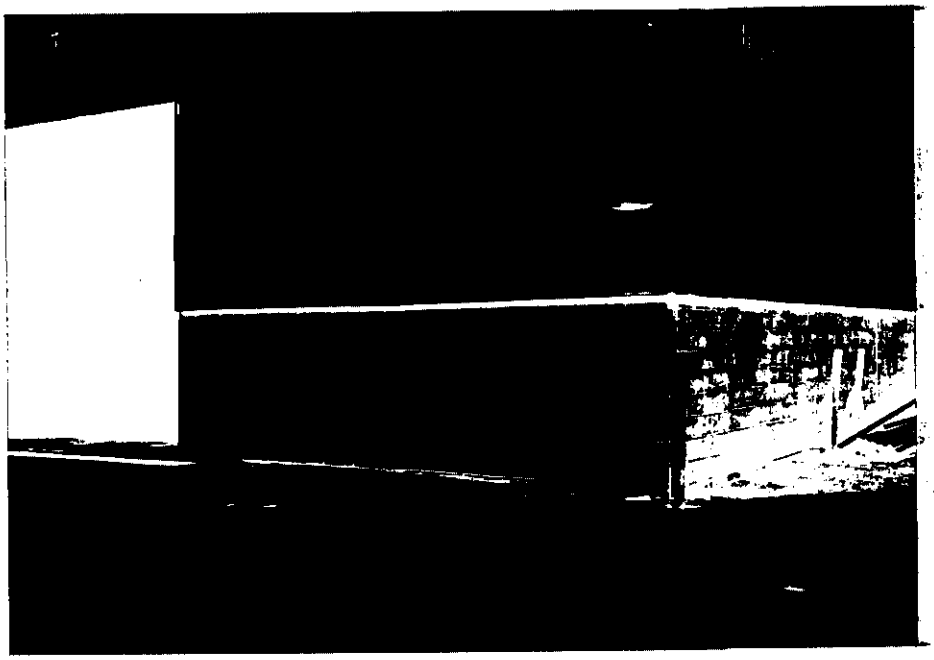


Photo 7 -
Building on top of old impoundment.

Photo 8 -
Downstream on the Little Valley Creek -
sampler is Thomas Fromm.

Photo 9 -
Downstream sample of swale along railroad
sampler is Thomas Fromm.

ORIGINAL (Red)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	568

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
Bishop Tube Company	Route 30 and Malin Road				
03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG. DIST.
Frazer	PA	19355	Chester		

09 COORDINATES		10 TYPE OF OWNERSHIP (Check one)
LATITUDE	LONGITUDE	☒ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN
32° 30' 26"	47° 35' 58"	

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
06 / 06 / 84 (MONTH DAY YEAR)	☐ ACTIVE ☒ INACTIVE	1951 / 1978 (BEGINNING YEAR / ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ☒ B. EPA CONTRACTOR NUS Corp. (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ___ (Name of firm)

☐ E. STATE ☐ F. STATE CONTRACTOR ___ (Name of firm) ☐ G. OTHER ___ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO
(b) (4) [redacted]	Environmental Technician	NUS Corp.	(215) 687-9510

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO
(b) (4) [redacted]	Geologist	NUS Corp.	(215) 687-9510
(b) (4) [redacted]	Environmental Engineer	NUS Corp.	(215) 687-9510
(b) (4) [redacted]	Environmental Technician	NUS Corp.	(215) 687-9510
(b) (4) [redacted]	Environmental Technician	NUS Corp.	(215) 687-9510
(b) (4) [redacted]	Environmental Engineer	NUS Corp.	(215) 687-9510

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	ADDRESS	16 TELEPHONE NO
(b) (4) [redacted]	Environ. Technician	NUS Corporation Wayne, PA	(215) 687-9510
Miers Johnson	Project Eng.	Bishop Tube Company Route 30 and Malin Road	(215) 647-3450
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	11:15 to 13:50	Sunny, hot, and humid

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO
Doug Hill	EPA	(215) 597-5841

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
(b) (4) [redacted]	NUS Corp.	FIT III	215-687-9510	06 / 06 / 84 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

ORIGINAL

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	568

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- _ A SOLID
- _ B POWDER, FINES
- _ C SLUDGE
- _ D OTHER _____ (Specify)
- _ E SLURRY
- X F LIQUID
- _ G GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS 16.5

CUBIC YARDS _____

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- X A TOXIC
- _ B CORROSIVE
- _ C RADIOACTIVE
- _ D PERSISTENT
- _ E SOLUBLE
- _ F INFECTIOUS
- _ G FLAMMABLE
- _ H IGNITABLE
- X I HIGHLY VOLATILE
- _ J EXPLOSIVE
- _ K REACTIVE
- _ L INCOMPATIBLE
- _ M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS	16.5	Tons	Generated per month
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
sol	vinyl chloride	75-01-4	cesspool and unlined pit	10 k	
sol	trichloroethylene	79-01-6	cesspool and unlined pit	20,120	
sol	1,1,1-trichloroethane	71-55-6	cesspool and unlined pit	7,700	
sol	1,1-dichloroethane	107-06-2	cesspool and unlined pit	54	
sol	1,1-dichloroethylene	75-35-4	cesspool and unlined pit	690	
sol	trans 1,2-dichloroethylene	156-60-5	cesspool and unlined pit	2,700	
sol	tetrachloroethene	127-18-4	cesspool and unlined pit	160	
sol	toluene	108-88-3	cesspool and unlined pit	5k	
sol	chloroform	67-66-3	cesspool and unlined pit	5k	

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

FIT III data summay sheet from site inspection of June 6, 1984.
Also, Pennsylvania Department of Environmental Resources (PA DER) preliminary assessment done by Frank Holmes.

ORIGINAL (Red)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	568

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 3,000
02 [X] OBSERVED (DATE: 6-6-84) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

There were 2 sites used for the dumping of wastes. One was an on-site cesspool and the other was an unlined pit. On-site wells are contaminated.

01 [X] B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: Unknown
02 [X] OBSERVED (DATE: 6-6-84) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The site is located adjacent to a tributary of the Little Valley River, which flows into the Valley River. The Valley River is used for fishing. Contamination was found in a swale along the railroad tracks. The swale is a tributary of the Little Valley River.

01 ☐ C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 [X] F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: 60 feet (Acres)
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The area of soil contamination at the site is 360 square feet, according to the Notification of Hazardous Waste Sites report submitted by Johnson Matthey, Inc.

01 ☐ G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 3,000
02 ☐ OBSERVED (DATE: _____) [X] POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The borough of Malvern is presently using a combination of springs and wells for its municipal source. These wells are located east of the site. One domestic source, located 3,000 feet to the southwest of the site, was found to be using groundwater.

01 ☐ H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
PA	5[illegible]

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

N/A

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids/Leaking drums) — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

Waste was discharged into the cesspool area and the unlined pit from 1951 until 1978.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

N/A

III. TOTAL POPULATION POTENTIALLY AFFECTED: 12,703

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Laboratory data from NUS FIT III site inspection of June 6, 1984 and from EPA files.

ORIGINAL
(Red)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION
01 STATE: PA 02 SITE NUMBER: 568

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☒ A. NPDES	PA 0013641			
☐ B. UIC				
☒ C. AIR	15-339-017			
☒ D. RCRA	PA 0081866309			
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☒ A. SURFACE IMPOUNDMENT	8.25	tons/month
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☒ I. OTHER cesspool (Specify)	8.25	tons/month

04 TREATMENT (Check all that apply)
- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER
- ☒ A. BUILDINGS ON SITE: 6

06 AREA OF SITE: 7 (Acres)

07 COMMENTS

Bishop Tube Company used an unlined pit and cesspool area to dispose of plant waste that included sanitary sewage, cooling water, and acid pickling rinse water.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ☒ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

Waste material was placed in an unlined pit and cesspool with no liners.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE ☐ YES ☒ NO

02 COMMENTS

Presently, the unlined pit and cesspool are covered with concrete and packed with limestone.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

State PA and information from EPA file.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: PA
02 SITE NUMBER: PAD 987268

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A. ☒	B. ☒
NON-COMMUNITY	C. ☐	D. ☒

02 STATUS: unknown

ENDANGERED	AFFECTED	MONITORED
A. ☐	B. ☐	C. ☐
D. ☐	E. ☐	F. ☐

03 DISTANCE TO SITE
A. 1-1/2 (mi)
B. ~~3,000 feet~~ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☒ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☒ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER: 3,000
03 DISTANCE TO NEAREST DRINKING WATER WELL: 3,000 (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
5 to 10 (ft)	north-northeast	5 to 10 (ft)	(gpd)	☐ YES ☐ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

The wells that supply the town of Malvern are located approximately 1-1/2 miles southeast of the site. A domestic well is located approximately 3,000 feet southwest of the site.

10 RECHARGE AREA
☐ YES ☒ NO
COMMENTS

11 DISCHARGE AREA
☒ YES ☐ NO
COMMENTS: Groundwater flows toward the unnamed tributary of the Little Valley River.

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Tributary to Little Valley River	☐	150 feet (mi)
	☐	(mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 4,237 NO OF PERSONS	B. 9,829 NO OF PERSONS	C. 12,703 NO OF PERSONS

02 DISTANCE TO NEAREST POPULATION: 500 feet (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE: 3,393

04 DISTANCE TO NEAREST OFF-SITE BUILDING: 250 feet (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

The population on all sides of the site is urban, but becomes more rural as one moves further away from the site.

ORIGINAL

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
PA	568

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☒ B. $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☒ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
6 (ft)	6 (ft)	N/A

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
34 (in)	2.5 to 3 (in)	3 %		5 to 7 %

09 FLOOD POTENTIAL

SITE IS IN N/A YEAR FLOODPLAIN

10 N/A ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE: A. N/A (mi)

OTHER: B. N/A (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

N/A (mi)

ENDANGERED SPECIES: N/A

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AGRICULTURAL LANDS: AG LAND
A. 3/4 (mi)	B. 500 feet (mi)	C. N/A (mi)	D. N/A (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The site is located at the base of a ridge with a steep slope behind the complex and a lesser slope to the front of the property.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

USGS Malvern and Valley Forge, Pennsylvania Quadrangle, 7.5 Minute series

Report on Bishop Tube Company by Betz Converse Murdoch, Inc.

ORIGINAL (Red)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	568

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	4	Environmental Research Group	
SURFACE WATER	4	Environmental Research Group	
WASTE		117 North First Street	
AIR		Ann Arbor, Michigan 48104	
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER Blank	1	Environmental Research Group	

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
HNU photoionizer	No readings above background were detected, except at monitoring well no. 2 where a reading of 6 ppm was recorded when the well cap was initially removed

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☒ GROUND ☐ AERIAL

02 IN CUSTODY OF NUS Corporation (Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS USGS Malvern, Pennsylvania Quadrangle map, 7.5 minute series

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

N/A

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

FIT III site inspection of June 6, 1984

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
PA	568

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Bishop Tube Company		Route 30 and Malin Road	3498	Frazer	PA	19355
N/A						
N/A						

PARENT COMPANY (If applicable)

08 NAME	09 D+B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE
Christiana Metals		Route 30 and Malin Road		PO Box 1189 Frazer	PA	19355
N/A						
N/A						

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Whittaker Corporation		Unknown				
N/A						
N/A						

IV. REALTY OWNER(S) (If applicable, list most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
N/A						
N/A						
N/A						

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA files and NUS FIT III site inspection of June 6, 1984

EPA FORM 2070-13 (7-81)

ORIGINAL (Red)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	568

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
Bishop Tube Company	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
Route 30 and Malin Road	

05 CITY	06 STATE	07 ZIP CODE
Frazer	PA	19355

08 YEARS OF OPERATION	09 NAME OF OWNER

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME	11 D+B NUMBER
N/A	

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)

01 NAME	02 D+B NUMBER
Bishop Tube Company	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
Route 30 and Malin Road	

05 CITY	06 STATE	07 ZIP CODE
Frazer	PA	19355

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1974 to 1979	

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

10 NAME	11 D+B NUMBER
N/A	

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER
Whittaker Corporation	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
Unknown	

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1969 to 1974	

10 NAME	11 D+B NUMBER
N/A	

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER
Matthey Bishop	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1951 to 1967	

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA file information and state information

ORIGINAL (Red)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	568

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
Bishop Tube Company	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
Route 30 and Malin Road	

05 CITY	06 STATE	07 ZIP CODE
Frazer	PA	19355

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

State and EPA file information

ORIGINAL (Red)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	568

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☒ H. ON SITE BURIAL — 02 DATE ~~late 1979 or~~ early 1980 — 03 AGENCY _____
04 DESCRIPTION
Material was packed with lime and placed under a cement cap.

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☒ L. ENCAPSULATION — 02 DATE ~~late 1979 or~~ early 1980 — 03 AGENCY _____
04 DESCRIPTION
Material was packed with lime and placed under a cement cap.

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

ORIGINAL (Red)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	568

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☒ S. CAPPING/COVERING — 02 DATE ~~late 1979 or~~ early 1980 — 03 AGENCY _____
04 DESCRIPTION
The material was enclosed with a cement cap as the dumping was stopped in 1979

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

State EPA and NUS FIT III site inspection information

ORIGINAL (Red)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	568

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

N/A

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS FIT III site inspection of June 6, 1984 and State and EPA file information

EPA FORM 2070-13 (7-81)

ORIGINAL (Red)

SECTION 6

ORIGINAL
(Red)

6.0 LABORATORY DATA

6.1 Sample Data Summary

The following Quality Assurance Review and Sample Data Summary for volatile organics have been prepared by CRL.

These samples were analyzed for volatile organics only.

TDD Number F3-8405-15
EPA Number PA-560

SAMPLE DATA SUMMARY
TARGET COMPOUNDS

☑ Organic ☐ Inorganic

Site Name Bishop Tube
Date of Sample 6-6-84

Compounds Detected

Sample Number	Sample Description and Location	Phase	Units	Methylene Chloride	MEK (2-Butanone)	Acetone	Vinyl Acetate	Chloroethene (Vinyl Chloride)	Trichloroethylene	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethylene	trans 1,2-Dichloroethylene	Tetrachloroethene	Toluene	1,2-Dichloroethane	Remarks
C4490	Upstream	AQ	µg/L	NDB◇	NDB◇	NDB◇	NDB◇										
C4491	Tributary From Site	AQ	µg/L	NDB◇	NDB◇												
C4492	Swale Along RAILROAD	AQ	µg/L	NDB◇	NDB◇		6◇	10K	2026.	1400.	7.	130	150	8	5K		
C4493	Field Blank	AQ	µg/L	8.8C◇	NDB◇	NDB◇											
C7083	Monitoring Well #1	AQ	µg/L	NDB◇	NDB◇												
C7084	Monitoring Well #2	AQ	µg/L	NDB◇		5K◇		10K	4800	4200	41	690	340	21	6	3◇	
C7085	Monitoring Well #3	AQ	µg/L	22C◇	22C◇		60C◇		20,120.	7700	54	612	1754	43			
C7086	Monitoring Well #4	AQ	µg/L	NDB◇	NDB◇			44	4800	45	14	29	2700	160			
C7087	Downstream	AQ	µg/L	NDB◇	NDB◇				NDB◇	NDB◇	NDB◇	NDB◇	NDB◇				

ORIGINAL (Red)

NOTE: For a review of this data and non-target, tentatively identified compounds, please see the Analytical Quality Assurance section of this report.

◇ Denotes results of questionable qualitative significance based upon quality assurance review of data.

TDD Number F3-8405-15
EPA Number PA-568

SAMPLE DATA SUMMARY
TARGET COMPOUNDS

☑ Organic ☐ Inorganic

Site Name Bishop Tube
Date of Sample 6-6-84

Compounds Detected

Sample Number	Sample Description and Location	Phase	Units	Chloroform	Carbon disulfide												Remarks
C4490	Upstream	AQ	µg/L														
C4491	Tributary (From Site)	AQ	µg/L														
C4492	Swale Along Railroad	AQ	µg/L														
C4493	Field Blank	AQ	µg/L														
C7083	Monitoring Well #1	AQ	µg/L														
C7084	Monitoring Well #2	AQ	µg/L	5K	NDB												
C7085	Monitoring Well #3	AQ	µg/L														
C7086	Monitoring Well #4	AQ	µg/L														
C7087	Downstream	AQ	µg/L														

NOTE: For a review of this data and non-target, tentatively identified compounds, please see the Analytical Quality Assurance section of this report.

◇ Denotes results of questionable qualitative significance based upon quality assurance review of data.

6.2 Quality Assurance Review

6.2.1 Organic Data: Lab Case 2873

6.2.1.1 Introduction

The findings offered in this report are based upon a review of the volatile organics analyses of nine water samples. Blank analyses results, matrix spike and duplicate analyses results, surrogate spike recoveries, target compound matching quality, tentatively identified compounds, BFB tuning performance, data completeness, calculations, and standards performance were evaluated in detail.

6.2.1.2 Qualifiers

It is recommended that this data package be utilized only with the following qualifier statements:

- All methylene chloride results may be questionable.
- All MEK (2-butanone) results may be questionable.
- All acetone results may be questionable.
- Vinyl acetate results in samples C4490, C4492, and C7085 may be questionable.
- The 1,2-dichloroethane result in sample C7084 may be questionable.
- Concentrations for trichloroethylene in samples C4492, C7084, C7085, and C7086; 1,1,1-trichloroethane in sample C4492, C7084, and C7085; and trans 1,2-dichloroethene in samples C7085 and C7086 may be quantitatively questionable.
- All results for sample C7087 are quantitatively and qualitatively questionable.
- The carbon disulfide result in sample C7084 may be questionable.

6.2.1.3 Findings

- Methylene chloride, acetone, and MEK (2-butanone) contamination of the laboratory blanks, method blank, and field blank C4493, were of sufficient magnitude to question the presence of these three compounds in all samples.

ORIGINAL (Red)

Site Name: Bishop Tube
TDD No.: F3-8405-15

- The presence of vinyl acetate in samples C4492 and C7085 is questionable because of poor spectral matching quality. In addition, vinyl acetate was observed in the quantitation lists of two laboratory blanks in sufficient quantity to question the vinyl acetate results of samples C4490, C4492, and C7085. The spectra provided for vinyl acetate confirmation in the laboratory blanks is also of poor quality.

- The presence of 1,2-dichloroethane in sample C7084 is questionable because of poor spectral matching quality. The laboratory states that this sample contains a "system contaminant", trichlorotrifluoroethane, which coelutes with 1,2-dichloroethane. The laboratory uses 1,1,2-trichloro-1,2,2-trifluoroethane in oil and grease extractions. Both the enhanced and unenhanced spectra of 1,2-dichloroethane contain constituent ions of the contaminant and the contaminant is present in a concentration at least one order of magnitude greater than 1,2-dichloroethane. There is a possibility this chlorofluorocarbon is a sample constituent, since it was not found in blanks or any other samples. Another chloroflurocarbon was found as a tentatively identified compound and many chlorinated volatile priority pollutants were found in C7084.

- No 1,2-dichloroethane was noted for sample C4492, though the analyte is present on the quantitation list at 2.7 ug/L, above the detection limit of 1 ug/L. No spectral confirmation was provided.

- Diminished quantitative accuracy is suggested for trichloroethylene, 1,1,1,-trichloroethane and trans-1,2-dichloroethene in several samples because instrument response was either saturated or significantly above the calibrated range. The laboratory narrative details efforts to quantify trichloroethylene and 1,1,1-trichloroethane in sample C7084 and trichloroethylene in samples C7085 and C7086 using secondary ions and average response factors calculated utilizing internal standard areas.

- Sample C7087 was run after sample C4492, which contained high levels of the analytes found in C7087. No blank was run after sample C4492 to demonstrate contaminant-free conditions. No spectral confirmations were provided for C7087, no analytes were quantified and instead the lab states--"None detected - blank" for each analyte. Many of these analytes were not found in any blank. It is not clear if compounds found in sample C7087 are present, or if they are a result of chromatographic ghosting from sample C4492. All results for C7087 are quantitatively and qualitatively questionable. Sample reanalysis has been requested.

- The quantitation list of sample C7084 noted carbon disulfide at a concentration of 1.6 ug/l, slightly above the laboratory detection limit of 1 ug/l. The lab reported ND-B, None Detected-Blank, though carbon disulfide was not found in any blank. No spectra were included. The presence of carbon disulfide is questionable in sample C7084.

ORIGINAL

Site Name: Bishop Tod
TDD No.: F3-8405-15

- There is one BFB tuning violation, occurring just before the three point standard curve was established at 10:19 on 6/11/84. Three ions are out of specified ranges by small amounts. All tunes of 6/12/84, when the samples were run, are of acceptable quality.

- Most d_8-toluene surrogate recoveries were outside of QC limits. The laboratory notes this surrogate was not quantitatively accurate and states they will correct the problem.

- Eight matrix spike recoveries and two Relative Percent Difference Checks were out of QC limits. Some of these were due to the laboratory's decision to spike a sample containing high levels of the compounds of interest, as mentioned in the laboratory narrative. These recoveries demonstrate the laboratory's problems in accurately quantifying analytes outside the working range of the standards. Most recoveries are consistently high. More useful QC information may have been obtained if the laboratory had chosen a lower level sample to spike.

- No screening for volatiles was performed by the laboratory.

6.2.1.4 Summary

This Quality Assurance Review has identified blank contamination, poor matrix recoveries, improper usage of "ND-B" code, quantification of analytes outside the working range of standards, a minor BFB tuning violation, and possible chromatographic ghosting as primary areas of concern.

Please see the accompanying support documentation appendix for specifics on this Quality Assurance Review.

Report prepared by (b) (4) [redacted] Date: _____

ORIGINAL
(Red)

SECTION 7

7.0 TOXICOLOGICAL EVALUATION

ORIGINAL (Red)

7.1 Summary

Sample analysis in this investigation was restricted to the detection of volatile organics only. Chlorinated ethanes and ethenes (up to 20,000 ug/l), some of which are suspect human carcinogens, and vinyl chloride (up to 44 ug/l), a recognized human carcinogen, were reported in samples from 3 monitoring wells (MW) underlying the site, and in a surface water sample from a swale adjacent to the site. Ingestion of the groundwater could potentially pose a carcinogenic risk.

The presence of volatile organic contaminants in the downstream surface water sample could not be determined due to laboratory error. Based on available data regarding the effects of the identified contaminants on freshwater aquatic life, their lack of persistence in surface waters, and their lack of a tendency to strongly bioaccumulate, the levels of contaminants noted in the swale sample would be expected to have minimal environmental effects.

It is possible that ppb concentrations of contaminants may be present in the ambient air on site or in the vicinity of the site. If present, they might pose a health hazard to local residents.

7.2 Distribution of Contaminants

Only volatile organics were assayed for in this investigation. Whether inorganic or other organic priority pollutants are present at or near this site is not known.

Chlorinated aliphatics were identified in samples from 3 on-site MWs and in the surface water sample from the swale alongside the railroad tracks. There were no volatile organics identified in MW no. 1.

ORIGINAL (Red) ORIGINAL

Vinyl chloride was measured in 1 MW at 44 ug/l, and in another MW and the swale below the minimum quantifiable limit of 10 ug/l. The following ethanes and ethenes were measured in MW samples and in the sample from the swale. The swale was reported by the FIT III team to be discolored.

	Monitoring Wells (ug/l)	Swale (ug/l)
trichloroethene	4,800 - 20,120	2,026
1,1,1-trichloroethane	45 - 7,700	1,400
1,1-dichloroethane	14 - 54	9
1,1-dichloroethene	29 - 690	130
trans-1,2-dichloroethene	340 - 2,700	150
tetrachloroethene	21 - 60	8

Due to limitations in instrumentation response, all data for trichloroethene and 1,1,1-trichloroethane, as well as 2 MW values for 1,2-dichloroethene are considered by the quality assurance chemist to be quantitatively questionable. The actual concentrations in some cases may actually be higher than those reported.

Toluene (6 ug/l) and chloroform (below the minimum quantifiable limit of 5 ug/l) were identified in MW no. 2. Toluene was also identified in the swale sample (below the minimum quantifiable limit of 5 ug/l). The presence of 1,2-dichloroethane in MW no. 3 is questionable. MW samples were all acidic, with pHs ranging from 5.93 to 6.15. Acidic groundwater may be a natural hydrological feature of the area.

Chlorinated ethane/ethene levels in the downstream aqueous sample were all reported by the laboratory as ND-B (not detectable due to blank contamination). According to the FIT III quality assurance chemist, many of the contaminants were not present in the blanks; ghosting, however, may have been a problem. Resampling of the downstream site would be necessary to confirm the presence or absence of these contaminants. There were no volatile organic contaminants confidently identified in surface water samples taken upstream of the site.

ORIGINAL (Red)

7.3 Toxicological Considerations

There is evidence that contaminants may be migrating from this site. Volatile organic contaminants were identified in samples taken from 3 on-site MWs, and the surface water (swale) adjacent to the site. They were not detected in samples from upstream surface waters. Their presence in a downstream sample could neither be confirmed nor ruled out. Of all contaminants identified, the highest concentration was of trichloroethene (TCE). A 4,000-gallon storage tank of TCE is reported to be present on site.

Chlorinated aliphatics tend to be persistent and highly mobile in groundwater. Based on a limited study, groundwater flow is expected to be towards the north and east, away from the direction of known current groundwater usage. Fractures in the underlying geology, however, make the prediction of flow difficult.

TCE is a suspect human carcinogen. Based on limited data from animal studies, it has been estimated by EPA's Carcinogen Assessment Group that the lifetime consumption of 2 liters of water/day containing 180 ug/l TCE could result in 1 additional case of cancer for every 10,000 individuals exposed. Using liver toxicity as the most sensitive endpoint, an Adjusted Acceptable Daily Intake (AADI) of 257 ug/l has been calculated. AADIs are calculated to protect against toxicities other than carcinogenic risk. The World Health Organization has recommended 30 ug/l as a tentative guideline for drinking water.[1]

1,1,1-Trichloroethane is not presently considered a carcinogen by EPA, although there is recent limited evidence for carcinogenicity in animals. Based on the preliminary animal data, it has been estimated that the lifetime consumption of 2 liters of water/day containing 21.7 ug/l could result in 1 additional case of cancer for every 1,000,000 individuals exposed. An AADI of 1,000 ug/l has been calculated, using liver damage as the most sensitive endpoint.[1]

ORIGINAL (Red)

There is insufficient information concerning the carcinogenicity of, or effects of chronic low-level exposure to, 1,1-dichloroethane. At high concentrations it can cause cardiac excitation in humans, and has been shown to produce liver toxicity in rodents.[2]

1,1-Dichloroethene has limited evidence of carcinogenicity in animals. Based on animal evidence, it is estimated that the lifetime consumption by humans of water containing 2.3 ug/l could result in 1 additional case of cancer for every 1,000,000 individuals exposed. An AADI of 350 ug/l has been calculated.[1] The toxic effects of 1,2-trans-dichloroethene are not well-documented. There is insufficient evidence as to whether or not it is a carcinogen.[3]

Tetrachloroethene (PCE) has limited evidence of carcinogenicity in animals. Based on animal data, it has been estimated that the lifetime consumption of 2 liters of water/day containing 10 ug/l could result in 1 excess case of cancer for every 100,000 individuals exposed. An AADI of 85 ug/l has been calculated, based only on toxic effects to blood components, the immune system, and the central nervous system. The World Health Organization has recommended a level of 10 ug/l as a tentative guideline for PCE in drinking water.[1]

Vinyl chloride is a recognized human and animal carcinogen, angiosarcoma of the liver being the most common tumor produced.[4] It has been estimated that the consumption over a lifetime of water containing 0.015 ug/l could cause 1 additional case of cancer for every 1,000,000 individuals exposed.[1]

The levels of toluene measured in the groundwater would not be expected to cause any adverse health effects if ingested.[5] Chloroform has evidence of carcinogenicity in animals. It has been estimated that the lifetime consumption of 2 liters of water/day containing approximately 1.9 ug/l could result in 1 additional case of cancer for every 100,000 individuals exposed.[6]

ORIGINAL (Red)

Ingestion of the groundwater could potentially pose a carcinogenic risk. Based on the maximum levels of individual volatile organics measured in MW samples, it can be calculated, for the sake of perspective, that the lifetime ingestion of the groundwater might result in approximately a 7.7 in 1,000 cancer risk.[1,6] In addition, reported levels of trichloroethene, 1,1,1-trichloroethane, and 1,1-dichloroethene exceed AADIs calculated to protect against toxicities other than cancer, and could potentially affect the liver.[1]

Based on available experimental data, it would not be expected that concentrations of volatiles similar to those reported in the swale would cause acute toxicity to aquatic life.[2,7-10] There is a paucity of data concerning potential chronic effects. However, volatile organics do not tend to persist in surface waters or substantially bioaccumulate, so that any long-term effects would be expected to be minimal. Groundwater is reported to discharge into the unnamed tributary of Little Valley Creek, and could potentially affect aquatic life. Chronic exposure to levels of TCE similar to the maximum concentration measured in groundwater samples (approximately 20,000 ug/l) has been reported to have behavioral effects on a species of freshwater fish.[7] It would be expected, however, that dilution of contaminants would occur as they entered the surface water and, as previously noted, would not tend to persist. The presence of volatile organics in downstream surface water could neither be confirmed nor ruled out.

Dermal contact with water in the swale would probably result in the absorption of only small amounts of contaminants. Since some of the contaminants are known or suspect carcinogens, no safe levels of exposure to these substances can be assumed. However, any anticipated health risks from dermal exposure would be expected to be low.

ORIGINAL (Red)

Although HNU readings of ambient air did not exceed background, it is possible that ppb concentrations of some contaminants could be present on site, as well as in the surrounding area. Low ambient air levels of some contaminants, if present, could potentially pose health hazards in individuals living near the site, if inhaled on a chronic basis. An HNU reading of 6 ppm was recorded when uncapping MW no. 2. Although this level is relatively low, the nature of the gas(es) is not known. Based on the sample data, it is likely to be composed of chlorinated aliphatics. Brief inhalation of this level of chlorinated aliphatics is likely to pose a limited health hazard.

Prepared by: (b) (4) [redacted] Date: February 6, 1985
Toxicologist

Reviewed by: (b) (4) [redacted] Date: February 11, 1985

Site Name: Bishop Tube Company
TDD No.: F3-8405-VR

ORIGINAL (Red)

LIST OF SOURCES

1. Federal Register. June 12, 1984. National Primary Drinking Water Regulations: Volatile Synthetic Organic Chemicals; Proposed Rulemaking. 49 (114): 24330.

2. U.S. Environmental Protection Agency. 1980. Ambient Water Quality Criteria for Chlorinated Ethanes. EPA PB81-117400.

3. U.S. Environmental Protection Agency. 1980. Draft Criteria Document for Dichloroethylenes. EPA PB84-199546.

4. U.S. Environmental Protection Agency. 1984. Draft Criteria Document for Vinyl Chloride. EPA PB84-199538.

5. Sandmeyer, E.E. 1981. Aromatic hydrocarbons. In: Patty's Industrial Hygiene and Toxicology, 3rd ed. G.D. Clayton and F.E. Clayton (eds.) pp. 3283-91. New York: John Wiley and Sons.

6. U.S. Environmental Protection Agency. 1980. Ambient Water Quality Criteria for Chloroform. EPA PB81-117442.

7. U.S. Environmental Protection Agency. 1980. Ambient Water Quality Criteria for Trichloroethylene. EPA PB81-117871.

8. U.S. Environmental Protection Agency. 1980. Ambient Water Quality Criteria for Dichloroethylenes. EPA PB81-117525.

9. U.S. Environmental Protection Agency. 1980. Ambient Water Quality Criteria for Tetrachloroethylene. EPA PB81-117830.

10. U.S. Environmental Protection Agency. 1980. Ambient Water Quality Criteria for Toluene. EPA PB81-117855.

ORIGINAL
(Red)

APPENDIX A

ORIGINAL (Red)

1. COST CENTER:	REM/FIT ZONE CONTRACT TECHNICAL DIRECTIVE DOCUMENT (TDD)	2. NO.:
ACCOUNT NO.:		F3-8405-15

3. PRIORITY:	4. ESTIMATE OF TECHNICAL HOURS:	5. EPA SITE ID:	6. COMPLETION DATE:	7. REFERENCE INFO.:
☐ HIGH ☒ MEDIUM ☐ LOW	200	PA-568	3 wks after QA	☒ YES ☐ NO ☐ ATTACHED ☒ PICK UP
	4A. ESTIMATE OF SUBCONTRACT COST:	5A. EPA SITE NAME: Bishop Tube Co. Frazer, PA		

8. GENERAL TASK DESCRIPTION: Perform site inspection of subject site.

9. SPECIFIC ELEMENTS:

1.) Review background information.
2.) Contact state and local agencies for relevant information.
3.) Submit sampling plan to EPA for approval.
4.) Coordinate lab analysis.
5.) Conduct on and off site inspection and sampling.
6.) Take and ship samples according to standard protocol.
7.) Perform Quality Assurance Review of lab data.
8.) Prepare and submit report.

10. INTERIM DEADLINES:

11. DESIRED REPORT FORM: FORMAL REPORT ☒ LETTER REPORT ☐ FORMAL BRIEFING ☐

OTHER (SPECIFY):

12. COMMENTS:

13. AUTHORIZING RPO: (SIGNATURE)

14. DATE:

15. RECEIVED BY: ☐ ACCEPTED ☐ ACCEPTED WITH EXCEPTIONS ☐ REJECTED

(CONTRACTOR RPM SIGNATURE)

16. DATE:

Sheet 1 White – FITL Copy
Sheet 2 Canary – DPO Copy
Sheet 3 Pink – Contracting Officer's Copy (Washington, D. C.)
Sheet 4 Goldenrod – Project Officer's Copy (Washington, D. C.)

ORIGINAL (Red)

APPENDIX B

SOURCE : USGS MALVERN, PA. QUAD. (7.5 MINUTE SERIES)

FIGURE I

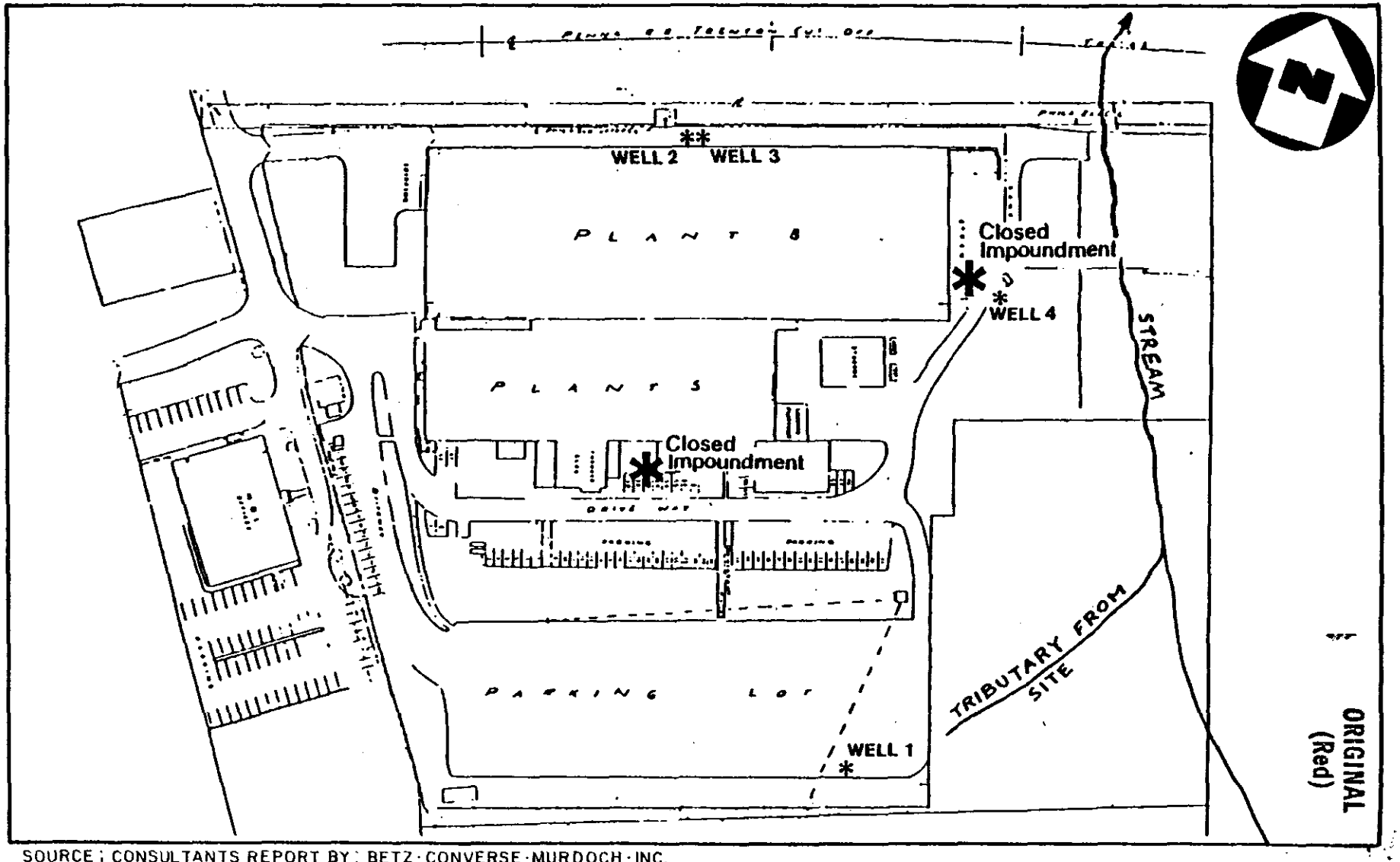
SITE LOCATION MAP

BISHOP TUBE CO., FRAZER, PA.

SCALE 1:24000

NUS CORPORATION

A Halliburton Company



SOURCE: CONSULTANTS REPORT BY: BETZ·CONVERSE·MURDOCH·INC.

SITE SKETCH

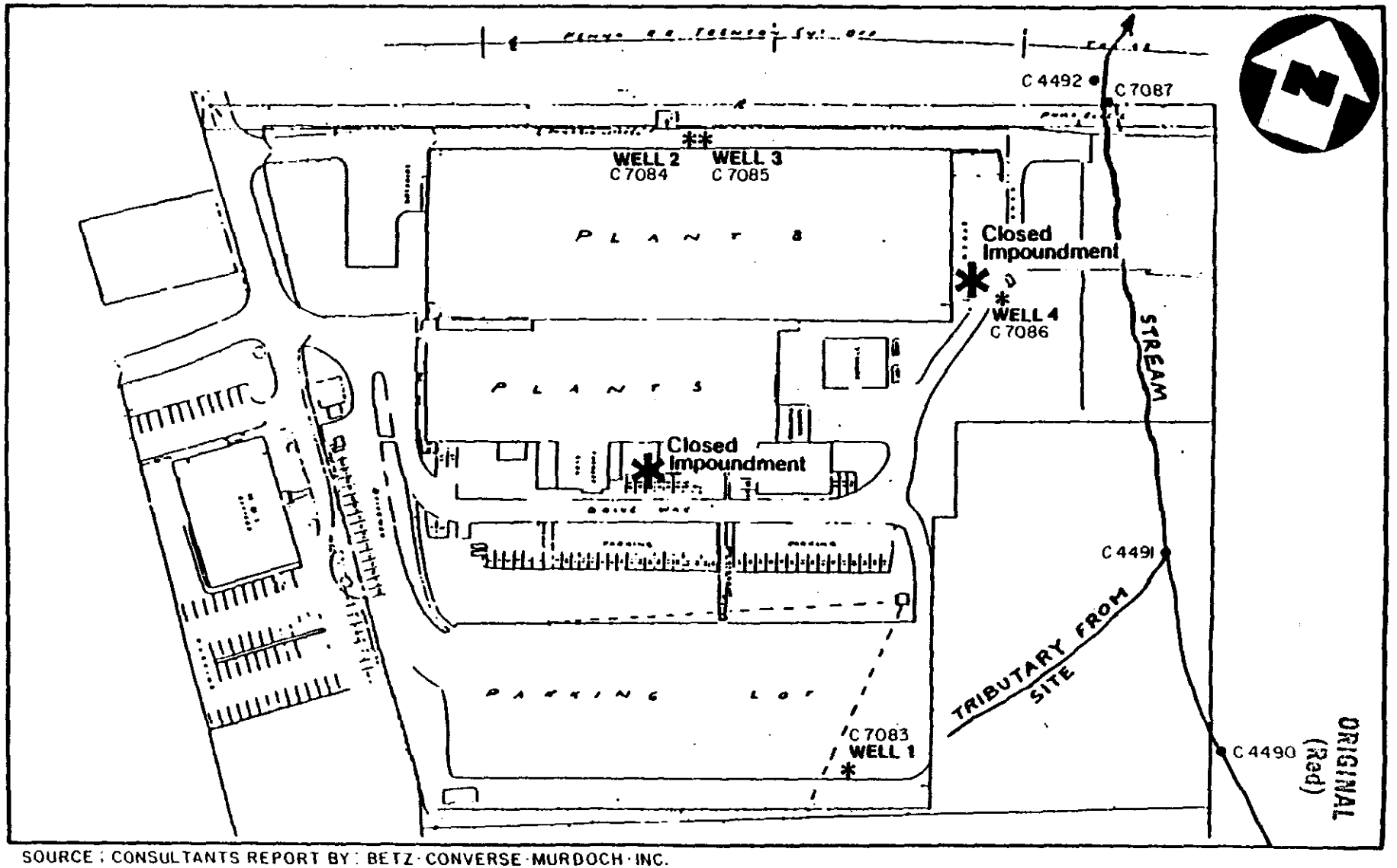
BISHOP TUBE CO., FRAZER, PA.

(NO SCALE)

FIGURE 2

NUS CORPORATION

A Halliburton Company



SOURCE : CONSULTANTS REPORT BY : BETZ · CONVERSE · MURDOCH · INC.

SAMPLE LOCATION MAP

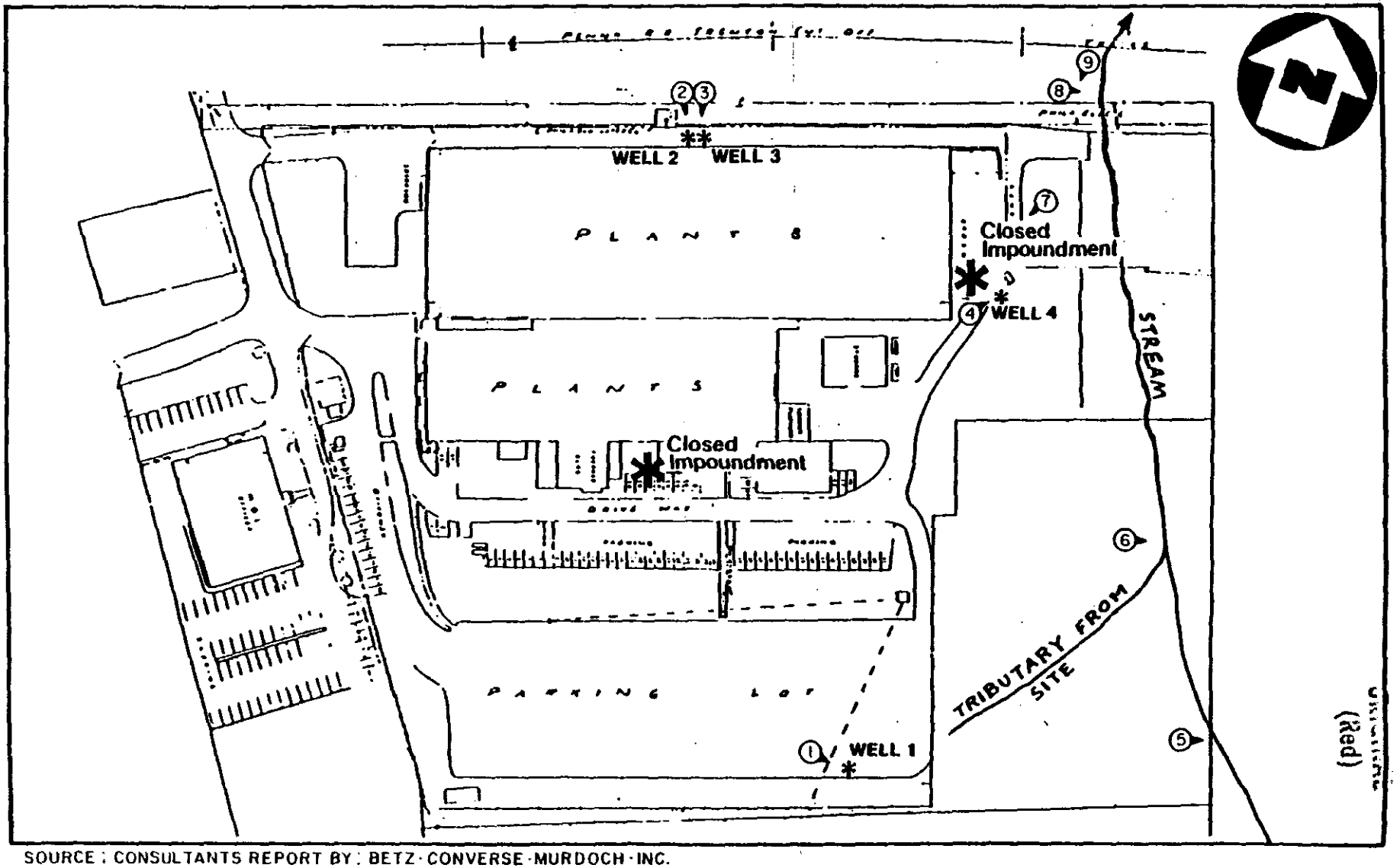
BISHOP TUBE CO., FRAZER, PA.

(NO SCALE)

FIGURE 3

NUS CORPORATION

A Halliburton Company



SOURCE : CONSULTANTS REPORT BY : BETZ · CONVERSE · MURDOCH · INC.

PHOTO LOCATION MAP

BISHOP TUBE CO., FRAZER, PA.

(NO SCALE)

FIGURE 4

NUS CORPORATION

A Halliburton Company

ORIGINAL (Red)

APPENDIX C

PROJECT NAME: Bichop Tube
TDD NO: [illegible]-2425-15

EPA SITE NO.: [illegible]-562
REGION: [illegible]

ORIGINAL (Red)

QUALITY ASSURANCE REVIEW OF ORGANIC ANALYSIS LAB DATA PACKAGE

Case No.: 2973
Contract No.: 68-01-6861
Contract Laboratory: ERG (Environmental Research Group, Inc.)
Applicable IFB No.: WA 83-A199
Reviewer: (b) (4) [redacted]
Review Date: 7/19/84

Applicable Sample No's.: C4490 [illegible]
C4491 [illegible]
C4492 [illegible]
(Field Blank) C4493 C7081
[illegible]

The organic analytical data for this case has been reviewed. The quality assurance evaluation is summarized in the following table:

Reviewer's Evaluation*	Fraction				
	VOLATILES	ACIDS	BASE/ NEUTRALS	PCB/ PEST.	TCDD
Acceptable		X	X	X	X
Acceptable with exception(s)	X	X	X	X	X
Questionable		X	X	X	X
Unacceptable		X	X	X	X

* Definitions of the evaluation score categories are listed on next page.

This evaluation was based upon an analysis of the review items indicated below:

- ◐ DATA COMPLETENESS
- ◐ BLANK ANALYSIS RESULTS
- ◐ SURROGATE SPIKE RESULTS
- ○ MATRIX SPIKE RESULTS
- ○ DUPLICATE ANALYSIS RESULTS
- ○ EVALUATION OF CONFIRMATIONS
- ○ QUANTITATIVE CALCULATIONS
- ◐ TARGET COMPOUND MATCHING QUALITY
- ◐ TENTATIVELY IDENTIFIED COMPOUNDS
- ○ CHROMATOGRAPHIC SENSITIVITY CHECKS
- ◐ DFTPP AND BFB SPECTRUM TUNE RESULTS
- ◐ STANDARDS
- ◐ CALIBRATION CHECK STANDARDS
- ◒ INTERNAL STANDARDS PERFORMANCE

Data review forms are attached for each of the review items indicated above.

‡ No errors noted, no form attached.

◒ Spot Check performed.

Comments: (1) See Data Completeness
(2) See Blank Analysis Results
(3) See Surrogate Spike [illegible]
(4) [illegible]
(5) [illegible]
(6) See tentatively [illegible]
(7) [illegible]

ORIGINAL (Red)

DATA EVALUATION SCORE CATEGORIES

ORIGINAL (Red)

ACCEPTABLE: Data is within established control limits, or the data which is outside established control limits does not affect the validity of the analytical results.

ACCEPTABLE WITH EXCEPTION(S): Data is not completely within established control limits. The deficiences are identified and specific data is still valid, given certain qualifications which are listed below.

QUESTIONABLE: Data is not within established control limits. The deficiences bring the validity of the entire data set into question. However, the data validity is neither proved nor disproved by the available information.

UNACCEPTABLE: Data is not within established control limits. The deficiences imply the results are not meaningful.

DATA COMPLETENESS												
	CONC./MATRIX	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ	AQ		
FRACTION	TRAFFIC REPORT #											
	LAB I.D. #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
VOA :	RUN DATE/TIME	[illegible] 11:56	[illegible] 15:[illegible]	[illegible] 16:[illegible]	[illegible] 7:00	[illegible] 3:02	[illegible] 9:17	[illegible] 3:55	[illegible] 11:[illegible]	[illegible] 17:45		
	TARGET COMPOUND TAB.	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	TARGET COMPOUND D.L.	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	TENT. I.D. COMPOUND TAB.	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	SURROGATE RECOVERY	✓	✓	✓	✓	✓	✓	✓	✓	✓		
(1)	GC SCREEN TABULATION	MS	MS	MS	MS	MS	MS	MS	MS	MS		
	GC/MS CHROMATOGRAMS	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	TARGET CMPD. QUAN. LIST	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	TARGET CMPD. SPECTRA	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	TENT. I.D. CMPD. Q.L.	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	TENT. CMPD. LIB. SRCH.	✓	✓	✓	✓	✓	✓	✓	✓	✓		
(2)	CHRO./SENS. CHECKS	2	2	2	2	2	2	2	2	2		
	BFB/DFTPP TUNE DATA	✓	✓	✓	✓	✓	✓	✓	✓	✓		
(3)	I.S AREAS CHARTS	MS	MS	MS	MS	MS	MS	MS	MS	MS		
	I.S. REL. RESP. FORM	MS	MS	MS	MS	MS	MS	MS	MS	MS		
	RF & AMTS.: CALIB. CHK.	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	RF & AMTS.: 3-PT CALIB.	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Chromatograms: Calib.Chk.	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Chromatograms: 3-Pt. Calib.	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	LINEARITY: 3-PT. CALIB	4	4	4	4	4	4	4	4	4		
	RF COMPARISON	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	SAMPLE/FIELD BLANK	✓	-	-	✓	-	✓	✓	✓	✓		
	METHOD/INSTR. BLANK	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	LAB DUPLICATE											
	FIELD DUP/REP											
	MAT. SPK./M. STD.	✓	✓	✓	✓	✓	✓	✓	✓	✓		

ORIGINAL (Red)

COMMENTS: (1) LAB states "NO VOA Screening performed." See [illegible]

(2) 7/12 BFB Spectra for 3rd Cal Ctrl MS tuning [illegible] - See Support Docu [illegible]

(3) IS Area and Relative Response DATA Missing

(4) Correlation coefficient calculated instead of RSD for 3 point calibration

Some [illegible] and on 3 point STANDARD Form

MISSING IS INFO Requested SMO 7/19/94

ORIGINAL (Red)

KEY TO DATA COMPLETENESS FORM

Abbreviation Used on Form	Description of Checklist Item
Conc./Matrix	Concentration category submitted in analysis request (low, med, hi); and matrix (sol., aq.)
Fraction	Fill in acid, base/neutral, acid/base/neutral, or volatiles analysis
Run Date/Time	Instrument run date (to be used for correlating calibration)
Target Cmpd. Tab.	Tabulated results for target compounds
Target Cmpd. D.L.	Detection limits for target compounds (actual/level indicated by screen
Tent. I.D. Cmpd. Tab.	Tabulated results for tentatively identified compounds
Surr. Rec.	Surrogate recoveries results
GC Screen Tab.	Tabulated GC screen results indicating required level of followup
GC/MS Chromatograms	Chromatograms of GC/MS analysis runs
Target Cmpd. Quan. List	Target compounds quantitation list, showing areas, ret. times
Target Cmpd. Spectra	Enhanced and unenhanced spectra of target compound hits
Tent. I.D. Cmpd. Q.L.	Quantitation list for tentatively identified compounds
Tent. Cmpd. Lib. Srch.	Spectra and library match spectra of tentatively identified compounds
Chro./Sens. Checks	EICP's and R.R.F.'s for chromatographic sensitivity checks
BFB/DFTPP Tune Data	Spectra intensity lists, and criteria comparison forms for BFB, DFTPP
I.S. Areas Charts	Internal standards area control charts and description of remedial action
I.S. Rel. Resp. Form	Internal standards relative response listings for each sample run
RF and amts.: Calib. Chk.	Tabulated response factors and amount injected for all cmpds. in calibration check
RF and amts.: 3-Pt. Calib.	Tabulated response factors and amount injected for all cmpds. in 3-point calibration
Chromatograms: Calib. Chk.	Chromatograms for calibration check standard
Chromatograms: 3-Pt. Calib.	Chromatograms for 3-point multilevel calibration standards.
Linearity: 3-Pt. Calib.	Tabulated correlation coefficient or relative standard deviation for calibration
RF Comparison	Tabulated comparison of calibration Response Factor with check standard
Sample/Field Blank	Equipment rinse or reagent water blank shipped with samples from field
Method/Instr. Blank	Method or instrument blank which is prepared at lab
Lab Duplicate	Sample which was split by lab for duplicate analysis
Field Dup/Rep	Sample which was split or collected twice in the field
Mat. Spk./M. Std.	Matrix spike or method standard (blind, or done by lab)
Pest. Tab.	Tabulated results for pesticides
Pest. D.L. Tab.	Tabulated detection limits for pesticides
Pest. Chro.	Chromatograms for pesticide screening
2nd Col. Conf.	Confirmation of pesticide results by using a second GC column and temperature
GC/MS Conf.	Confirmation of pesticide results by GC/MS analysis
Pest. Dup., Spk. Blk.	Pesticide duplicate, spike, and blank
Pest. Std. Chro.	Chromatogram of pesticide standard
Pest. Std. I.D.	Pesticide standard identification form
TCDD	2,3,7,8-tetrachlorodibenzodioxin
TCDD Tab., D.L., EICP, Blk.	TCDD tabulated results, detection limits, extracted ion current profile, blank

KEY TO SYMBOLS USED IN DATA COMPLETENESS TABLE

Symbol	Meaning	Symbol	Meaning
✓	Data item present	I	Incomplete data item
NA	Data item not applicable or not required	NC	Data item not clearly explained (units of conc., etc)
P	Data item within established control limits		
F	Data item outside established control limits	* or [number]	See footnote
MS	Missing item	XX/XX/XX XX:XX	Date/Time of run (calibration, etc.)

RUN CHRONICLE

ORIGINAL (Red)

FRACTION: [illegible]H			FRACTION:			FRACTION:		
RUN ORDER	RUN ID/ DESCRIPTION	DATE / TIME	RUN ORDER	RUN ID/ DESCRIPTION	DATE / TIME	RUN ORDER	RUN ID/ DESCRIPTION	DATE
	[illegible]	[illegible]						
	V60 [illegible]	[illegible]						
	V60 [illegible]	[illegible]						
	V100 SG12H [illegible]	[illegible]						
	V BLK G12A Blank	[illegible]						
	V 109621 method blank	6-12 [illegible]						
	V109622 Field clean C4493	6-12 [illegible]						
	V109623 C [illegible]	6-12 [illegible]						
	V109624 C [illegible]	6-12 [illegible]						
	V100 SG12B [illegible]	6-12 [illegible]						
	V BLK G12C Blank	6-12 13:51						
	V109[illegible] C4490	6-12 [illegible]						
	V109[illegible] C44[illegible]	6-12 [illegible]						
	V109[illegible] C44[illegible]	[illegible]						
	V109[illegible] C [illegible]	6-12 [illegible]						
	V[illegible] C [illegible]	6-12 [illegible]						
	V[illegible]	[illegible]						
	V109[illegible] 4493 [illegible]	[illegible]						
	V109[illegible] [illegible]	6-13 [illegible]						
	V[illegible]	[illegible]						
	V109[illegible]	[illegible]						
	V100 S[illegible]	[illegible]						

BLANK ANALYSIS RESULTS FOR TARGET COMPOUNDS

FRACTION	TYPE	CONC	MATRIX	SAMPLE #	SOURCE OF H_2O	CONTAMINANTS (CONCENTRATION, DETECTION LIMIT
1	VOA	LAB Blank Aqueous		VBLK612A		67 ng Methylene Chloride 13.4 (µg/l) / 5 µg/l 55 ng Acetone 10.9 (µg/l) / 5 µg/l 18 ng MEK (2-Butanone) 3.6 (µg/l) / 5 µg/l 2.2 ng Chlorobenzene 0.4 (µg/l) / 5 µg/l
1	VOA	LAB Blank Aqueous		VBLK612C		[illegible] ng Methylene Chloride 11.5 (µg/l) / 5 µg/l 34 ng Acetone 6.8 (µg/l) / 5 µg/l 20 ng MEK (2-Butanone) 4.0 (µg/l) / 5 µg/l 48 ng Vinyl Acetate 9.7 (µg/l) / 5 µg/l
						ORIGINAL (Red)
1	VOA	Method Blank Aqueous		V109621	Result reported by LAB	21 ng Methylene Chloride 5.8 (µg/l) / 5 (µg/l) 22 ng Acetone 6.4 (µg/l) / 5 (µg/l) 9.7 ng MEK (2-Butanone) 1.9 (µg/l) / 5 (µg/l)
1	VOA	Field Blank		C4493 V109622		73 ng Methylene Chloride (C) 8.8 (µg/l) / 5 (µg/l) 15 ng Acetone NDB / 5 µg/l 7.5 ng MEK (2-Butanone) NDB / 5 (µg/l)
1	VOA	LAB Blank Aqueous		VBLK612H		27 ng Methylene Chloride 5.4 (µg/l) / 5 (µg/l) 21 ng Acetone 4.1 (µg/l) / 5 (µg/l) 19 ng MEK (2-Butanone) 3.8 (µg/l) / 5 (µg/l) 43 ng Vinyl Acetate 8.7 (µg/l) / 5 (µg/l) 17 ng Trichloroethylene 3.3 (µg/l) / 5 (µg/l)
					1	
2	VOA	LAB Blank Aqueous		VBLK612H	Inferred From Quant List	1.5 ng 1,1,1-trichloroethane 0.3 µg/l / 5 µg/l 2.8 ng Toluene 0.6 µg/l / 5 " 2.0 ng Chlorobenzene 0.4 " / 5 "
2	VOA	Field Blank Aqueous		C4493 V109622		3.8 ng Vinyl Acetate 0.7 µg/l / 5 µg/l 2.6 ng Toluene 0.5 " / 5 "

LABORATORY REPORTED FIELD BLANK DATA IS COMPARED WITH THE SAMPLE DATA IN A TABULATION FORM WITHIN SAMPLE ANALYTICAL DATA SUMMARY. TENTATIVELY IDENTIFIED COMPOUNDS IN BLANKS ARE LISTED ON A SEPARATE

COMMENTS:

(1) RESULT REPORTED BY LABORATORY AND CONFIRMED BY REVIEWER.

(2) RESULT INFERRED FROM QUANTITATION LIST, DIAGNOSTICS, CHROMATOGRAM AND/OR SPECTRA.

BLANK ANALYSIS RESULTS FOR TARGET COMPOUNDS

FRACTION	TYPE	CONC	MATRIX	SAMPLE #	SOURCE OF H_2O	CONTAMINANTS (CONCENTRATION)	ORIGINAL (Red) LIMIT
② VOA	LAB BLANK Aqueous			VBLK[illegible]	② Inferred from Quan List	160 ng Vinyl Acetate	[illegible]
						2.0 ng Benzene	0.4 " / [illegible]
						1.7 ng 2-Hexanone [illegible]	[illegible] " / [illegible]
						3.0 ng Toluene	0.6 " / [illegible]
						2.8 ng Ethyl Benzene	0.6 " / [illegible]
						2.1 ng Styrene	0.4 " / [illegible]
② VOA	LAB BLANK Aqueous			VBLK[illegible]		3.2 ng Trichloroethylene	0.6 (µg/l)/5
						1.9 ng Toluene	0.4 " / 5
						4.0 ng Styrene	0.8 " / 5
② VOA	Method Blank Aqueous					222 ng Vinyl Acetate	44.4 (µg/l)/5
						2.6 ng Toluene	0.5 " / 5

LABORATORY REPORTED FIELD BLANK DATA IS COMPARED WITH THE SAMPLE DATA IN A TABULATION FORM WITHIN SAMPLE ANALYTICAL DATA SUMMARY. TENTATIVELY IDENTIFIED COMPOUNDS IN BLANKS ARE LISTED ON A SEPARATE

COMMENTS:

(1) RESULT REPORTED BY LABORATORY AND CONFIRMED BY REVIEWER.

(2) RESULT INFERRED FROM QUANTITATION LIST, DIAGNOSTICS, CHROMATOGRAM AND/OR SPECTRA.

BLANK ANALYSIS RESULTS FOR TENTATIVELY IDENTIFIED COMPOUNDS

ORIGINAL (Red)

ALL TENTATIVELY IDENTIFIED COMPOUNDS FOUND IN BLANK ANALYSES ARE LISTED BELOW:

	SAMPLE #	FRACTION	SCAN #(S)	SPECTRUM MATCH INDICES TYPE	SCORE	TYPE	SCORE	ESTIMATED CONCENTRATION	COMPOUND NAME	COMMENT
Field Blank	[illegible]3	VOA						No tentatives Found		
	([illegible]22)									
Method Blank	VO[illegible]21	VOA						No tentatives Found		
3VOA LAB Blks	VB[illegible]2H	VOA						No tentatives Noted		
	VB[illegible]2C							No tentative sheet included — no area		
	VB[illegible]H							No tentative search of these 3 LAB Blanks		

WATER SURROGATE PERCENT RECOVERY SUMMARY

CASE NO. 2873
LOW LEVEL X
WATER X
QC REPORT NO.

CONTRACTOR ERG. INC.
MED. LEVEL

CONTRACT NO. 68-01-6869
HIGH LEVEL
OTHER (specify)

[---------Volatile----------][----------Semi-Volatile----------]-[Pesticide-]-[-Dioxin-]

SHO Traffic Report No.	D_8 Toluene (86-119)	BFB (85-121)	D_4-1,2-Dichloroethane (77-120)	D_5-Nitrobenzene (41-120)	2-Fluorobiphenyl (44-119)	D_{14}-p-Terphenyl (33-128)	D_5-Phenol (15-96)	2-Fluorophenol (23-107)	2,4,6-Tribromophenol (20-105)	Dibutylchlorendate (67-114)**	1,2,3,4-TCDD (23-148)
C4490	137.1 *	100.8	111.4								
C4491	145.6 *	107.6	118.1								
C4492	128.1 *	95.2	102.6								
C4492 A	127.1 *	92.1	87.3								
C4492 B	130.2 *	95.9	96.0								
C4492 BLK	151.8 *	100.5	119.0								
C4493	165.6 *	117.3	122.8 *								
C7083	154.9 *	115.3	110.6								
C7084	116.3	99.0	23.1 *								
C7085	109.7	99.2 *	102.7								
C7086	125.9 *	97.5	109.2								
C7087	142.2 *	101.2	112.8								
VBLK612A	138.9 *	88.2	123.7 *								
VBLK612C	134.9 *	87.9	117.8								
VBLK612H	127.1 *	91.0	114.1								

*Asterisked values are outside of QC limits
**Advisory Limit

Comments: TOTAL OF NINE WATER SAMPLES — VOA ONLY.

NA = NOT APPLICABLE.

Volatiles: 17 out of 45; outside of QC limits
Semi-Volatiles: NA out of NA; outside of QC limits
Pesticides: NA out of NA; outside of QC limits
Dioxin: NA out of NA; outside of QC limits

Limits Revised 12/83

ORIGINAL (Red)

MATRIX SPIKE DUPLICATE/RECOVERY

CASE NO. 2873
LOW LEVEL X
WATER X
QC REPORT NO.

CONTRACTOR ERG. INC.
MED. LEVEL
SOIL/SED.

CONTRACT NO. 68-01-6869
HIGH LEVEL
OTHER (Specify)
UNITS (Circle) ug/kg (ug/L)

FRACTION	COMPOUND	CONC. SPIKE ADDED	CONC. MS	% REC.	CONC. MSD	% REC	RPD	QC %RECOVERY LIMITS* RPD	WATER	SOIL	COMMENTS
VOA SMO # C 4492	1,1-Dichloroethylene	26.1	72	276 *	49	188 *	38 *	<15%	61-145	59-177	
	Trichloroethylene	25.0	90	360 *	0	0 *	200*	<15%	71-120	62-137	COMMENT①
	Chlorobenzene	25.0	34	136 *	36	144*	6	<15%	75-130	60-133	
	Toluene	25.0	27	108	29	116	7	<15%	76-125	59-139	
	Benzene	25.0	36	144 *	40	160*	10	<15%	76-127	66-142	
B/N SMO #	1,2,4-Trichlorobenzene							<50%	39- 98	38-107	
	Acenaphthene							<50%	46-118	31-137	
	2,4-Dinitrotoluene							<50%	24- 96	28- 89	
	Di-N-Butylphthalate							<50%	11-117	29-135	
	Pyrene							<50%	26-127	35-142	
	N-Nitrosodi-N-Propylamine							<50%	41-116	41-126	
	1,4-Dichlorobenzene							<50%	36- 97	28-104	
ACID SMO #	Pentachlorophenol							<40%	9-103	17-109	
	Phenol							<40%	12- 89	26- 90	
	2-Chlorophenol							<40%	27-123	25-102	
	P-Chlor-M-Cresol							<40%	23- 97	26-103	
	4-Nitrophenol							<40%	10- 80	11-114	
PEST SMO #	Lindane							<40%	56-123	46-127	
	Heptachlor							<40%	40-131	35-130	
	Aldrin							<40%	40-120	34-132	
	Dieldrin							<40%	52-126	31-134	
	Endrin							<40%	56-121	42-139	
	P,P-DDT							<40%	38-127	23-134	

*Asterisked values are outside QC limits.

RPD: VOAs 2 out of 5; outside QC limits
B/N NA out of NA; outside QC limits
ACID NA out of NA; outside QC limits
PEST NA out of NA; outside QC limits

RECOVERY: VOAs 8 out of 10; outside of QC limits
B/N NA out of NA; outside of QC limits
ACID NA out of NA; outside of QC limits
PEST NA out of NA; outside of QC limits

① ZERO RECOVERY IN MSD IN DUE TO SAMPLE AMOUNT BEING LARGER THAN AMOUNT FOUND IN MSD .

*Advisory Limits
Revised 12/83

ORIGINAL

DUPLICATE ANALYSIS RESULTS

ORIGINAL (Red)

DUPLICATE TYPE (SAMPLE/SPIKE/BLANK)			C4492MS	C4492MSD				
SAMPLE NO.'S								
FIELD DUPLICATE								
LAB DUPLICATE								
SAMPLE TYPE	LOW MED. HI		No Screen	No Screen				
	SOL. AQ. LIQ		Aqueous	Aqueous				
Fraction			VOA	VOA				

The relative percent difference (RPD) for each parameter group was evaluated. The duplicate analysis RPD acceptance criteria should be:

Fraction	Maximum Acceptable Percent Difference
Volatile	15%
Base/Neutral	50%
Acid	40%
Pesticides	40%

The RPDs exceeding the maximum acceptable percent difference were:

Fraction	Compound	Actual RPD		SPIKE/recovery Comparison SAMPLE	CONC.	SPIKE recovery SAMPLE	CONC.	UNI
VOA - C4492 MS	1,1-Dichloroethylene (61-145)	38	MS	276%	2ml/72	MSD [illegible]	25/49	MS
	Trichloroethylene (71-120)	200	MS	360%	25/90	MSD 0%	25/0	[illegible]
	Chlorobenzene (75-130)	6	MS	136%	25/34	MSD 144%	25/2[illegible]	[illegible]
	Benzene (76-127)	10	MS	144%	25/[illegible]	MSD [illegible]	25/40	[illegible]

Comments: 1,1-Dichloroethylene trichloroethylene found in Large Quantities C4492. See Note in Lab Narrative.

TARGET COMPOUND MATCHING QUALITY [redacted]RIGINAL [redacted]ed)

TARGET COMPOUNDS OF QUESTIONABLE SPECTRUM OR RETENTION TIME MATCHING QUALITY ARE LISTED BELOW

SAMPLE #	FRACTION	SCAN #(S) OB/EXP	SPECTRUM MATCH INDICES TYPE	SCORE	TYPE	SCORE	ESTIMATED CONCENTRATION	COMPOUND NAME	COMMENTS
C4490	VOA						NDB	Methylene Chloride	
							NDA	Acetone	No spectra
							NDB	MEK	included
							NDB	Vinyl Acetate	
C4491	VOA						NDB	Methylene Chloride	No Spectra
							NDB	MEK	included
C4492	VOA						NDB	Methylene Chloride	No Spectra
							NDB	MEK	INCLUDED
		376					(49/L)	Vinyl Acetate	
								reject Spectra no m/e 86 present	
								which is parent ion of vinyl acetate (m/e)	
								See Support Documents	
		469					(2.7 µg/L)	1,2 Dichloroethane	
								present ON QUAN LIST, No Spectra	
								included, Detection Limit 1 µg/L (1 µg/L)	
C4493	VOA						NDB	Acetone	No spectra
							NDB	MEK	included
C7083	VOA						NDB	Methylene Chloride	No Spectra
							NDB	MEK	Included
C7084	VOA						NDB	Methylene Chloride	No Spectra
		253					NDB	Carbon Disulfide	Included
								WHAT BLANK IS CS_2 IN? Reviewer Can't	
								FIND that BLANK — Not ON QUAN LIST	
		380					(3 µg/L)	1,2-Dichloromethane	
								FAIR Match but other ions present —	
								coelutes with $C_2Cl_3F_3$ - Noted by	
								LAB as System Contaminant —	
								Good match when eliminate $C_2Cl_3F_3$ ion	
								$C_2Cl_3F_3$ concentration at least 1 order	
								magnitude greater than 1,2-Dichloroethane	
C7085	VOA						(50.0 µg/L)	Vinyl Acetate — other ions present	
								See Support Documents	
[illegible]	VOA						NDB	Methylene Chloride	No Spectra
							NDB	MEK	included
C7086	VOA						NDB	Methylene Chloride	
							NDB	MEK	No Spectra
					[illegible]	[illegible]	NDB	Trichloroethylene	No Blank i
					[illegible]	[illegible]	NDB	1,1-Trichloroethane	Last 5 and
					9	[illegible]	NDB	1,1-Dichloroethane	(Why weren't
					33	[illegible]	NDB	1,1-Dichloroethylene	they Quant
					61	[illegible]	NDB	trans-1,2-Dichloroethylene	

TENTATIVELY IDENTIFIED COMPOUND SAMPLE RESULTS

ORIGINAL (Red)

ALL TENTATIVE IDENTIFICATIONS OF CONFIDENT MATCHING QUALITY, WHICH AREN'T SUSPECTED ARTIFACTS/CONTAMINANTS, ARE LISTED BELOW:

SAMPLE #	FRACTION	SCAN #(S)	SPECTRUM MATCH INDICES TYPE	SCORE	TYPE	SCORE	ESTIMATED CONCENTRATION	COMPOUND NAME	COMMENTS
C7084	VGH	170	?	956	F	956	(10 PB/L)	chlorotrifluoroethene (C_2ClF_3)	
								Good Match	
		207	?	954	F	[illegible]	(2.0 PB/L)	2-Butene	
								Agree that this is a cyclic hydrocarbon	
								but could easily be 2nd choice	
								1-Butene (purity 954) or 3rd choice	
								2-methyl-1-propene (purity 952)	
		373						UNKNOWN	
C7086	VAA	440						UNKNOWN	
		626	?	928	F	968	(5.0 PB/L)	2,4,4-trimethylpentene (C_8H_{16})	
								close but not exact spectral match.	
								Agree this is probably C_8H_{16} Aliphatic	
								Alkene, but may be another isomer	

QUANTITATIVE CALCULATIONS

[redacted]NAL (Red)

ORIGINAL (Red)

CALCULATION ERRORS AND CORRECTED RESULTS ARE LISTED BELOW

(1) Chloroform %D Calculation Std V1008 612C

RF = 0.950 TRF = 1.005

%D = $\frac{TRF - RF}{TRF}$ = $\frac{1.005 - 0.950}{1.005}$ = $\frac{.025}{1.005}$ = 2.49%

Reported 24.9% wrong Decimal spot location

(2) Sample C7035

5X Dilution Factor

All Detection Limits Should be elevated (X5)

ORIGINAL (Red)

APPENDIX D

ORIGINAL (Red)

U.S. ENVIRONMENTAL PROTECTION AGENCY - CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 - 703/557-2490

Sample Number: C 4490

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ERG. INC.
Case No: 2873
Lab Sample ID No: 06 / 109616
QC Report No:
Sample Matrix: WATER
Contract No.: 68-01-6267
Data Release Authorized By: [illegible]
Date Sample Received: 6/17/84

VOLATILES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: —
DATE ANALYZED: 6/18/84
PERCENT MOISTURE: NA
CONC./DILUTION FACTOR: NA

PP #	CAS #		ug/l or ug/kg (circle one)	
(2V)	107-02-8	acrolein	100	U
(3V)	107-13-1	acrylonitrile	100	U
(5V)	71-43-2	benzene	5	U
(6V)	56-23-5	carbon tetrachloride	5	U
(7V)	108-90-7	chlorobenzene	5	U
(10V)	107-06-2	1,2-dichloroethane	1	U
(11V)	71-55-6	1,1,1-trichloroethane	5	U
(13V)	75-34-3	1,1-dichloroethane	5	U
(14V)	79-00-5	1,1,2-trichloroethane	5	U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	10	U
(16V)	75-00-3	chloroethane	10	U
(19V)	110-75-8	2-chloroethylvinyl ether	10	U
(23V)	67-66-3	chloroform	5	U
(29V)	75-35-4	1,1-dichloroethene	5	U
(30V)	156-60-5	trans-1,2-dichloroethene	5	U
(32V)	78-87-5	1,2-dichloropropane	10	U
(33V)	10061-02-6	trans-1,3-dichloropropene	5	U
	10061-01-05	cis-1,3-dichloropropene	5	U
(38V)	100-41-4	ethylbenzene	5	U
(46V)	75-09-2	methylene chloride	ND	B
(85V)	74-87-3	chloromethane	10	U
(86V)	74-83-9	bromomethane	10	U
(87V)	75-25-2	bromoform	10	U
(88V)	75-27-4	bromodichloromethane	5	U
(89V)	75-69-4	fluorotrichloromethane	10	U
(90V)	75-71-8	dichlorodifluoromethane	10	U
(91V)	124-48-1	chlorodibromomethane	10	U
(85V)	127-18-4	tetrachloroethene	5	U
(86V)	108-88-3	toluene	5	U
(87V)	79-01-6	trichloroethene	5	U
(88V)	75-01-4	vinyl chloride	10	U
	67-64-1	acetone	ND	B
	78-93-3	2-butanone	ND	B
	75-15-0	carbondisulfide	1	U
	519-78-6	2-hexanone	5	U
	108-10-1	4-methyl-2-pentanone	5	U
	100-42-5	styrene	5	U
	108-05-4	vinyl acetate	ND	B
	1330-20-7	total xylenes	5	U

PESTICIDES (BY GC)

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	NA
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	NA

December 1983

U - Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
K - Actual value, within the limitations of this method, is less than the value given.
CX - Compounds which were concentrated by a factor of 10 times.
B - Blank > 1/2 method D.L. and > 1/2 conc. in sample. Report ND B
C - Blank > 1/2 method D.L. and ≤ 1/2 conc. in sample. Report (corrected conc.) C

[redacted] ORIGINAL (Red)

Sample Number
C 44491

U.S. ENVIRONMENTAL PROTECTION AGENCY - CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 - 703/557-2490

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ERG. INC.
Case No: 2873
Lab Sample ID No: OG 109617
QC Report No:
Sample Matrix: WATER
Contract No.: 68-01-6869
Date Release Authorized By: [illegible]
Date Sample Received: 6/7/84

VOLATILES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: NA
DATE ANALYZED: 6/12/84
PERCENT MOISTURE: NA
CONC./DILUTION FACTOR: NA

PP #	CAS #		ug/l or ug/kg (circle one)	
(2V)	107-02-8	acrolein	100	U
(3V)	107-13-1	acrylonitrile	100	U
(4V)	71-43-2	benzene	5	U
(6V)	56-23-5	carbon tetrachloride	5	U
(7V)	108-90-7	chlorobenzene	5	U
(10V)	107-06-2	1,2-dichloroethane	1	U
(11V)	71-55-6	1,1,1-trichloroethane	5	U
(13V)	75-34-3	1,1-dichloroethane	5	U
(14V)	79-00-5	1,1,2-trichloroethane	5	U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	10	U
(16V)	75-00-3	chloroethane	10	U
(19V)	110-75-8	2-chloroethylvinyl ether	10	U
(23V)	67-66-3	chloroform	5	U
(29V)	75-35-4	1,1-dichloroethene	5	U
(30V)	156-60-5	trans-1,2-dichloroethene	5	U
(32V)	78-87-5	1,2-dichloropropane	10	U
(33V)	10061-02-6	trans-1,3-dichloropropene	5	U
	10061-01-05	cis-1,3-dichloropropene	5	U
(38V)	100-41-4	ethylbenzene	5	U
(44V)	75-09-2	methylene chloride	ND	B
(45V)	74-87-3	chloromethane	10	U
(46V)	74-83-9	bromomethane	10	U
(47V)	75-25-2	bromoform	10	U
(48V)	75-27-4	bromodichloromethane	5	U
(49V)	75-69-4	fluorotrichloromethane	10	U
(50V)	75-71-8	dichlorodifluoromethane	10	U
(51V)	124-48-1	chlorodibromomethane	10	U
(85V)	127-18-4	tetrachloroethene	5	U
(86V)	108-88-3	toluene	5	U
(87V)	79-01-6	trichloroethene	5	U
(88V)	75-01-4	vinyl chloride	10	U
	67-64-1	acetone	5	U
	78-93-3	2-butanone	ND	B
	75-15-0	carbondisulfide	1	U
	519-78-6	2-hexanone	5	U
	108-10-1	4-methyl-2-pentanone	5	U
	100-42-5	styrene	5	U
	108-05-4	vinyl acetate	5	U
	1330-20-7	total xylenes	5	U

PESTICIDES (BY GC)

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	NA
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	NA

December, '83

U - Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
K - Actual value, within the limitations of this method, is less than the value given.
CX - Compounds which were concentrated by a factor of 10 times.
B - Blank > 1/2 method D.L. and > 1/2 conc. in sample. Report ND B
C - Blank > 1/2 method D.L. and ≤ 1/2 conc. in sample. Report (corrected conc.) C

ORIGINAL (Red)

ORIGINAL (Red)

U.S. ENVIRONMENTAL PROTECTION AGENCY - CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 - 703/557-2490

Sample Number
C 4492

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ERG. INC.
Case No: 2873
Lab Sample ID No: 06 / 109618
QC Report No:
Sample Matrix: WATER
Contract No.: 68-01-6369
Data Release Authorized By: [illegible]
Date Sample Received: 6/7/84

VOLATILES

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: NA
DATE ANALYZED: 6/12/84
PERCENT MOISTURE: NA
CONC./DILUTION FACTOR: NA

PP #	CAS #		(ug/l) or ug/kg (circle one)	
(2V)	107-02-8	acrolein	100	U
(3V)	107-13-1	acrylonitrile	100	U
(4V)	71-43-2	benzene	5	U
(6V)	56-23-5	carbon tetrachloride	5	U
(7V)	108-90-7	chlorobenzene	5	U
(10V)	107-06-2	1,2-dichloroethane	1	U
(11V)	71-55-6	1,1,1-trichloroethane	1400.0	
(13V)	75-34-3	1,1-dichloroethane	9.0	
(14V)	79-00-5	1,1,2-trichloroethane	5	U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	10	U
(16V)	75-00-3	chloroethane	10	U
(19V)	110-75-8	2-chloroethylvinyl ether	10	U
(23V)	67-66-3	chloroform	5	U
(29V)	75-35-4	1,1-dichloroethene	130.0	
(30V)	156-60-5	trans-1,2-dichloroethene	150.0	
(32V)	78-87-5	1,2-dichloropropane	10	U
(33V)	10061-02-6	trans-1,3-dichloropropene	5	U
	10061-01-05	cis-1,3-dichloropropene	5	U
(38V)	100-41-4	ethylbenzene	5	U
(44V)	75-09-2	methylene chloride	ND	B
(45V)	74-87-3	chloromethane	10	U
(46V)	74-83-9	bromomethane	10	U
(47V)	75-25-2	bromoform	10	U
(48V)	75-27-4	bromodichloromethane	5	U
(49V)	75-69-4	fluorotrichloromethane	10	U
(50V)	75-71-8	dichlorodifluoromethane	10	U
(51V)	124-48-1	chlorodibromomethane	10	U
(85V)	127-18-4	tetrachloroethene	8.0	
(86V)	108-88-3	toluene	5	K
(87V)	79-01-6	trichloroethene	2026.0	C
(88V)	75-01-4	vinyl chloride	10	K
	67-64-1	acetone	5	U
	78-93-3	2-butanone	ND	B
	75-15-0	carbondisulfide	1	U
	591-78-6	2-hexanone	5	U
	108-10-1	4-methyl-2-pentanone	5	U
	100-42-5	styrene	5	U
	108-05-4	vinyl acetate	6.0	
	1330-20-7	total xylenes	5	U

PESTICIDES (BY GC)

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle on
(89P)	309-00-2	aldrin	NA
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	NA

December 1983

U - Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
K - Actual value, within the limitations of this method, is less than the value given.
CX - Compounds which were concentrated by a factor of 10 times.
B - Blank > 1/2 method D.L. and > 1/2 conc. in sample. Report ND B
C - Blank > 1/2 method D.L. and ≤ 1/2 conc. in sample. Report (corrected conc.) C

U.S. ENVIRONMENTAL PROTECTION AGENCY - CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 - 703/557-2490

ORIGINAL

Sample Number C 4293

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ERG. INC.
Case No: 2873
Lab Sample ID No: 06 / 109622
QC Report No:
Sample Matrix: WATER
Contract No.: 68-01-6869
Data Release Authorized By:
Date Sample Received: 6 / 7 / 84

VOLATILES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: NA
DATE ANALYZED: 6 / 12 / 84
PERCENT MOISTURE: NA
CONC./DILUTION FACTOR: NA

PP #	CAS #		ug/l or ug/kg (circle one)	
(2V)	107-02-8	acrolein	100	U
(3V)	107-13-1	acrylonitrile	100	U
(4V)	71-43-2	benzene	5	U
(6V)	56-23-5	carbon tetrachloride	5	U
(7V)	108-90-7	chlorobenzene	5	U
(10V)	107-06-2	1,2-dichloroethane	1	U
(11V)	71-55-6	1,1,1-trichloroethane	5	U
(13V)	75-34-3	1,1-dichloroethane	5	U
(14V)	79-00-5	1,1,2-trichloroethane	5	U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	10	U
(16V)	75-00-3	chloroethane	10	U
(19V)	110-75-8	2-chloroethylvinyl ether	10	U
(23V)	67-66-3	chloroform	5	U
(29V)	75-35-4	1,1-dichloroethene	5	U
(30V)	156-60-5	trans-1,2-dichloroethene	5	U
(32V)	78-87-5	1,2-dichloropropane	10	U
(33V)	10061-02-6	trans-1,3-dichloropropene	5	U
	10061-01-05	cis-1,3-dichloropropene	5	U
(38V)	100-41-4	ethylbenzene	5	U
(44V)	75-09-2	methylene chloride	8.8	C
(45V)	74-87-3	chloromethane	10	U
(46V)	74-83-9	bromomethane	10	U
(47V)	75-25-2	bromoform	10	U
(48V)	75-27-4	bromodichloromethane	5	U
(49V)	75-69-4	fluorotrichloromethane	10	U
(50V)	75-71-8	dichlorodifluoromethane	10	U
(51V)	124-48-1	chlorodibromomethane	10	U
(85V)	127-18-4	tetrachloroethene	5	U
(86V)	108-88-3	toluene	5	U
(87V)	79-01-6	trichloroethene	5	U
(88V)	75-01-4	vinyl chloride	10	U
	67-64-1	acetone	ND	B
	78-93-3	2-butanone	ND	B
	75-15-0	carbondisulfide	1	U
	519-78-6	2-hexanone	5	U
	108-10-1	4-methyl-2-pentanone	5	U
	100-42-5	styrene	5	U
	108-05-4	vinyl acetate	5	U
	1330-20-7	total xylenes	5	U

PESTICIDES (BY GC)

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	NA
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	NA

December 1983

U - Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
K - Actual value, within the limitations of this method, is less than the value given.
CX - Compounds which were concentrated by a factor of 10 times.
B - Blank > 1/2 method D.L. and > 1/2 conc. in sample. Report ND B
C - Blank > 1/2 method D.L. and ≤ 1/2 conc. in sample. Report (corrected conc.) C

U.S. ENVIRONMENTAL PROTECTION AGENCY - CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 - 703/557-2490

ORIGINAL (Red)

Sample Number: C 7083

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ERG. INC.
Lab Sample ID No: OC 109623
Sample Matrix: WATER
Data Release Authorized By: [illegible]

Case No: 2373
QC Report No:
Contract No.: 68-01-6369
Date Sample Received: 6/7/84

VOLATILES

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: NA
DATE ANALYZED: 6/12/84
PERCENT MOISTURE: NA
CONC./DILUTION FACTOR: NA

PP #	CAS #		(ug/l or ug/kg) (circle one)	
(2V)	107-02-8	acrolein	100	U
(3V)	107-13-1	acrylonitrile	100	U
(4V)	71-43-2	benzene	5	U
(6V)	56-23-5	carbon tetrachloride	5	U
(7V)	108-90-7	chlorobenzene	5	U
(10V)	107-06-2	1,2-dichloroethane	1	U
(11V)	71-55-6	1,1,1-trichloroethane	5	U
(13V)	75-34-3	1,1-dichloroethane	5	U
(14V)	79-00-5	1,1,2-trichloroethane	5	U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	10	U
(16V)	75-00-3	chloroethane	10	U
(19V)	110-75-8	2-chloroethylvinyl ether	10	U
(23V)	67-66-3	chloroform	5	U
(29V)	75-35-4	1,1-dichloroethene	5	U
(30V)	156-60-5	trans-1,2-dichloroethene	5	U
(32V)	78-87-5	1,2-dichloropropane	10	U
(33V)	10061-02-6	trans-1,3-dichloropropene	5	U
	10061-01-05	cis-1,3-dichloropropene	5	U
(38V)	100-41-4	ethylbenzene	5	U
(64V)	75-09-2	methylene chloride	ND	B
(65V)	74-87-3	chloromethane	10	U
(66V)	74-83-9	bromomethane	10	U
(67V)	75-25-2	bromoform	10	U
(68V)	75-27-4	bromodichloromethane	5	U
(69V)	75-69-4	fluorotrichloromethane	10	U
(70V)	75-71-8	dichlorodifluoromethane	10	U
(71V)	124-48-1	chlorodibromomethane	10	U
(85V)	127-18-4	tetrachloroethene	5	U
(86V)	108-88-3	toluene	5	U
(87V)	79-01-6	trichloroethene	5	U
(88V)	75-01-4	vinyl chloride	10	U
	67-64-1	acetone	5	U
	78-93-3	2-butanone	ND	B
	75-15-0	carbondisulfide	1	U
	519-78-6	2-hexanone	5	U
	108-10-1	4-methyl-2-pentanone	5	U
	100-42-5	styrene	5	U
	108-05-4	vinyl acetate	5	U
	1330-20-7	total xylenes	5	U

PESTICIDES (BY GC)

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		(ug/l or ug/kg) (circle one)
(89P)	309-00-2	aldrin	NA
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		(ug/l or ug/kg) (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	NA

December 1983

U - Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
K - Actual value, within the limitations of this method, is less than the value given.
CX - Compounds which were concentrated by a factor of 10 times.
B - Blank > 1/2 method D.L. and > 1/2 conc. in sample. Report ND B
C - Blank > 1/2 method D.L. and ≤ 1/2 conc. in sample. Report (corrected conc.) C

ORIGINAL

U.S. ENVIRONMENTAL PROTECTION AGENCY - CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 - 703/557-2490

Sample Number: C 7098

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ERG. INC.
Case No: 2873
Lab Sample ID No: 06/109622
QC Report No:
Sample Matrix: WATER
Contract No.: 63-01-6869
Data Release Authorized By: [illegible]
Date Sample Received: 6/7/84

VOLATILES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: NA
DATE ANALYZED: 6/12/84
PERCENT MOISTURE: NA
CONC./DILUTION FACTOR: NA

PP #	CAS #		ug/l or ug/kg (circle one)
(2V)	107-02-8	acrolein	100 U
(3V)	107-13-1	acrylonitrile	100 U
(4V)	71-43-2	benzene	5 U
(6V)	56-23-5	carbon tetrachloride	5 U
(7V)	108-90-7	chlorobenzene	5 U
(10V)	107-06-2	1,2-dichloroethane	3.0
(11V)	71-55-6	1,1,1-trichloroethane	4200.0
(13V)	75-34-3	1,1-dichloroethane	41.0
(14V)	79-00-5	1,1,2-trichloroethane	5 U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	10 U
(16V)	75-00-3	chloroethane	10 U
(19V)	110-75-8	2-chloroethylvinyl ether	10 U
(23V)	67-66-3	chloroform	5 K
(29V)	75-35-4	1,1-dichloroethene	690.0
(30V)	156-60-5	trans-1,2-dichloroethene	340.0
(32V)	78-87-5	1,2-dichloropropane	10 U
(33V)	10061-02-6	trans-1,3-dichloropropene	5 U
	10061-01-05	cis-1,3-dichloropropene	5 U
(38V)	100-41-4	ethylbenzene	5 U
(64V)	75-09-2	methylene chloride	ND B
(65V)	74-87-3	chloromethane	10 U
(66V)	74-83-9	bromomethane	10 U
(67V)	75-25-2	bromoform	10 U
(68V)	75-27-4	bromodichloromethane	5 U
(69V)	75-69-4	fluorotrichloromethane	10 U
(70V)	75-71-8	dichlorodifluoromethane	10 U
(71V)	124-48-1	chlorodibromomethane	10 U
(85V)	127-18-4	tetrachloroethene	21.0
(86V)	108-88-3	toluene	6.0
(87V)	79-01-6	trichloroethene	4800.0
(88V)	75-01-4	vinyl chloride	10 K
	67-64-1	acetone	5 K
	78-93-3	2-butanone	5 U
	75-15-0	carbondisulfide	ND B
	519-78-6	2-hexanone	5 U
	108-10-1	4-methyl-2-pentanone	5 U
	100-42-5	styrene	5 U
	108-05-4	vinyl acetate	5 U
	1330-20-7	total xylenes	5 U

PESTICIDES (BY GC)

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	NA
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	NA

December 1983

U - Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
K - Actual value, within the limitations of this method, is less than the value given.
CX - Compounds which were concentrated by a factor of 10 times.
B - Blank > 1/2 method D.L. and > 1/2 conc. in sample. Report ND B
C - Blank > 1/2 method D.L. and ≤ 1/2 conc. in sample. Report (corrected conc.) C

ORIGINAL (Red)

U.S. ENVIRONMENTAL PROTECTION AGENCY - CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 - 703/557-2490

Sample Number: C 7085

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ERG. INC.
Case No: 2973
Lab Sample ID No: 06 / 109625R
QC Report No:
Sample Matrix: WATER
Contract No.: 68-01-6369
Date Release Authorized By:
Date Sample Received: 6 / 7 / 84

VOLATILES

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: NA
DATE ANALYZED: 6 / 13 / 84
PERCENT MOISTURE: NA
CONC./DILUTION FACTOR: NA

PP #	CAS #		(ug/l) or ug/kg (circle one)	
(2V)	107-02-8	acrolein	100	U
(3V)	107-13-1	acrylonitrile	100	U
(4V)	71-43-2	benzene	5	U
(6V)	56-23-5	carbon tetrachloride	5	U
(7V)	108-90-7	chlorobenzene	5	U
(10V)	107-06-2	1,2-dichloroethane	1	U
(11V)	71-55-6	1,1,1-trichloroethane	7700	
(13V)	75-34-3	1,1-dichloroethane	54.0	
(14V)	79-00-5	1,1,2-trichloroethane	5	U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	10	U
(16V)	75-00-3	chloroethane	10	U
(19V)	110-75-8	2-chloroethylvinyl ether	10	U
(23V)	67-66-3	chloroform	5	U
(29V)	75-35-4	1,1-dichloroethene	612.0	
(30V)	156-60-5	trans-1,2-dichloroethene	1754.0	
(32V)	78-87-5	1,2-dichloropropane	10	U
(33V)	10061-02-6	trans-1,3-dichloropropene	5	U
	10061-01-05	cis-1,3-dichloropropene	5	U
(38V)	100-41-4	ethylbenzene	5	U
(44V)	75-09-2	methylene chloride	22.0	C
(45V)	74-87-3	chloromethane	10	U
(46V)	74-83-9	bromomethane	10	U
(47V)	75-25-2	bromoform	10	U
(48V)	75-27-4	bromodichloromethane	5	U
(49V)	75-69-4	fluorotrichloromethane	10	U
(50V)	75-71-8	dichlorodifluoromethane	10	U
(51V)	124-48-1	chlorodibromomethane	10	U
(85V)	127-18-4	tetrachloroethene	43.0	
(86V)	108-88-3	toluene	5	U
(87V)	79-01-6	trichloroethene	20120	
(88V)	75-01-4	vinyl chloride	10	U
	67-64-1	acetone	5	U
	78-93-3	2-butanone	22.0	C
	75-15-0	carbondisulfide	1	U
	519-78-6	2-hexanone	5	U
	108-10-1	4-methyl-2-pentanone	5	U
	100-42-5	styrene	5	U
	108-05-4	vinyl acetate	60.0	C
	1330-20-7	total xylenes	5	U

PESTICIDES (BY GC)

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	NA
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	NA

December 1983

U - Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
K - Actual value, within the limitations of this method, is less than the value given.
CX - Compounds which were concentrated by a factor of 10 times.
B - Blank > 1/2 method D.L. and > 1/2 conc. in sample. Report ND B
C - Blank > 1/2 method D.L. and ≤ 1/2 conc. in sample. Report (corrected conc.) C

U.S. ENVIRONMENTAL PROTECTION AGENCY - CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 - 703/557-2490

Sample Number: C 7086

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ERG. INC.
Case No: 2873
Lab Sample ID No: OW 109626
QC Report No:
Sample Matrix: WATER
Contract No.: 68-01-6369
Data Release Authorized By:
Date Sample Received: 6/7/84

VOLATILES

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: NA
DATE ANALYZED: 6/12/84
PERCENT MOISTURE: NA
CONC./DILUTION FACTOR: NA

PP #	CAS #		ug/l or ug/kg (circle one)	
(2V)	107-02-8	acrolein	100	U
(3V)	107-13-1	acrylonitrile	100	U
(4V)	71-43-2	benzene	5	U
(5V)	56-23-5	carbon tetrachloride	5	U
(7V)	108-90-7	chlorobenzene	5	U
(10V)	107-06-2	1,2-dichloroethane	1	U
(11V)	71-55-6	1,1,1-trichloroethane	45.0	C
(13V)	75-34-3	1,1-dichloroethane	14.0	C
(14V)	79-00-5	1,1,2-trichloroethane	5	U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	10	U
(16V)	75-00-3	chloroethane	10	U
(19V)	110-75-8	2-chloroethylvinyl ether	10	U
(23V)	67-66-3	chloroform	5	U
(29V)	75-35-4	1,1-dichloroethene	29.0	C
(30V)	156-60-5	trans-1,2-dichloroethene	2700.0	C
(32V)	78-87-5	1,2-dichloropropane	10	U
(33V)	10061-02-6	trans-1,3-dichloropropene	5	U
	10061-01-05	cis-1,3-dichloropropene	5	U
(38V)	100-41-4	ethylbenzene	5	U
(44V)	75-09-2	methylene chloride	ND	B
(45V)	74-87-3	chloromethane	10	U
(46V)	74-83-9	bromomethane	10	U
(47V)	75-25-2	bromoform	10	U
(48V)	75-27-4	bromodichloromethane	5	U
(49V)	75-69-4	fluorotrichloromethane	10	U
(50V)	75-71-8	dichlorodifluoromethane	10	U
(51V)	124-48-1	chlorodibromomethane	10	U
(83V)	127-18-4	tetrachloroethene	160.0	
(86V)	108-88-3	toluene	5	U
(87V)	79-01-6	trichloroethene	4800.0	
(88V)	75-01-4	vinyl chloride	44.0	
	67-64-1	acetone	5	U
	78-93-3	2-butanone	ND	B
	75-15-0	carbondisulfide	1	U
	591-78-6	2-hexanone	5	U
	108-10-1	4-methyl-2-pentanone	5	U
	100-42-5	styrene	5	U
	108-05-4	vinyl acetate	5	U
	1330-20-7	total xylenes	5	U

PESTICIDES (BY GC)

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	NA
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	NA

December 1983

U - Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
K - Actual value, within the limitations of this method, is less than the value given.
CX - Compounds which were concentrated by a factor of 10 times.
B - Blank > 1/2 method D.L. and > 1/2 conc. in sample. Report ND B
C - Blank > 1/2 method D.L. and ≤ 1/2 conc. in sample. Report (corrected conc.) C

ORIGINAL (Red)

U.S. ENVIRONMENTAL PROTECTION AGENCY - CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 - 703/557-2490

Sample Number: C 7087

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ERG, INC.
Case No: 2373
Lab Sample ID No: 06 / 109627
QC Report No:
Sample Matrix: WATER
Contract No.: 68-01-6869
Data Release Authorized By:
Date Sample Received: 6/7/84

VOLATILES

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: NA
DATE ANALYZED: 6/12/84
PERCENT MOISTURE: NA
CONC./DILUTION FACTOR: NA

PP #	CAS #		(ug/l) or ug/kg (circle one)	
(2V)	107-02-8	acrolein	100	U
(3V)	107-13-1	acrylonitrile	100	U
(4V)	71-43-2	benzene	5	U
(6V)	56-23-5	carbon tetrachloride	5	U
(7V)	108-90-7	chlorobenzene	5	U
(10V)	107-06-2	1,2-dichloroethane	1	U
(11V)	71-55-6	1,1,1-trichloroethane	ND	B
(13V)	75-34-3	1,1-dichloroethane	ND	B
(14V)	79-00-5	1,1,2-trichloroethane	5	U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	10	U
(16V)	75-00-3	chloroethane	10	U
(19V)	110-75-8	2-chloroethylvinyl ether	10	U
(23V)	67-66-3	chloroform	5	U
(29V)	75-35-4	1,1-dichloroethene	ND	B
(30V)	156-60-5	trans-1,2-dichloroethene	ND	B
(32V)	78-87-5	1,2-dichloropropane	10	U
(33V)	10061-02-6	trans-1,3-dichloropropene	5	U
	10061-01-05	cis-1,3-dichloropropene	5	U
(38V)	100-41-4	ethylbenzene	5	U
(44V)	75-09-2	methylene chloride	ND	B
(45V)	74-87-3	chloromethane	10	U
(46V)	74-83-9	bromomethane	10	U
(47V)	75-25-2	bromoform	10	U
(48V)	75-27-4	bromodichloromethane	5	U
(49V)	75-69-4	fluorotrichloromethane	10	U
(50V)	75-71-8	dichlorodifluoromethane	10	U
(51V)	124-48-1	chlorodibromomethane	10	U
(85V)	127-18-4	tetrachloroethene	5	U
(86V)	108-88-3	toluene	5	U
(87V)	79-01-6	trichloroethene	ND	B
(88V)	75-01-4	vinyl chloride	10	U
	67-64-1	acetone	5	U
	78-93-3	2-butanone	ND	B
	75-15-0	carbondisulfide	1	U
	591-78-6	2-hexanone	5	U
	108-10-1	4-methyl-2-pentanone	5	U
	100-42-5	styrene	5	U
	108-05-4	vinyl acetate	5	U
	1330-20-7	total xylenes	5	U

PESTICIDES (BY GC)

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	NA
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	NA

December 1983

U - Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
K - Actual value, within the limitations of this method, is less than the value given.
CX - Compounds which were concentrated by a factor of 10 times.
B - Blank > 1/2 method D.L. and > 1/2 conc. in sample. Report ND B
C - Blank > 1/2 method D.L. and ≤ 1/2 conc. in sample. Report (corrected conc.) C

STANDARDS

ORIGINAL (Red)

APPENDIX E

ORIGINAL (Red)

EPA Notification of Hazardous Waste Site

United States Environmental Protection Agency
Washington DC 20460

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

A Person Required to Notify:
Enter the name and address of the person or organization required to notify.

Name: Johnson Matthey Inc.
Street: 4 Malin Road
City: Malvern State: PA Zip Code: 19355

B Site Location:
Enter the common name (if known) and actual location of the site.

Name of Site: Bishop Tube Co.
Street: Route 30 and Malin Road
City: Malvern County: Chester State: PA Zip Code: 19355

PAD-08-136-8309

C Person to Contact:
Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title): Curtis, Barbara Environ. Specialist
Phone: (215) 648-8278

D Dates of Waste Handling:
Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year): 1951 To (Year): 1979 - disposal ended by Bishop Tube Co.
1969 - sold to Whittaker Corp.

E Waste Type: Choose the option you prefer to complete

Option I: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☐ Pesticides
5. ☐ Heavy metals
6. ☒ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☐ Mixed Municipal Waste
10. ☐ Unknown
11. ☒ Other (Specify) Non EP Toxic Metals

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical, General
9. ☐ Plating/Polishing
10. ☐ Military/Ammunition
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab Hospital
17. ☐ Unknown
18. ☒ Other (Specify) Stainless Steel pickling

Option 2: This option is available to persons familiar with the Resource Conservation and Recovery Act (RCRA) Section 3001 regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous waste listed in the regulations under Section 3001 of RCRA. Enter the appropriate four-digit number in the boxes provided. A copy of the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the site is located.

Form Approved
OMB No. 2060-0138

Notification of Hazardous Waste Site — Side Two

F Waste Quantity

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☐ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☒ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☐ Other (Specify) _____

Total Facility Waste Amount

cubic feet: Note (A)

gallons: Note (A)

Total Facility Area

square feet: 360

acres: _____

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☐ Suspected ☐ Likely ☐ None

Note (B)

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and assessing hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

~~H Sketch Map of Site Location:~~ (Optional)

~~Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.~~

(A) The amount of hazardous waste to be found at the site is unknown due to the unavailability of data as to the amount rendered non-hazardous by natural process. Approximately 8,000 gallons of acid waste was discharged per year in a stream containing 3.25 million gallons of non-hazardous waste water.

I Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

J. Bishop & Co. Platinum Works opened the site in 1951. The name was changed to Matthey Bishop, Inc. in 1967. Matthey Bishop sold the Plant as Bishop Tube Co. to the Whittaker Corporation on 31 March, 1969. Whittaker sold it to Christiana Metals on 7 January, 1974. The Plant is now called: Bishop Tube Co., Division of Christiana Metals Corp. Matthey Bishop changed its name to Johnson Matthey Inc. on 1 April, 1980.

(B) Unknown. No release of hazardous waste from the above facility has been observed or detected, however, the possibility of some release cannot be discounted.

In the absence of recorded data, it has been necessary to compile the foregoing data on the basis of the personal knowledge, recollection and estimates of currently employed personnel of Bishop Tube Co.

J Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required to notify check "Other".

Name: Johnson Matthey Inc.

Street: 4 Malin Road

City: Malvern State: PA Zip Code: 19355

Signature: _____ Date: 6/8/81

Howard S. Roberts
Senior Vice President

☐ Owner, Present
☒ Owner, Past
☐ Transporter
☐ Operator, Present
☒ Operator, Past
☐ Other

ORIGINAL (Red)

APPENDIX F

eries 1959, No. 19

Issued [redacted]

SOIL SURVEY

ORIGINAL
(Red)

Chester and Delaware Counties, Pennsylvania

OUR SOIL * OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
PENNSYLVANIA STATE UNIVERSITY
College of Agriculture and Agricultural Experiment Station
and the
PENNSYLVANIA DEPARTMENT OF AGRICULTURE
Soil Conservation Commission

ORIGINAL (Red)

discontinuous films of silt on peds; friable; medium acid (pH 5.8); gradual, wavy lower boundary; 8 to 10 inches thick.

D_1 24 to 50 inches, yellowish-red (5YR 5/6) silt loam; common, medium, distinct mottles of gray (10YR 5/1); thick, platy structure that breaks to pieces that subdivide into moderate fine, subangular blocky structure; firm; strongly acid (pH 5.2).

The variations in this soil are in the thickness and color of the horizons. The texture of the subsoil ranges from loam to silty clay loam. The parent material consists of alluvium washed from the Hagerstown or Conestoga soils. In a few places the alluvium has been transported for short distances through areas of soils underlain by mica, schist, or quartzite.

The Lindside soils are moderately permeable. They have high available moisture capacity and are moderately high in fertility. In most places the soils are free of stones. They are saturated for prolonged periods and have mottles in the lower part of the subsoil. In most places they are subject to occasional and light overflow and deposition.

Lindside silt loam (Ls).—The profile of this soil is the ame as the profile described as typical for the series.

This soil is used mostly for pasture or hay, but corn and small grain also grow well. The soil is productive and has high available moisture capacity. Ash, sycamore, hickory, white oak, red oak, and tulip-poplar grow well on this soil.

The soil is in capability unit IIw-2; woodland group 8; and group 13 for building sites.

Made Land

Made land consists of areas in which the soil has been covered by other materials or from which the soil has been moved about or removed to provide materials for urban or industrial development. Because the areas consist of variable materials, they have not been given a capability classification or a woodland suitability classification. They have, however, been included in the groups for building sites.

Made land, gravelly materials (Ma).—This miscellaneous land type consists of areas in which the profile of the normal soil has been destroyed or covered by earthmoving equipment used for urban or industrial development. In these areas the soil materials consist of sand, gravel, and clay in various mixtures, but gravelly materials predominate. This mapping unit is in group 1 for building sites.

Made land, silt and clay materials (Mc).—This miscellaneous land type consists of areas in which the profile of the normal soil has been destroyed or covered by earthmoving equipment. In most places the exposed materials consist of silt and clay, but small areas of sandy and gravelly materials are intermingled with the silt and clay This unit is in group 3 for building sites.

Made land, gabbro and diabase materials (Md).—This miscellaneous land type consists of areas that have been graded or filled and the profile of the normal soil destroyed or covered. Large, grayish-brown boulders of diabase, and coarse-grained, salt-and-pepper colored boulders of gabbro make up most of the mass of material; the rest consists mainly of a mixture of reddish silty clay oam or clay from the subsoil and gray to brown silt loam from the surface layer. This mapping unit is in group 3 for building sites.

Made land, schist and gneiss materials (Me).—This miscellaneous land type consists of areas in which the profile of the normal soil has been destroyed or covered by earthmoving equipment used for urban or industrial development. In these areas the soil material consists of a mixture of grayish-brown material from the surface layer, silt loam from the subsoil, and partially weathered micaceous schist and gneiss rocks. This unit is in group 1 for building sites.

Made land, sanitary land fill (Mf).—This miscellaneous land type is made up of alternate layers of soil material and trash and has been compacted by heavy equipment. It is in group 5 for building sites.

Manor Series

The Manor series consists of shallow, well-drained soils of uplands. The soils occur in both Chester and Delaware Counties, but in Chester County they are more common south of Chester Valley. The parent material of these soils is mostly mica, schist, and gneiss. The schist is fairly soft and weathers easily. The soils formed on schist appear to be deep, but, actually, they have little development in the B horizon. The soils formed on gneiss are shallow over bedrock in many places.

The Manor soils have a dark-brown surface layer. Their subsoil is yellowish red or yellowish brown and is micaceous. In many places the soil has a slippery or greasy feeling caused mainly by the abundance of mica that it contains. The native forest consisted mostly of red oak, white oak, chestnut, hickory, black oak, tulip-poplar, and beech.

The Manor soils are near the deep, well-drained Chester soils and the moderately deep, well-drained Glenelg soils. They are also near the Glenville and Worsham soils, but they are shallower and better drained than those soils.

Typical profile of Manor loam, 8 to 15 percent slopes, moderately eroded:

A_p 0 to 7 inches, dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable; very strongly acid (pH 5.0); clear, smooth lower boundary; 6 to 8 inches thick.

B_1 7 to 13 inches, yellowish-red (5YR 4/8) loam; weak, fine, granular structure; friable; strongly acid (pH 5.2); gradual, wavy lower boundary; 5 to 8 inches thick.

B_2 13 to 21 inches, yellowish-brown (10YR 5/6), smooth loam; weak, fine, subangular blocky structure; friable; strongly acid (pH 5.4); gradual, wavy lower boundary; 8 to 12 inches thick.

C 21 to 50 inches, dark yellowish-brown (10YR 4/4) very fine sandy loam containing yellow (10YR 7/6) lenses that are ¼ inch thick; weak, medium, somewhat platy structure that breaks to weak, fine, granular structure; loose to very friable; medium acid (pH 5.6).

The texture of the surface layer is loam or light silt loam. The color of the surface layer ranges from pale brown to dark grayish brown, and that of the subsoil, from yellowish brown to reddish brown. Depth to bedrock ranges from 15 inches in some places that are underlain by gneiss to between 8 and 10 feet in soils that are underlain by mica schist.

In most places the subsoil is very micaceous and is underlain by highly weathered mica schist. The mica schist is interspersed with partially disintegrated fragments of rock. In some areas near South Valley Hills, where the underlying rocks are albite-chlorite schist, 40 to 60 percent of the profile, by volume, consists of frag-

ments of schist. The fragments vary in size. They are as much as 3 or 4 inches across and ½ inch to 2 inches thick.

Manor loam, 0 to 3 percent slopes, moderately eroded (MgA2).—In this soil depth to the C horizon is greater than in the profile described as typical for the series. In most places, however, part of the original surface layer has been lost through erosion. In a few places the surface layer has been removed for use as casing soil in mushroom houses.

Manor loam, 0 to 3 percent slopes, moderately eroded, is easy to work. It has moderate to low available moisture capacity, and its productivity is moderately low.

If this soil is managed properly, most farm crops grow fairly well on it. Contour cultivation is needed to help control erosion. A cropping system is needed in which grasses and legumes are grown every 3 or 4 years. Large amounts of lime and fertilizer are required. Red oak, black oak, chestnut oak, hickory, and tulip-poplar grow well on this soil.

The soil is in capability unit IIs-1; woodland group 13; and group 5 for building sites.

Manor loam, 3 to 8 percent slopes, moderately eroded (MgB2).—Except that depth to parent material is greater, the profile of this soil is similar to the one described as typical for the series. The soil has lost about 50 percent of its original surface layer through erosion.

Most of this soil is easy to work. It has moderate to low available moisture capacity and is moderately to highly permeable.

This soil is moderately well suited to the general farm crops grown in the area. Contour stripcropping and diversion terraces will help to control erosion. Growing a sod crop of grasses and legumes at least 50 percent of the time also helps to control erosion and increases the supply of organic matter in the soil. Red oak, white oak, black oak, tulip-poplar, and hickory grow well on this soil.

The soil is in capability unit IIe-5; woodland group 13; and group 5 for building sites.

Manor loam, 3 to 8 percent slopes, severely eroded (MgB3).—This soil has lost nearly all of the original surface layer through erosion, and part of the subsoil has been mixed with the remaining surface soil. Otherwise, the profile is similar to the one described as typical for the series. In a few places the surface layer has been removed to provide casing soil for use in mushroom houses.

This soil can be used for small grain, but it is better suited to hay or pasture. If the soil is cultivated, it should be tilled on the contour to help control erosion. Diversion terraces would be needed. The soil is well suited to a permanent cover of hay or pasture. Large amounts of fertilizer and lime are needed for adequate yields. The lime and fertilizer should be applied according to the needs indicated by soil tests. Red oak, black oak, chestnut oak, and hickory grow fairly well on this soil.

The soil is in capability unit IIIe-4; woodland group 13; and group 5 for building sites.

Manor loam, 8 to 15 percent slopes (MgC).—Most of this inextensive soil is wooded. It has a layer of leaf mold, about 1 inch thick, on the surface. Just beneath the leaf mold is an A_1 horizon, 2 inches thick, of dark grayish-brown loam that is very friable and contains many roots. The A_2 horizon, underlying the A_1, consists of dark-brown silt loam, 4 to 6 inches thick that contains 15 to 20 percent, by volume, of fragments of schist. The profile underlying the A_2 horizon is sim[illegible] to the described as typical for the series, except that the de to parent material is between 20 and 24 inches.

This soil is moderately permeable and has mode available moisture capacity. If cleared, it is well su to hay or pasture. Its use for row crops and small gr is limited. If this soil is used for tilled crops, cont stripcropping and diversion terraces are needed to con erosion. A hay crop is needed 2 years out of 4 to h maintain organic matter in the soil. Red oak, black o white oak, beech, chestnut oak, and hickory grow fa well on this soil.

The soil is in capability unit IIIe-4; woodland gr 15; and group 6 for building sites.

Manor loam, 8 to 15 percent slopes, moderately ero (MgC2).—The profile of this soil is the one described typical for the series.

This soil is fairly well suited to the general farm cr grown in this area. Its available moisture capac however, is moderately low to low. During dry peric crops grown on this soil are among the first in the a to be damaged by lack of moisture.

The soil is well suited to permanent pasture. If i used for cultivated crops, contour stripcropping diversion terraces are needed to help control erosi Growing a sod of grasses and legumes 50 percent of time also helps to control erosion and adds organic ma to the soil. Red oak, white oak, black oak, hickory, beech grow well on this soil.

The soil is in capability unit IIIe-4; woodland group and group 6 for building sites.

Manor loam, 8 to 15 percent slopes, severely ero (MgC3).—The profile of this soil is shallower, in m places, than the profile described as typical for the ser Nearly all of the original surface layer has been wash away, and material from the upper part of the subsoil been mixed with the remaining surface layer. Gullies common.

In several places the surface layer of this soil has b removed to provide casing soil for use in mushroom hous In these areas gullies form soon after the surface laye removed unless practices are applied immediately protect the soil.

This soil needs a permanent sod of hay or pasture help control erosion. To obtain a satisfactory co lime and fertilizer should be applied before seedi according to the needs indicated by soil tests. Black o chestnut oak, red oak, beech, and hickory are suited.

This soil is in capability unit IVe-4; woodland gro 15; and group 6 for building sites.

Manor loam, 15 to 25 percent slopes (MgD).—This s is nearly all forested. On the surface is a layer of l mold about 1 inch thick. Just beneath the leaf mold i layer of dark grayish-brown loam, about 2 inches thi that is very friable and contains many roots. Underlyi this layer is an A_2 horizon, 4 to 6 inches thick, of da brown silt loam that contains 15 to 20 percent, by volun of fragments of schist. The profile below the A_2 horiz is similar to the one described as typical for the series.

This soil has moderately low available moisture capaci It is easily penetrated by air, moisture, and plant roo

Because of its strong slopes and susceptibility to e sion, the soil is not well suited to cultivated crops. T soil needs a permanent cover of sod or trees. If it cleared for pasture, a large amount of lime and fertili

...ded for satisfactory yields. White oak, red oak, ... oak, beech, hickory, and tulip-poplar are suited to ... soil.

The soil is in capability unit IVe-4; woodland group ... and group 6 for building sites.

Manor loam, 15 to 25 percent slopes, moderately eroded (...).—The profile of this soil is shallower than the profile described as typical for the series, but, otherwise, it is similar. Most of this soil is wooded or in pasture. In areas that have been cleared, between 50 and 75 percent of the original surface layer has been lost through erosion.

This soil is well suited to permanent hay or pasture. Lime and fertilizer are required to obtain adequate yields. Red oak, white oak, black oak, beech, tulip-poplar, and hickory are the dominant kinds of trees that grow on this soil.

This soil is in capability unit IVe-4; woodland group 15; and group 6 for building sites.

Manor loam, 15 to 25 percent slopes, severely eroded (...D3).—The profile of this soil is shallower than the one described as typical for the series, and gullies are common. Practically all of this soil has been cleared and was cultivated at one time. Permeability is moderately high, but the available moisture capacity is low.

This soil is not well suited to corn or small grain, but it is fairly well suited to permanent pasture or trees. Large amounts of fertilizer and lime are needed for plants to grow vigorously. White pine, Virginia pine, Banks pine, and pitch pine are suited to this soil.

The soil is in capability unit VIe-2; woodland group 15; and group 6 for building sites.

Manor loam and channery loam, 25 to 35 percent slopes (MhE).—The profile of this soil is shallower over bedrock than the profile described as typical for the series, and there is a mat of leaves, about 1 inch thick, on the surface. The mat is underlain by a layer, 6 to 7 inches thick, of grayish-brown loam that has granular structure. This layer contains many fragments of rock that occupy from 40 to 60 percent of the soil mass. The profile beneath this horizon is similar to the profile described as typical for the series.

This soil has not been cleared and is used as woodland. It is well suited to trees. If cleared, it has only a limited use for pasture. Red oak, white oak, black oak, chestnut oak, beech, and hickory grow fairly well on this soil.

This soil is in capability unit VIe-2; woodland group 17; and group 9 for building sites.

Manor loam and channery loam, 25 to 35 percent slopes, severely eroded (MhE3).—The profile of this soil is shallower over bedrock than the one described as typical for the series. It is shallow to very shallow. The present surface layer is mostly material from the former subsoil. In a few places bedrock is near the surface, and there are a few rock outcrops. In a few other areas, 40 to 60 percent of the profile consists of fragments of rock. The number of rocks increases with increasing depth.

This soil is probably best suited to use as woodland. It has steep slopes, is droughty, and is low in fertility. Furthermore, the areas are inaccessible to farm machinery, and erosion is difficult to control. White pine, red pine, Virginia pine, Banks pine, and pitch pine grow fairly well on this soil.

The soil is in capability unit VIIe-1; woodland group 17; and group 9 for building sites.

Manor soils, 35 to 60 percent slopes (MkF).—These soils are shallow. Most of the areas are wooded and have a thin layer of leaf mold, about one-half inch thick, on the surface. In most places the soils are only slightly to moderately eroded, but a few areas have been cleared and have become severely eroded. There are numerous fragments of rock in the surface layer and throughout the profile. In eroded areas the subsoil is very thin. The available moisture capacity is fairly low, but permeability is rapid to very rapid.

These soils are not suited to cultivated crops or pasture. They are well suited to trees, which are needed to provide a permanent cover. Red oak, white oak, black oak, chestnut oak, beech, and hickory grow fairly well on these soils if the areas are not severely eroded. In areas that are severely eroded, red pine, Virginia pine, Banks pine, white pine, and pitch pine can be grown.

This soil is in capability unit VIIe-1; woodland group 17; and group 9 for building sites.

Manor very stony loam, 0 to 8 percent slopes (MmB).—Except that it is stony and is thicker, 20 to 24 inches to the C horizon, the profile of this soil is similar to the one described as typical for the series. There is a layer of leaf mold, about 1 inch thick, on the surface. The leaf mold is underlain by a layer, 2 to 3 inches thick, of dark grayish-brown loam that contains many small roots. Beneath this layer is the A_2 horizon, which is 4 to 8 inches thick and consists of dark-brown silt loam that contains a few fragments of schist.

The many large stones on the surface make this soil unsuitable for cultivation. In some places, however, the soil has a limited use for pasture. Red oak, white oak, black oak, beech, and hickory are fairly well suited.

This soil is in capability unit VIIs-1; woodland group 13; and group 5 for building sites.

Manor very stony loam, 8 to 25 percent slopes (MmD).—This soil has a thin layer of leaf mold, about 1 inch thick, on the surface. Just beneath the leaf mold is a layer, 1 to 2 inches thick, of dark grayish-brown loam that is very friable and contains many roots. Underlying this layer is an A_2 horizon, 5 to 7 inches thick, of dark-brown silt loam that contains, by volume, 15 to 20 percent of fragments of schist. The profile beneath the A_2 horizon is similar to the one described as typical for the series.

The many large stones on the surface and in the profile of this soil make cultivation impractical. Some areas, if cleared, can be used for pasture, providing the stones are not so numerous as to prevent the control of woody and undesirable kinds of plants. White oak, red oak, black oak, tulip-poplar, hickory, and beech are well suited to this soil.

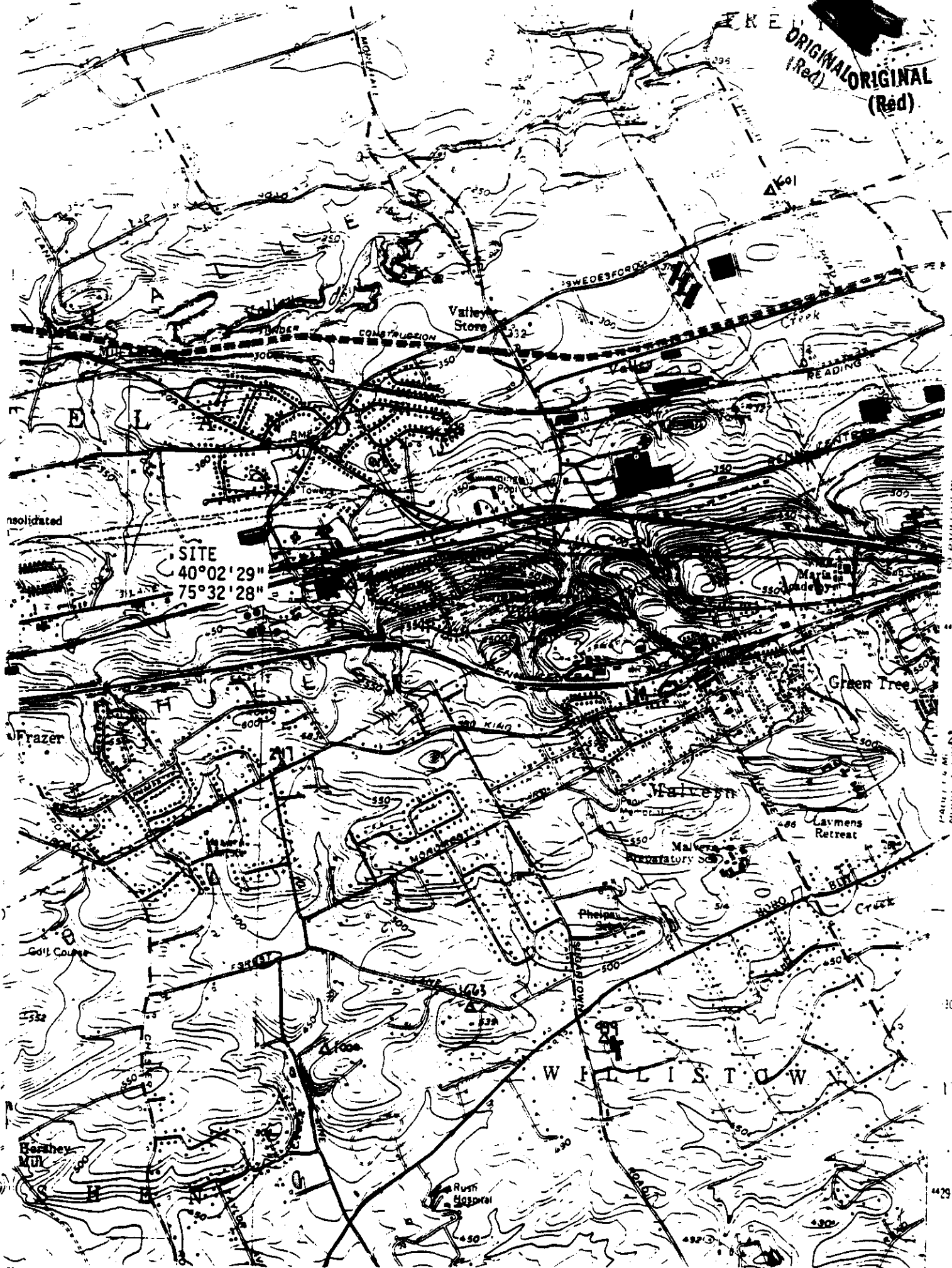
This soil is in capability unit VIIs-1; woodland group 15; and group 6 for building sites.

Manor very stony loam, 25 to 60 percent slopes (MmF).—This soil has a thin layer of leaf mold, about 1 inch thick, on the surface. The leaf mold is underlain by 1 to 2 inches of dark grayish-brown loam that is very friable and contains many small roots. Just beneath this layer is a horizon, 3 to 6 inches thick, of dark-brown silt loam 20 to 25 percent of which, by volume, consists of fragments of schist. Depth to the C horizon ranges from 15 to 20 inches.

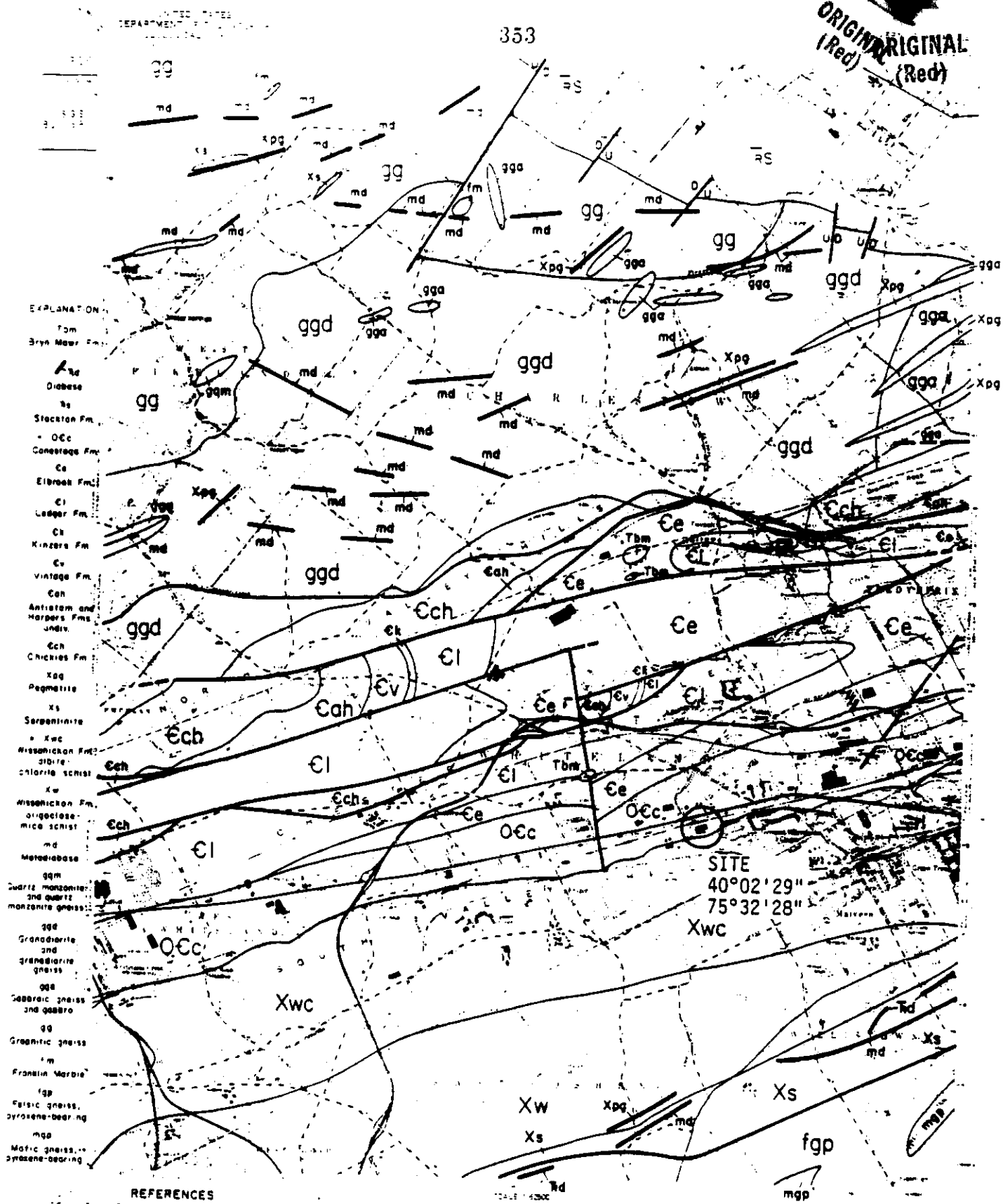
The many large stones make this soil unsuitable for cultivation or for use as pasture. The soil is probably

ORIGINAL
(Red)

APPENDIX G


ORIGINAL
(Red)
SITE
40°02'29"
75°32'28"
Valley Store
Green Tree
Malvern
Laymens Retreat
Frazer
Golf Course
Hershey Mill
Rush Hospital
Creek
SWEDESFORD
READING
KING
FOREST
WILLISTOWN

ORIGINAL (Red)



Compiled by A. A. SOCOLOW, 1978

MALVERN

ORIGINAL (Red)

WELL NO.	2917 *	MONITORING ** #1	#2	#3	#4
OWNER	D. GLAZAR	BISHOP TUBE CO			
LATITUDE & LONGITUDE	40°01'50" 75°32'23"	40° 02' 29" 75° 32' 28"			
WELL DEPTH (FT.)	105	48	24	13.5	20
DIAMETER OF WELL (INS)	6	4	4	4	4
CASING	21	30' PVC	15' PVC	8' PVC	7' PVC
SCREEN	OPEN	20' FROM BOTTOM	9' FROM BOTTOM	5' FROM BOTTOM	13' FROM BOTTOM
BEDROCK FORMATION	WISSAHICKON SCHIST	SCHIST	LIMESTONE	LIMESTONE	LIMESTONE
DEPTH TO BEDROCK	9	20 (UNWEATHERED)	13	18	20
FIRST WATER BEARING	93	30	–	–	–
WATER LEVEL	6	15	–	–	–
DISTANCE TO SITE	~3,000's	ON-SITE			

* PA DER GROUND WATER INVENTORY SYSTEM, CHESTER CO, WILLISTOWN TOWNSHIP.

** HYDROGEOLOGIC STUDY, BISHOP TUBE CO., FRAZER, PA. RETZ·CONVERSE·MURDOCH·INC., OCT. 1981

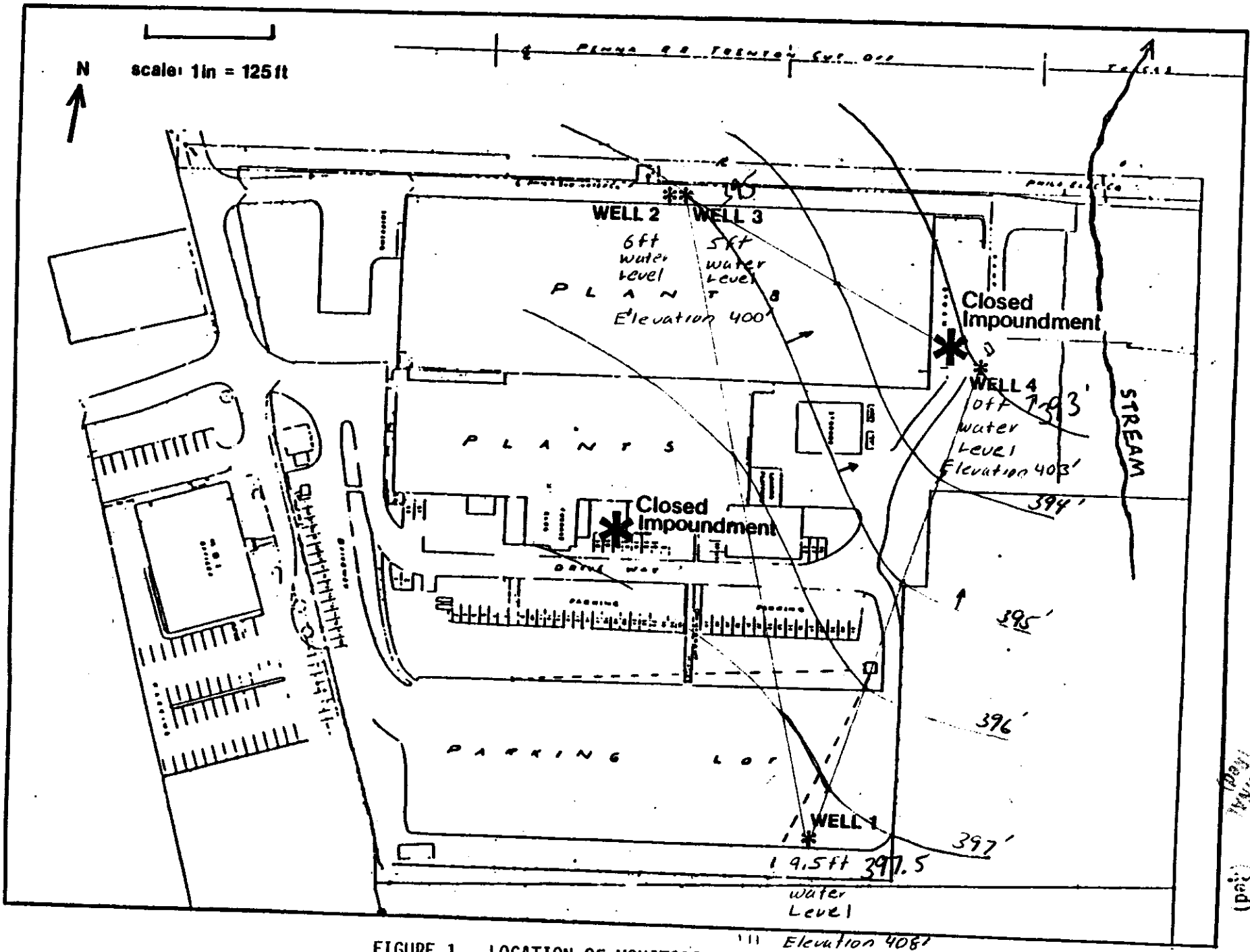


FIGURE 1. LOCATION OF MONITORING WELLS AND CLOSED IMPOUNDMENTS

Betz · Converse · Murdoch · Inc.

ORIGINAL (Red)

1140 Well #1 opened [redacted]
4" PVC construct. ORIGINAL (Red)
No HNU readings above
Background either in well
or ambient air
Background Reading 2.0 ppm

Sounding 9.5 feet to wate
Total Depth 49 feet.
26 Gallons for each volume
78 Bails with 1 Gallon Bail

wells are cutoff 6" above
surface

1144 Begin Bailing Well #1

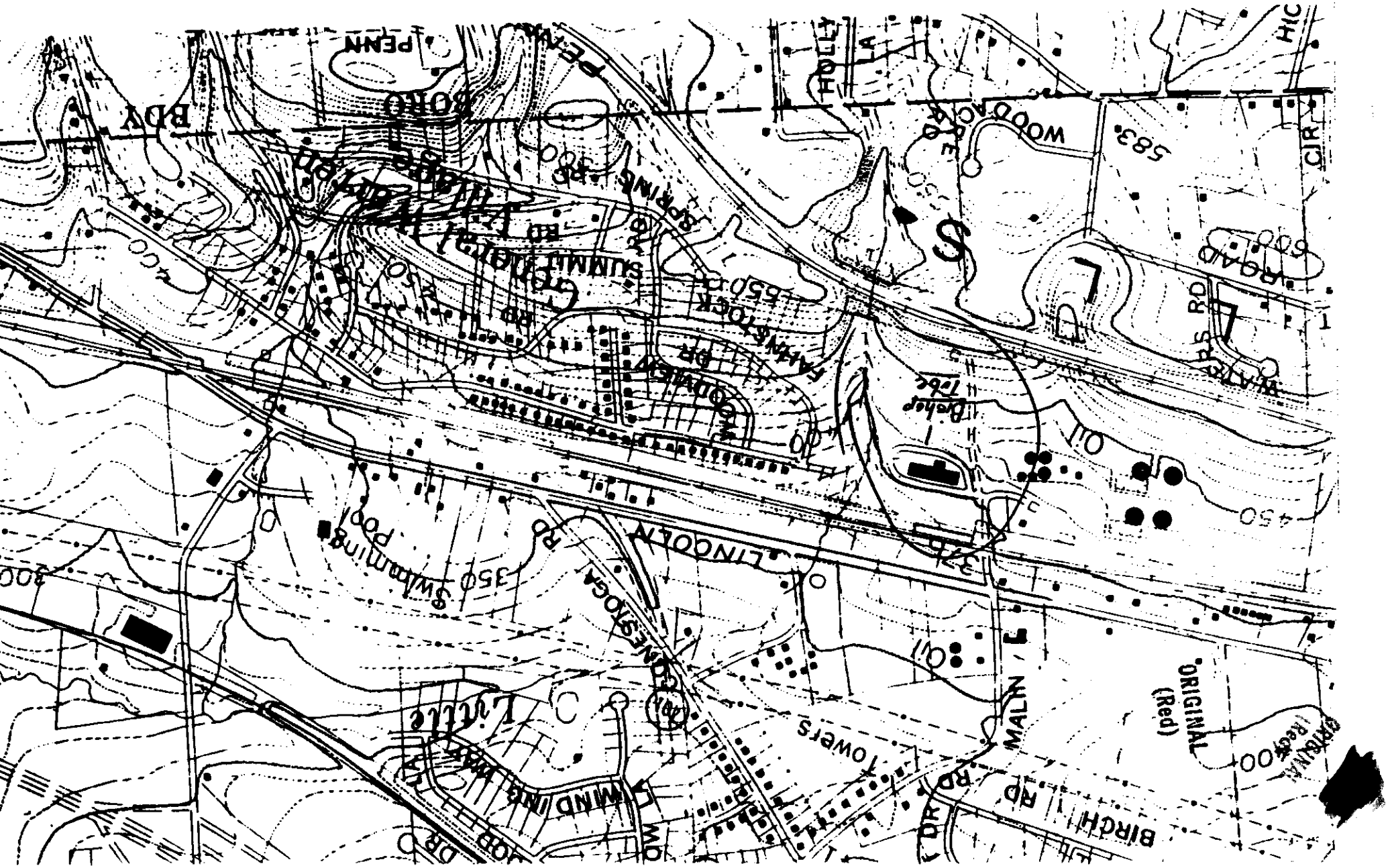
1150 Well #2
HNU readings: In hole imediat
after opening peak at 6 ppm
Ambient was background
Readings in hole dropped to 5 ppm
6 feet to water
Total Depth 22 feet. 16 feet
of Water. 1 Gallon Bailer
Dave Walker

10 Gallons per column
3 volumes 30 Ga. 15 (Red)

Well # 3
No HNU readings above background
5' to water
14' Total Depth
9' column of water = 6 Gallons/column
~~1/2 ga~~
18 Gallons total
30 Gals with 1/2 gallon Bailer
Begin at 1200

1210 Well # 4 4" PVC
HNU reading 4 ppm in hole
Ambient Air 3 ppm
Background 3 ppm
Depth to water 10 feet
Total Depth 20 feet
10' column of water

ORIGINAL (Red)



BDY
BORO
PENN
HOLLY
WOODACRE RD
583
CIR
SPRINGS RD
SUMMIT RD
FAHNSTOCK
550
WOODVIEW DR
Brisher Tube
Oil
450
LINCOLN
350
Swimming Pool
CONESTOGA RD
Little
WINDING WAY
Towers
MALIN
BIRCH RD
ORIGINAL (Red)
ORIGINAL (Red)

ORIGINAL (Red)

NUS CORPORATION — **TELECON NOTE**

CONTROL NO:	DATE:	TIME:
F3-8405-15	Monday March 25, 1985	2:30

ORIGINAL (Red)

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
IRA Dutton	Malvern Public Works Foreman	(215) 644-1859

AND:

Chuck Meyer (NUS)

DISCUSSION:

The water supply for the Boro of Malvern is serviced by (b) (9) [redacted]. The wells are 140, 190 and 196 feet deep in the Wissahicken Formation off of (b) (9) [redacted] located 2 1/4 miles to the (b) (9) [redacted] site.

ACTION ITEMS:

NUS 067 REVISED 0581

APPENDIX H

Betz · Converse · Murdoch · Inc.

PROPOSAL

TO

BISHOP TUBE COMPANY
MALIN ROAD
FRAZER, PA 19355

FOR

HYDROGEOLOGIC STUDY

BCM PROPOSAL NO. 13-8326-41R

MAY 2, 1980

PREPARED BY:

(b) (4)

[redacted]

SENIOR GEOLOGIST

BETZ·CONVERSE·MURDOCH·INC.
ONE PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PENNSYLVANIA 19462

MAY 2, 80
ORIGINAL
(Red)

INTRODUCTION

Bishop Tube Company of Frazer, Pennsylvania has been instructed by the Pennsylvania Department of Environmental Resources (PA DER) to retain a consultant to conduct a study of groundwater conditions in the vicinity of their plant site. In the past, Bishop Tube and its former owners discharged sanitary sewage, cooling water, and acid pickling rinse water to an unlined pit and cesspool located on plant property. Over the past 1-1/2 years, these discharges were diverted to a sanitary sewer, a nearby stream, and holding tanks. Consequently, the use of the pit and cesspool was discontinued.

SCOPE OF WORK

Betz·Converse·Murdoch·Inc. (BCM) proposes the following scope of work to complete the hydrogeologic study at the Frazer site:

1. Initial Data Collection

A BCM geologist will collect pertinent data at the site relative to past disposal practices, existing wells and core boring records. The number of required monitoring wells and their location will be established.

2. Monitoring Well Installation

BCM will subcontract with a reputable well driller to install monitoring wells at locations established in Section 1.

A BCM geologist will supervise installing the monitoring wells and will inspect and certify their construction and the nature of subsurface conditions. It is assumed that three (3) monitoring wells will be required.

3. Water Sampling

BCM will collect water samples from the following locations:

- Existing wells - east and west wells
- Monitoring wells
- Discharge junction box and discharge outlet
- Stream - Above and below discharge outlet

The samples will be analyzed for the following parameters:

Nitrate	Fluoride	Iron
Ammonia	Chromium	Nickel
Zinc	Manganese	pH
		Temperature

Samples will be collected once from each sampling point. If additional sampling is required, it will be done on a per diem basis, plus expenses. These parameters and sampling locations have been designated by the PA DER Bureau of Water Quality Management staff member assigned to follow-up on this investigation.

4. Report

A draft final report will be prepared and submitted to Bishop Tube upon completion of the study. This report will include an Introduction, Methods, Results, Conclusions, and Recommendations. BCM will meet with Bishop Tube to discuss the report, and to subsequently prepare a final report suitable for submission to PA DER. A meeting with the DER is also included under this task.

5. Discharge Pipe Flow Measurement (Optional)

At the discretion of the Bishop Tube Company, BCM will measure flows in the discharge pipe between the junction box and the discharge outlet. These measurements will determine if groundwater is leaking into the pipe in that interval, thereby degrading the quality of the discharge to the stream.

QUALIFICATIONS AND EXPERIENCE

BCM has the qualifications and experience necessary to perform the full range of work required for the completion of this hydrogeologic study. BCM's staff of geologists has supervised the installation of numerous monitoring wells and has completed the hydrogeologic interpretation of subsurface conditions and groundwater flow patterns. Hydrogeologic studies completed by BCM have also included groundwater sampling and negotiations with the PA DER on behalf of our clients.

The BCM geologists assigned to this study are Robert D. Buller, Senior Geologist, and William S. Neubeck, Geologist/Hydrologist. Mr. Buller has completed over twenty hydrogeologic studies in his seven years with BCM. He will be actively involved in all aspects of the project. Mr. Neubeck has extensive experience in the supervision of well drilling and sampling and will play an integral role in similar activities for this study. BCM's experienced technicians would perform the discharge pipe flow measurements, if that option is selected. Resumes of participants are attached.

ORIGINAL

REPORT

ORIGINAL (Red)

Bishop Tube Co.

FRAZER, PENNSYLVANIA

Hydrogeologic Study

Bishop Tube Co.
FRAZER, PENNSYLVANIA 19355 (215) 647-3450

MIERS C. JOHNSON
PROJECT ENGINEER

A DIVISION OF
CHRISTIANA METALS
CORPORATION

BCM Betz·Converse·Murdoch·Inc.
Consulting Engineers, Planners and Scientists

ORIGINAL
(Red)

HYDROGEOLOGIC INVESTIGATION

FOR

BISHOP TUBE CORPORATION
ROUTE 30 AND MALIN ROAD
FRAZER, PENNSYLVANIA 19355

OCTOBER 1981

BCM PROJECT NO. 00-5265-01

PREPARED BY

(b) (4) [redacted]

GEOLOGIST

APPROVED BY

(b) (4) [redacted]

ASSISTANT VICE PRESIDENT

BETZ•CONVERSE•MURDOCH•INC.
ONE PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PENNSYLVANIA 19462

ORIGINAL (Red)

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1.2 Monitoring Well Installation 1
1.3 Monitoring Well Sampling Method 1

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3.0 DISCUSSION OF RESULTS 3

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5.2 Recommendations 8

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ORIGINAL (Red)

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Table 2	Chester County Health Department Well Water Standards for Collected Parameters	5

FIGURES

Figure 1	Locations of Monitoring Wells and Closed Impoundments	2

Betz • Converse • Murdoch • Inc.

Oct 1981

ORIGINAL (Red)

1.0 BACKGROUND

1.1 General

The Bishop Tube Company operates a stainless steel tube manufacturing plant in Frazer, Pennsylvania. The Pennsylvania Department of Environmental Resources (DER) instructed Bishop Tube to conduct a hydrogeologic study of surface water and groundwater conditions at the plant. Betz•Converse•Murdoch•Inc. (BCM) of Plymouth Meeting, Pennsylvania, was retained to conduct the investigation, which was performed with the approval of the DER. This report describes the work performed and the results obtained, and contains recommendations for future action.

1.2 Monitoring Well Installation

Between June 3, 1981 and June 5 1981, four monitoring wells were installed on the plant site by Thomas G. Keyes, Inc. under the supervision of a BCM geologist. The well locations are shown in Figure 1; copies of the original well logs are contained in Appendix 1.

Well 1, which serves to monitor background groundwater quality conditions, is finished in the Wissahickon Schist, a lower Paleozoic metamorphic formation. Wells 2 and 4 are finished in colluvium, alluvium, or residual soils above the Conestoga Formation, an Ordovician limestone containing minor amounts of shale and phyllite. Well 2 extends into the Conestoga Formation to a depth of 24 feet. Wells 2 and 3, located on the north side of Plant Building 8, are 24 feet and 13.5 feet deep, respectively. Well 3 monitors the uppermost water-bearing zone, and Well 2 monitors a lower, apparently separate, water-bearing zone. The locations of Wells 2, 3, and 4 were selected, with the DER's agreement, to be the closest feasible downgradient sites to the deactivated and closed waste impoundments identified in Figure 1.

1.3 Monitoring Well Sampling Method

On June 16, 1981, all four monitoring wells were sampled. Because of the generally turbid conditions of the water samples, the wells were resampled on July 31, 1981. A standard procedure was followed, using a submersible pump to purge the wells and collect the samples. Also, to eliminate the uncertainties that arise from the turbid samples, all samples were filtered through an 0.45 m filter using a vacuum pump before filling the pre-fixed bottles.

All samples were transported immediately to the BCM laboratory in Norristown, Pennsylvania, where they were analyzed.

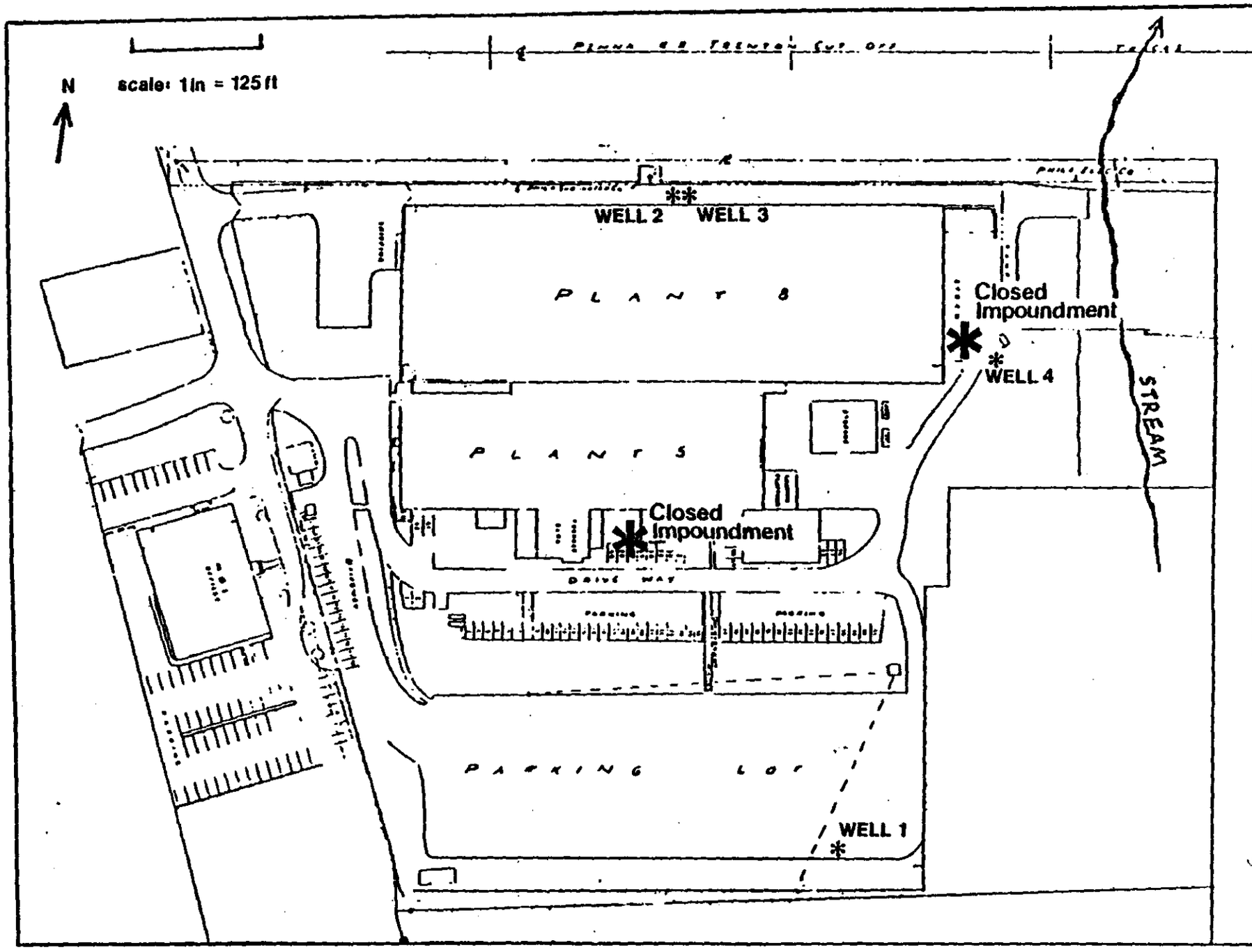

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FIGURE 1. LOCATION OF MONITORING WELLS AND CLOSED IMPOUNDMENTS

TABLE 1

ANALYTICAL RESULTS FOR SAMPLES COLLECTED JULY 31, 1981
(All values except pH in mg/l)

Parameter	Sampling Station						
	Well 1	Well 2	Well 3	Well 4	Upstream	Discharge	Downstream
Total Dissolved Solids	63	303	151	353	144	205	156
Copper	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Aluminum	<0.250	<0.250	<0.250	4.10	<0.250	<0.250	<0.250
Zinc	0.057	0.050	0.050	0.065	0.046	0.073	0.046
Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Manganese	<0.014	2.22	<0.014	2.10	<0.014	<0.014	<0.014
Iron	0.054	1.01	<0.040	.173	<0.040	<0.040	<0.040
Nickel	<0.10	<0.10	<0.10	0.454	<0.10	<0.10	<0.10
Chemical Oxygen Demand	1	34	16	19	6	5	4
Nitrate - Nitrogen	6.77	<0.10	0.05	7.22	2.76	2.22	2.72
Ammonia - Nitrogen	0.02	0.16	0.10	2.1	0.02	0.12	0.07
Fluoride	<0.10	0.2	0.5	23.1	0.2	1.0	2.2
pH	6.3	7.4	8.7	6.8	7.3	7.8	7.5

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3.2 Surface Water Quality

Table 1 presents the data on the water quality samples taken from the Bishop Tube cooling water discharge and two sampling stations on the unnamed stream--one upstream and one downstream. The purpose of sampling these three points was to determine if there is a significant difference in stream water quality between the upstream and downstream points that can be attributed to the cooling water and/or groundwater discharge.

A comparison of the data from the three stations shows that only the fluoride concentration increases significantly between the upstream station and the downstream station. The 1.0 ppm of fluoride in the cooling water discharge probably is partially responsible for this increase, but it cannot completely account for the 2.2 ppm at the downstream station. Some of the fluoride contribution probably is from recharge by groundwater (that contains 23.1 ppm fluoride near Well 4).

3.3 Deep Groundwater Quality

The quality of groundwater at a depth of 300 feet below the ground surface has been determined by U.S. Geologic Survey (USGS) personnel who sampled Bishop Tube's east well on June 3, 1981 as part of a county-wide USGS study. The USGS report is contained in Appendix 2.

The USGS analyses show that all concentrations of constituents studied to be lower than the Chester County Health Department standards presented in Table 2, except for fluoride. The fluoride concentration in the well was 1.0 ppm. This level is within the range of acceptable limits, and is approximately at the recommended concentration for intentionally-fluoridated water.

It is not clear from the available data if the east well is monitoring groundwater that is potentially affected by the plant operations or if the well takes water that is upgradient from the plant. It is possible that the values shown in the USGS report are representative of regional background levels.

4.0 SUMMARY OF FINDINGS

1. Compared to background conditions (as shown in Well 1) and drinking water standards, the groundwater beneath the site exhibits no contamination for most of the parameters.

2. Well 1 exhibits generally high quality water representative of background conditions. Elevated nitrate levels are the result of upgradient influences off Bishop Tube property.

3. Well 2 exhibits levels of iron and manganese in excess of background conditions as measured in Well 1. It appears that these levels do not represent natural background conditions.

4. Well 3, which monitors the shallow groundwater zone on the north side of the plant, exhibits no contamination. No contaminants are present in this well near levels of concern.

5. Well 4 exhibits elevated concentrations of fluoride, aluminum, manganese, iron, and nickel above background levels.

6. With the exception of fluoride, the surface water samples, including the cooling water discharge, showed no problems that warrant further investigation. The fluoride levels at the downstream sampling station suggest that fluoride is being added to the stream from the cooling water discharge and from groundwater discharge.

7. The deep groundwater beneath the site exhibits no significant contamination. The highest value is for fluoride, which, at 1.0 ppm, is within the range of acceptablility for fluoridated drinking water.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

1. The groundwater near Well 4 is moving towards, and discharges into, the unnamed stream. This is evident by the increase in fluoride concentration in the stream that cannot be attributed to the cooling water discharge. In recharging the stream, the fluoride-enriched groundwater becomes greatly diluted by the stream water.

2. The groundwater conditions at Bishop Tube are not a hazard to public health. The area of high fluoride concentrations is probably limited to the immediate vicinity around Well 4 and adjacent parts of the stream. The stream is not used for water supply and it shows significantly lower values for all parameters. The nearest public water supply well is about 1.5 miles away. Any surface or groundwater traveling from the Bishop Tube area to the public well would be diluted by several orders of magnitude before it was taken up in the well, and should be within drinking water standards.

ORIGINAL (Red)

3. It is possible that the groundwater near Well 4, which was monitored in the overburden, could move downward into the limestone. If this were to happen, any contamination in the groundwater would become very diluted before being taken up in any public water supply well.

5.2 Recommendations

Based on the conditions described previously, the surface and groundwater quality at the Bishop Tube site should be periodically monitored. This monitoring should include sampling water from the stream and from all four wells, as before. The samples should be analyzed for the key parameters shown to be important: fluoride, iron, manganese, aluminum, and nickel. This periodic monitoring will determine if changes in the system occur over time. Further action beyond this is not warranted at this time.

APPENDIX 1

WELL LOGS

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ORIGINAL (Red)

DRILLING LOG

WELL NUMBER: 1 Background

LOCATION: upper parking lot

SURFACE ELEVATION:

DRILLER: (b) (4) [redacted]

COMPANY:

Malvern, PA

LOGGED BY: (b) (4) [redacted]

COMMENTS:

WELL OWNER: Bishop Tube

ADDRESS: Malvern, PA

TOTAL DEPTH: 48 Ft

STATIC WATER LEVEL: 15' 6" DATE: 6-3-81 1100

DRILLING METHOD: air rotary

DATE DRILLED: 6-3-81 START 0813 STOP 0915

SKETCH MAP

LOCATION:

DEPTH FROM SURFACE (FEET)	GRAPHIC LOG	SAMPLES I.D. NUMBER	SAMPLES SPOON BLOWS	DESCRIPTION OF MATERIALS Wissahickon Schist
	0-20'			weathered schist; mica, quartz pebbles, lt brown, dry, iron stains
	20'			moisture encountered, waited a few minutes, no free water
	30'			hit water @ approx 30 Ft
	48'			total depth 48'
				- one soil sample taken at 30 Ft -
				20' of 4" PVC screen set from 48' to 28', gravel packed
				30' of 4" PVC pipe set above
				(b) (4) [redacted]

Betz • Converse • Murdoch • Inc. [redacted]

DRILLING LOG

WELL NUMBER: 2 Downgradient

LOCATION: N side of main plant building approx. midway on building ~5' from bldg

SURFACE ELEVATION: [redacted] (b) (4)

DRILLER: [redacted]

COMPANY: Thomas Keynes Malvern Pa [redacted] (b) (4)

LOGGED BY: [redacted]

COMMENTS:

WELL OWNER: Bishop Tube

ADDRESS: Malvern, Pa.

TOTAL DEPTH: 24'

STATIC WATER LEVEL: _____ DATE: _____

DRILLING METHOD: air rotary, air hammer

DATE DRILLED: 6/4/81

SKETCH MAP

LOCATION:

DEPTH FROM SURFACE (FEET)	GRAPHIC LOG	SAMPLES I.D. NUMBER	SAMPLES SPOON BLOWS	DESCRIPTION OF MATERIALS
	0-6'	8" air rotary		Fill - limestone pebbles, brown soil matrix
	6-13'			Weathered limestone and schist(?), platy weathered limestone fragments
				~~water~~ moisture encountered at 8'
	13-19½	6" air hammer		Limestone, blue-grey, platy, dry
	19½-24			Same lithology as above, much water
				9' of 4" PVC screen set from 24'-15', gravel packed to 14'
				bentonite ~~to~~ from 14'-8', cuttings to 1', cement to surface
				15' PVC pipe set from 15 to surface [redacted] (b) (4)
				Development time 35 min on 6/5/81

Betz • Converse • Murdoch • Inc. BCM

ORIGINAL

DRILLING LOG

WELL NUMBER: 3 Downgradient

LOCATION: N side of main plant building approx. 4' E of well #2

SURFACE ELEVATION:

DRILLER: (b) (4) [redacted]

COMPANY: Thomas Keynes Malvern, Pa

LOGGED BY: (b) (4) [redacted]

COMMENTS:

WELL OWNER: Bishop Tube

ADDRESS: Frazier Pa

TOTAL DEPTH: 13.5

STATIC WATER LEVEL: DATE:

DRILLING METHOD: Air rotary

DATE DRILLED: 6/4/81

SKETCH MAP

LOCATION:

DEPTH FROM SURFACE (FEET)	GRAPHIC LOG	SAMPLES I.D. NUMBER	SAMPLES SPOON BLOWS	DESCRIPTION OF MATERIALS
	0-1'			Road gravel
	1'-6'			Fill - limestone + schist pebbles w/brown 'soil' matrix, dry
	6'-10'			Brown matrix of silt + sand, some schist fragments, water at 8'
	10-13			Grey matrix, platy limestone fragments, moist
	13-13½			Fresh Unweathered limestone, blue-grey, dry
				4" PVC screen 13½'-8', gravel packed to 6'
				4" PVC pipe 8' to surface, bentonite 6'-1'
				cement to surface
				Developed for 30 minutes but probably poorly due to problem w/pump

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BCM

ORIGINAL (Red)

DRILLING LOG

WELL NUMBER: 4 Downgradient

WELL OWNER: Bishop Tubs

LOCATION: East of plant in finished product storage area ~20' N of SE corner of bldg

ADDRESS: Frazier Pa

TOTAL DEPTH: 20'

SURFACE ELEVATION:

STATIC WATER LEVEL: DATE:

DRILLER: (b) (4) [redacted]

DRILLING METHOD: Air rotary

COMPANY: Thomas Keyser

DATE DRILLED: 6/5/85

LOGGED BY: (b) (4) [redacted]

COMMENTS:

SKETCH MAP

LOCATION:

DEPTH FROM SURFACE (FEET)	GRAPHIC LOG	SAMPLES I.D. NUMBER	SAMPLES SPOON BLOWS	DESCRIPTION OF MATERIALS
	0-4'			Road gravel + finer limestone fill
	4-7.5'			More fill, encountered moisture at 4'
	7.5-20'			Combination of limestone + phyllite flakes within a finer matrix
				4" PVC screening from 20' to 7'
				4" Casing 7' to 0+'
				Gravel packed to ~5', bentonite to 1', cement to surface
				Developed for ~40 min. on 6/5/85
				(b) (4) [redacted]

ORIGINAL

APPENDIX 2

USGS REPORT ON EAST WELL

United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
35 Great Valley Parkway
Great Valley Corporate Center
Malvern, PA 19355

ORIGINAL (Red)

Bishop Tube
Route 30 & Malin Road
Frazer, PA 19355

Attention: Mr. Chuck Thompson

Dear Mr. Thompson:

Thank you for allowing us to sample your well as part of the Chester County Ground Water Quality Monitoring Program. Enclosed is a copy of the laboratory report. Your well water meets EPA's safe drinking water standards. We may wish to sample your well again in the future as part of the program.

The quantity of dissolved substances in your well water are shown in quantities of milligrams per liter (MG/L) and micrograms per liter (UG/L). One milligram per liter of dissolved substance is equivalent to one part of the substance in one million parts of water. One microgram per liter of dissolved substance is equivalent to one part of the substance in one billion parts of water.

If you have any questions concerning the sampling procedure, please call me anytime at 647-9008. If you have any questions concerning health related problems and contaminants, please call Philip Terry, Chester County Health Department, at 431-6247.

Sincerely,

Charles R. Wood
Subdistrict Chief

DKD/cdk
Encl.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CENTRAL LABORATORY ATLANTA, GEORGIA

WATER QUALITY ANALYSIS
LAB-ID # 161031 RECORD-# 53682

SAMPLE LOCATION: 2432
STATION ID: 400221075321201 LAT.LONG.SEQ.: 400221 0753212 01
DATE OF COLLECTION: BEGIN--810603 END-- TIME--1100
STATE CODE: 42 COUNTY CODE: 029 PROJECT IDENTIFICATION: 444209300
DATA TYPE: 2 SOURCE: GROUND WATER GEOLOGIC UNIT:
COMMENTS: UNIQUE-#:
OWNER BISHOP TUBE

ALDRIN, TOT (WATER)	UG/L	<	0.01
ANALYZING AGENCY			80010
ARSENIC, DISSOLVED	UG/L		1
BENZENE, TOTAL	UG/L		0.0
BROMOFORM, TOTAL	UG/L		0.0
OMIUM, DIS.	UG/L		1
CARBON TETRA., TOT.	UG/L		0.0
CHLORDANE, T (WATER)	UG/L	<	0.1
CHLOROBENZENE, TOTAL	UG/L		0.0
CHLORODIBROMO., TOT.	UG/L		0.0
CHLOROETHANE, TOTAL	UG/L		0.0
CHLOROFORM, TOTAL	UG/L		0.0
CHROMIUM, DISSOLVED	UG/L		0
CONFIRMATION ABOVE 2	UG/L		0
CYANIDE, TOTAL			DETR. DELETED
DDD, TOTAL (WATER)	UG/L	<	0.01
DDE, TOTAL (WATER)	UG/L	<	0.01
DDT, TOTAL. (WATER)	UG/L	<	0.01
DICHLOROBROMOMETHA,T	UG/L		0.0
DICHLORODIFLUOROME,T	UG/L		0.0
DIELDRIN, T. (WATER)	UG/L	<	0.01
DSULFAN I TOTAL	UG/L	<	0.01
ENDRIN, TOTAL(WATER)	UG/L	<	0.01
ETHYLBENZENE, TOTAL	UG/L		0.0
FLUORIDE, DISSOLVED	MG/L		1.0
GROSS PCBS T (WATER)	UG/L	<	0.1
GROSS PCNS T (WATER)	UG/L	<	0.1
HEPT EPOX, T (WATER)	UG/L	<	0.01
HEPTACHLOR T.(WATER)	UG/L	<	0.01
IRON, DIS.	UG/L		10

LEAD, DIS.	UG/L		1
LINDANE, TOT (WATER)	UG/L	<	0.01
MANGANESE, DISSOLV.	UG/L		1
MERCURY, DISSOLVED	UG/L		0.3
METALS DISS CHE-EXT			0
METHOXYCHLOR T.(WAT)	UG/L	<	0.01
METHYLBROMIDE, TOTAL	UG/L		0.0
METHYLENE CHLORIDE,T	UG/L		0.0
MIREX, TOT.	UG/L	<	0.01
NICKEL, DIS.	UG/L		8
PERTHANE, TOT.	UG/L	<	0.01
PH FIELD	UNITS		7.1
PHENOLS, TOTAL	UG/L		0
SP. CONDUCTANCE FLD	UMHOS		325
TETRACHLOROETHYLEN,T	UG/L		0.0
TOLUENE, TOTAL	UG/L		0.0
TOXAPHENE, T (WATER)	UG/L	<	0.1
TRICHLOROETHYLENE,T	UG/L		0.0
TRICHLOROFLUOROMET,T	UG/L		0.0
VINYL CHLORIDE, TOTA	UG/L		0.0
WATER TEMPERATURE	DEG C		12.0
1,1-DICHLORETHYLEN,T	UG/L		0.0
1,1-DICHLOROETHANE,T	UG/L		0.0
1,1,1-TRICHLOROETH,T	UG/L		0.0
1,1,2-TRICHLOROETH,T	UG/L		0.0
1,1,2,2-TETRCHLORO,T	UG/L		0.0
1,2-DICHLOROETHANE,T	UG/L		0.0
1,2-DICHLOROPROPAN,T	UG/L		0.0
1,3-DICHLOROPROPAN,T	UG/L		0.0
12TRANSDICL-ETHYLENE	UG/L		0.0
2-CL-ETHYLVINYLETHER	UG/L		0.0

CONTINUED ON NEXT PAGE

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CENTRAL LABORATORY ATLANTA, GEORGIA

ORIGINAL (Red)

WATER QUALITY ANALYSIS
LAB-ID # 162811 RECORD-# 58928

SAMPLE LOCATION: 2432
STATION ID: 400221075321201 LAT.LONG.SEQ.: 400221 0753212 01
DATE OF COLLECTION: BEGIN--810603 END-- TIME--1100
STATE CODE: 42 COUNTY CODE: 029 PROJECT IDENTIFICATION: 444240300
DATA TYPE: 2 SOURCE: GROUND WATER GEOLOGIC UNIT:
COMMENTS: UNIQUE-#:
OWNER BISHOP TUBE

ANALYZING AGENCY		80010	NITR DISS NH4 AS N	MG/L		0.02
CARBON, ORGANIC, TOT	MG/L	0.9	NITR. DIS NH4 AS NH4	MG/L		0.03
NITR DIS NO2 AS N	MG/L	< 0.01	PH FIELD	UNITS		7.1
DIS NO2+NO3 -N	MG/L	0.14	SP. CONDUCTANCE FLD	UMHOS		325
			WATER TEMPERATURE	DEG C		12.0

CATIONS	(MG/L)	(MEQ/L)	ANIONS	(MG/L)	(MEQ/L)
			NITR DIS NO2+N	0.14	0.010
TOTAL			TOTAL		0.010

ORIGINAL (Red)

REFERENCE NO. 17

ORIGINAL (Red)

Christiana Metals Corporation
BISHOP TUBE FACILITY
Frazer, Pennsylvania

Results of Implementation of Groundwater Remediation Work Plan Phase I

Submitted To:
The Pennsylvania Department of Environmental Resources

January 1990

BCM
Engineers, Planners, Scientists
and Laboratory Services

REPORT

RESULTS OF IMPLEMENTATION OF GROUNDWATER REMEDIATION WORK PLAN PHASE I

FOR

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

JANUARY 1990

BCM PROJECT NO. 00-6471-01

PREPARED BY

(b) (4) [redacted]

GEOLOGIST

(b) (4) [redacted]

SENIOR GEOLOGIST

(b) (4) [redacted]

VICE PRESIDENT

4598y

BCM

Engineers, Planners, Scientists and Laboratory Services
One Plymouth Meeting • Plymouth Meeting, PA 19462 • Phone: (215) 825-3800

BCM

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BCM

ORIGINAL (Red)

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BCM

ORIGINAL

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Figure 8 Isopleth Map of Total VOCs in Groundwater - September 28, 1989

BCM

EXECUTIVE SUMMARY

BCM Engineers Inc. (BCM) implemented Phase I: Additional Investigations of the June 1989 Groundwater Remediation Work Plan from July through September 1989 for the Christiana Metals Corporation (Christiana) at its Bishop Tube Facility in Frazer, Pennsylvania. The investigation included the completion of eight soil borings, analysis of soil samples, installation of seven monitoring wells, and sampling of the monitoring wells for the presence of volatile organic compounds (VOCs). The results of the investigation determined the presence of VOCs in every groundwater monitoring well sample collected except the upgradient well sample. Each well contained one or more VOCs in concentrations exceeding the primary drinking water maximum contaminant levels (MCLs) established by the U.S. Environmental Protection Agency (EPA). The VOC contaminant plume in groundwater extends to the northeast from the apparent source areas where an aboveground solvent storage tank and a degreaser tank are located. Soil sample analytical results indicated the presence of VOCs in soil apparently caused by upward migration of volatilized VOCs from the contaminated groundwater into the soils.

BCM recommends that additional investigation be implemented to determine the downgradient (offsite) and vertical extent of the plume in the aquifer and to determine proposed groundwater cleanup levels. BCM also recommends proceeding with Phase II: Aquifer Testing to expedite remediation of the highest levels of VOC-contamination detected in onsite groundwater.

BCM

1.0 INTRODUCTION

This report presents the results of implementation of Phase I: Additional Investigations of the June 1989 Groundwater Remediation Work Plan for the delineation of volatile organic compound (VOC) contamination in soil and groundwater at Christiana Metals Corporation's Bishop Tube Facility in Frazer, Pennsylvania. The report describes monitoring well installation and soil boring activities, describes sampling activities, discusses the results of the investigation, and provides conclusions and recommendations for additional activities.

1.1 BACKGROUND

In 1981, BCM performed an investigation of the impact of closed waste impoundments on surface water and groundwater at the Bishop Tube plant site in Frazer, Pennsylvania (BCM, 1981) (Figure 1). With the approval of the Pennsylvania Department of Environmental Resources (PADER), four shallow monitoring wells were installed at that time. The results of the study were presented in a 1981 BCM report which documented groundwater fluoride levels (maximum concentration 23.1 milligrams per liter (mg/l) in excess of the drinking water standard of 2.0 mg/l in one well.

In 1987, elevated concentrations of fluoride were detected in shallow groundwater collected at a sump within the plant. Due to an inadvertent connection between the sump and the plant's NPDES-permitted non-contact cooling water discharge, the discharge exceeded the permitted average monthly limit of 10.0 mg/l for fluoride. Bishop Tube has been pumping the sump water to storage for offsite hauling and treatment.

In cooperation with PADER, the July 1987 Work Plan (BCM, 1987) was developed to install additional monitoring wells, collect soil samples in the vicinity of the abandoned waste impoundments, and collect and analyze water samples from the monitoring wells and the adjacent stream. The purpose of the investigation was to update the 1981 study and extend the effort to include other possible groundwater contaminants, such as the degreasing agents used at the plant. PADER's approval of the Work Plan was obtained prior to commencing the project.

In May 1988, BCM presented a report entitled Groundwater Quality Investigation to Bishop Tube (BCM, 1988). The work described in the May 1988 report was conducted in accordance with BCM's PADER-approved, July 1987 Work Plan. The investigation included installing and sampling 5 groundwater monitoring wells, MW-5, MW-6, MW-7, MW-8, and MW-9, at the locations shown in Figure 2, to complement the four existing wells at the site. Five soil borings were drilled and samples were retained for laboratory analysis, and five stream samples were collected and analyzed. The soil boring locations and the stream sampling locations are also shown on Figure 2.

The May 1988 report concluded that Bishop Tube was the apparent source of trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) contamination in groundwater. Data evaluation revealed areas with some metals contamination. The metals contamination in soils appears to be associated with plant operations at the former infiltration basins on the plant site.

Christiana Metals Corporation (Christiana), the former parent company of Bishop Tube, authorized BCM to continue with the next phase of this project by preparing a work plan to delineate the extent of TCE and TCA-bearing groundwater and to develop mitigation measures. The draft Work Plan was prepared by BCM and submitted to PADER during a meeting between representatives of PADER, BCM, and Christiana on July 26, 1988. During this meeting, PADER requested that Bishop Tube conduct quarterly monitoring in the vicinity of the east end of the plant where the cooling water discharges to the stream. This monitoring was requested to document levels of fluoride in groundwater which were anticipated to decrease with time as a result of improvements made in the company's pickle liquor handling practices, the presumed source of the fluoride.

Prior to submission of a Revised Work Plan addressing the PADER requests concerning quarterly monitoring, BCM conducted a soil vapor survey (SVS) in October 1988 along the north side of the facility as proposed in the July 1988 Draft Work Plan. The results of the SVS indicated the presence of low levels of soil contamination (TCE, PCE, and trans-1-2- dichloroethene) within areas of limited lateral extent adjacent to the aboveground Solvent Storage tank, loading area, and concrete storage pad.

BCM's revised Draft Groundwater Remediation Work Plan, dated May 31, 1989, was submitted to Christiana for review and comment. The final Groundwater Remediation Work Plan (Work Plan) was submitted to PADER in June 1989 (BCM, 1989). The final Work Plan, proposed the installation of seven additional groundwater monitoring wells (five shallow wells and two deep wells) numbered MW-10 through MW-16. Also proposed were five soil borings along the north side of the facility in areas identified during the SVS as containing low levels of VOC contamination. During implementation of the Work Plan, three additional soil borings were added to the work scope and were drilled adjacent to the degreaser tank located inside the plant. All soil borings and well locations are shown on Figure 2. The Work Plan also proposed the quarterly groundwater monitoring to be conducted at the east end of the plant and in the vicinity of the NPDES-permitted cooling water discharge.

1.2 OBJECTIVES

The primary objective of this study was to characterize VOC contamination in groundwater and provide recommendations for additional investigations and/or remedial activities. Specific objectives of the study were as follows:

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- Determination of potential source area(s) of VOC contamination in the groundwater
- Document shallow and bedrock aquifer water qualities
- Document groundwater flow directions
- Document soil quality in potential source areas
- Implement a quarterly groundwater monitoring program at the east end of the plant and in the NPDES-permitted cooling water discharge area and present the results of the first quarterly sampling results.

BCM

ORIGINAL (Red)

2.0 GEOLOGIC SETTING

2.1 GEOLOGY/HYDROGEOLOGY

The Bishop Tube site is located close to the northern base of South Valley Hills. There are two formations in the area, the Wissahickon Formation, a muscovite schist with minor quartz and feldspar and the Conestoga Formation, a crystalline limestone. The Pennsylvania Geological Survey (BERG, 1981) identifies the contact between the Wissahickon and Conestoga Formations to be on the south side of the plant.

The Wissahickon Formation is a medium-to-coarse-grained, banded rock, which is characterized by large amounts of mica and considerable amounts of feldspar. The primary porosity of the rock itself is relatively low. However, abundant secondary porosity structures (joints) within the rock provide openings for the storage and circulation of water. Generally, the size and frequency of joint structures decrease with depth, which in turn, reduce the water-yielding capacity of the formation. The planes of schistosity within the Wissahickon Formation may contain water, but they are generally subcapillary in size and do not yield it freely.

Competent rock belonging to the Wissahickon Formation was encountered in MW-1 on the south side of the plant. A thin and highly weathered zone of the Wissahickon Formation is present beneath most of the northern portion of the site immediately overlying the Conestoga Formation. The Wissahickon Formation encountered on the north side of the plant appears to be colluvium which has migrated downslope from the Wissahickon Formation outcrop on the south side of the plant. The colluvium is thickest on the eastern side of the plant in the vicinity of the stream.

The Conestoga Formation, a dolomitic and shaley limestone, is part of the limestone group that supplies the largest springs in southeastern Pennsylvania. The Conestoga Formation has low primary porosity and, therefore, groundwater migration is mainly through secondary porosity which results from the development of dissolution channels and fractures in the rock. Wells drilled in this rock have yields ranging from less than one gallon per minute (gpm) to 300 gpm (HALL, 1973), depending on the number and size of solution channels or fractures intersected by the well.

The monitoring wells and borings installed at the site indicate that approximately 10 to 20 feet of overburden is present throughout much of the site. Bishop Tube personnel reported that the southwest corner of the lower portion of the plant is set into the limestone and blasting of the rock was required to construct the plant foundation in this area.

The fill and underlying weathered schist are thickest at the northeast corner of the plant in the vicinity of MW-9. The varying amount of overburden soil and fill is probably due to the site's location on a moderately steep slope and the necessity for cut and fill grading during construction of the plant.

A zone of weathered rock, commonly called saprolite exists on top of bedrock throughout much of the area. The saprolite has a lower permeability than the overlying material as evidenced by the presence of perched water at the overburden/saprolite interface. The yields of shallow monitoring wells completed in the perched water zone are typically 0.5 to 1 gpm while wells completed in fractured bedrock below the saprolite generally yield more than 15 gpm.

2.2 SOILS

Soils in the vicinity of the Bishop Tube site are categorized as belonging to the Manor Loam and Conestoga Silt Loam soil units (SCS, 1963).

The Manor Loam is a very fine sandy loam soil and is characteristically found above the Wissahickon Formation. The Manor Loam is a well-drained soil that is moderately permeable and has a moderately low moisture capacity. The Manor Loam is easily eroded from slopes, which explains why it is mainly found on level to gently sloping areas.

The Conestoga Silt Loam covers most of the area immediately north of the plant. This soil unit consists of a well-drained silt loam surface soil and a fine, sandy, clay subsoil. It is moderate in available moisture capacity and has a moderately rapid permeability.

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ORIGINAL (Red)

3.0 METHODS OF INVESTIGATION

3.1 TEST BORINGS AND SOIL SAMPLING

Eight soil test borings were drilled at Bishop Tube from August 1 through 18, 1989. Five of the soil borings were installed along the north side of the plant, and three of the borings were installed within the plant in the vicinity of the finished product degreaser tank (Figure 2).

Soil borings along the north side of the plant were drilled with 4.25-inch inside diameter (ID), hollow stem augers. Soil test borings installed inside the plant were installed with 3.25-inch ID hollow stem augers. During test boring drilling, soil samples were collected with 2-inch outside diameter (OD), high carbon steel, split barrel (split-spoon) samplers. A lithologic description of the soil contained in each splitbarrel was recorded by a geologist. Test boring logs providing soil classification, depth to water, boring dimensions, drilling equipment, backfilling methods, and other data are provided in Appendix A.

Representative samples from each split-barrel were placed in glass jars and sealed for the purpose of conducting head space analysis measurements of the relative concentration of VOCs in each sample jar air space. This test provided qualitative information on the relative levels of VOCs in the sampled soil. Following a 10- to 15-minute waiting period to allow any VOCs present in the soil to volatilize into the headspace between the soil sample and the jar lid, each jar was opened and an organic vapor detector (OVA) flame ionization detector probe was inserted into the sample jar head space to remove and analyze a sample of the accumulated vapor. The results of the head space analyses were recorded in the field logbook and are summarized in Table 1.

Selected split-barrel soil samples from each test boring were collected for laboratory analyses. Soil samples were removed from the split-barrel by the onsite geologist using a properly decontaminated stainless steel hand trowel and placed in laboratory cleaned and properly labelled sample jars. All field duplicate samples were composited in properly decontaminated stainless steel mixing bowls. Aliquots of soil for VOC analyses were not composited. Aliquots of soil for VOC analyses were removed from the split-barrel and placed in the proper sample container immediately upon opening the split-barrel soil sampler. All soil samples and field quality assurance/quality control (QA/QC) samples were collected, handled, stored, and transported as specified in the PADER- approved QA/QC Plan and Reporting Deliverables (QA/QC Plan) document contained in Appendix B of the June 1989 Groundwater Remediation Work Plan.

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All sampling equipment was decontaminated as specified in the QA/QC Plan. All samples were placed in a chilled environment and transported by the sampler to the BCM Laboratory in Norristown, Pennsylvania.

All onsite work was conducted in accordance with BCM's site-specific Health and Safety Plan, contained in Appendix B.

All soil borings were advanced to the surface of bedrock or auger refusal, whichever was encountered first. Upon encountering one of these conditions, the augers were removed from the borehole and, if the boring was not to be used as a monitoring well location, a 90 percent neat cement/10 percent powdered bentonite grout was pressure tremied from the bottom of the borehole to ground surface. All soil cuttings were then placed in sealed 55-gallon drums for subsequent disposal.

Ground surface elevations and horizontal locations of all boring locations were surveyed by a Pennsylvania-licensed surveyor, and are presented in Table 2. In addition, the vertical elevations of the three stream sampling locations sampled as part of earlier investigation activities were also surveyed and are also presented in Table 2.

3.2 MONITORING WELL INSTALLATION

Seven groundwater monitoring wells were installed on or in the vicinity of the Bishop Tube site from August 2 through 8, 1989. A total of 16 groundwater monitoring wells are now incorporated into the groundwater monitoring well network associated with the hydrogeological investigation being conducted at the Bishop Tube site. Of the seven new monitoring wells installed as part of this investigation, four were installed to monitor the shallow unconsolidated aquifer present in the weathered shist and soil and three were installed to monitor the deeper limestone rock aquifer. Four of the monitoring wells were incorporated into two well clusters, located across the Consolidated Railroad (Conrail) railroad tracks to the north of the site. Each of the well clusters consists of one deep well completed in the Conestoga aquifer and one shallow monitoring well completed immediately above the contact between the overlying unconsolidated soil aquifer and the underlying limestone rock aquifer.

Each of the deep rock aquifer monitoring wells was constructed inside an 6-inch boring drilled using air percussion drilling techniques. The shallow monitoring wells were installed inside 6.25-inch borings drilled with hollow stem augers. Well drilling logs for each monitoring well are presented in Appendix A. Schematic as-built monitoring well diagrams are presented in Figures 3 and 4 for the shallow and deep monitoring wells, respectively.

Generally, each monitoring well was constructed with approximately 10 feet of 4-inch ID, threaded flush joint, 20-slot (0.020 inch), Schedule 40 PVC screen, and 4-inch ID, threaded flush joint, Schedule 40 PVC casing (riser). After inserting the screen and casing, a sand pack of No. 1 Jessie Morie silica sand was installed in the annular space from the bottom of the borehole to approximately two feet above the screen. An approximately 2-foot thick bentonite pellet seal was installed immediately above the sand pack. The bentonite seal was moistened with water if it was above the static water level and allowed to sit undisturbed for approximately 10 minutes to allow the bentonite to expand and seal the borehole.

Following installation of the bentonite seal, a grout consisting of 90-percent neat cement/10-percent bentonite was pressure grouted via a tremie from the top of the bentonite seal to the ground surface. A locking, protective steel casing was installed from approximately 3 feet below ground surface to approximately 2 feet above ground surface, and concrete collars were installed around each protective casing. At selected wells, vehicle access requirements necessitated installation of flush-mounted protective steel casings with locking caps.

The rock monitoring wells MW-13 and MW-15 were constructed using a double casing technique. A 10-inch diameter borehole was drilled through overburden and into competent rock. A 6-inch ID steel casing was installed in the borehole and the annulus around the casing was tremie grouted with a cement/bentonite. A 6-inch diameter borehole was drilled through the steel casing to the desired well completion depth in rock.

Following the installation of all the monitoring wells, each well was developed for approximately 1 hour with either a centrifugal or submersible pump. Well development water was placed in sealed 55-gallon drums for subsequent disposal by Christiana. All downhole well development equipment was properly decontaminated prior to its insertion into each well.

All soil and rock cuttings generated during the drilling of each well were placed in sealed 55-gallon drums for subsequent disposal by Christiana.

All monitoring wells were surveyed by a Pennsylvania-licensed surveyor. The horizontal location of each well was surveyed to the nearest 0.01 foot and the elevations of ground surfaces, inner PVC casings, and outer steel casings, were surveyed to the nearest 0.01 foot above mean sea level. Table 3 presents a summary of the monitoring well elevations.

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3.3 GROUNDWATER SAMPLING

As specified in the Work Plan, all new groundwater monitoring wells (MW-10 through MW-16) and groundwater monitoring wells MW-2 and MW-3 were sampled twice. In addition, previously existing groundwater monitoring wells MW-1 and MW-4 through MW-9 were sampled once during the first round of groundwater sampling to initiate the PADER-required quarterly groundwater monitoring program in the pickle liquor handling area. The first round of groundwater sampling was conducted on August 29 and 30, 1989. The second round of groundwater sampling was conducted on September 28, 1989.

Prior to collecting groundwater samples, total well depth and depths to the top of the water columns were measured and recorded, and the volume of water in each well was calculated and recorded. All wells, except MW-13 and MW-15, were purged of a minimum of approximately three well volumes prior to groundwater sampling with either a peristaltic pump or PVC bailer. Approximately two well volumes of groundwater were purged from wells MW-13 and MW-15 prior to sample collection.

During the pumping of each well, the pH, specific conductance, and temperature of the groundwater were measured. Field data sheets are provided in Appendix C. All purge water was placed in sealed 55-gallon drums for subsequent disposal by Christiana. All downhole purging equipment was decontaminated in accordance with the QA/QC Plan contained in Appendix B of the Work Plan.

Groundwater sampling was conducted using laboratory cleaned, dedicated, 2-inch outside diameter (OD) Teflon bailers. Groundwater samples were collected, handled, stored, and transported in accordance with QA/QC protocols contained in Appendix B of the Work Plan. All Chain-of-Custody documentation is provided in Appendix D of this report. Quality Control samples, trip blanks, field blanks, and duplicates were collected and submitted for analyses according to the protocols outlined in the QA/QC document referenced above.

All groundwater samples collected during both rounds of groundwater sampling were submitted to the BCM Laboratory in Norristown, Pennsylvania, for analysis.

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4.0 RESULTS OF INVESTIGATION

4.1 SOIL SAMPLE ANALYTICAL RESULTS

A total of 24 discrete soil samples were collected during the period from August 1 through 18, 1989. In addition, two duplicate soil samples, four field blank samples, and three trip blank samples were collected and submitted for laboratory analyses. All samples were analyzed for purgeable halocarbon volatile organic compounds (VOCs) by gas chromatography (GC). Laboratory analytical results for all compounds detected at or above their respective analytical method detection limits are summarized in Table 4. All quality control trip blank and field blank analytical results are summarized in Table 5. Laboratory analytical data sheets are contained in Appendix E.

VOCs detected in soil samples collected at Bishop Tube included the following:

- Bromodichloromethane
- Chloroform
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- trans-1,2-Dichloroethene
- Tetrachloroethene (PCE)
- 1,1,1-Trichloroethane (TCA)
- Trichloroethene (TCE)

Methylene chloride, detected in many of the soil samples, was also detected in field blank and trip blank samples. Methylene chloride is a common laboratory contaminant and does not appear to be attributable to onsite soil conditions. Total VOC concentrations detected in the soil samples ranged from below the method detection limit in samples MW-10A (1.5) and MW-12 (1.5) to a high of greater than 85.5 milligrams per kilogram (mg/kg) in soil sample B-5 (3.5).

It should be noted that the VOC levels in the six samples from borings B-5 and B-6 were unable to be quantified by the laboratory and were reported at levels greater than the maximum instrument detection limit for each of the analyses. Reanalysis of the samples was attempted; however, the results of the reanalysis were anomalously low, suggesting that most of the VOC contaminants in the sample had volatilized out of the soil sample prior to the reanalysis. A description of the procedures utilized by the laboratory to analyze these samples is provided in a BCM interoffice correspondence contained in Appendix F.

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4.2 GROUNDWATER SAMPLE ANALYTICAL RESULTS

The groundwater sampling program conducted at Bishop Tube consisted of two separate rounds of monitoring well sampling. The first round of groundwater sampling was conducted on August 29 and 30, 1989, and included collecting samples from monitoring wells MW-1 through MW-16. The second round of groundwater sampling was conducted on September 28, 1989, and included obtaining samples from monitoring wells MW-2 and MW-3 and MW-10 through MW-16.

All groundwater samples obtained in the first round in August were analyzed for pH and specific conductance. Groundwater samples collected from wells MW-1 through MW-9 were also analyzed for fluoride, nitrate, chromium, copper, and nickel to satisfy the quarterly groundwater monitoring requirements in the NPDES-permitted cooling water discharge area at the east end of the plant. All groundwater samples and QA/QC samples were analyzed for VOCs. Laboratory analytical results for all compounds detected at or above their respective analytical method detection limits are presented in the following tables: August 29 and 30 groundwater samples in Table 6, August 29 and 30 QA/QC samples in Table 7, September 28 groundwater samples in Table 8, and September 28 QA/QC samples in Table 9.

Where applicable, the Maximum Contaminant Levels (MCLs) established by the U.S. Environmental Protection Agency (EPA) for the respective contaminants in drinking water are listed on the tables. All laboratory analytical data sheets are presented in Appendix E.

4.2.1 August 29 and 30, 1989, Sample Analytical Results

VOCs detected in the groundwater samples collected on August 29 and 30 included the following:

- Chloroethane
- 1,1 Dichloroethane
- 1,2 Dichloroethane
- 1,1 Dichloroethene
- Methylene Chloride
- Tetrachloroethene (PCE)
- trans-1,2-Dichloroethene
- 1,1,1-Trichloroethane (TCA)
- Trichloroethene (TCE)
- Vinyl Chloride

Total VOC concentrations ranged from not detected above the method detection limit of 1 microgram per liter (ug/l) in background monitoring well MW-1 to a high of 202,607 ug/l in well MW-3. Each well in which VOC compounds were detected contained one or more VOC compounds at levels above the MCLs established for the respective VOC in drinking water. No VOCs were detected in the QA/QC blanks.

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Fluoride concentrations ranged from less than 0.1 mg/l in MW-1 to a high of 14.1 mg/l in MW-4. Fluoride was above its MCL of 4.0 mg/l in monitoring wells MW-4, MW-5, MW-6, and MW-7.

Nitrate concentrations ranged from a low of 0.099 mg/l in MW-5 to a high of 7.13 mg/l in MW-4. Nitrate was not detected above its MCL of 10 mg/l in any of the wells.

The low (more acidic) pH of 5.83 standard units (S.U.) was detected in sample MW-7 and the high (more basic) pH of 7.34 S.U. was detected in sample MW-13. A secondary MCL has been established for pH and ranges from 6.5-8.5. pH was below (more acidic) the secondary MCL in monitoring wells MW-1, MW-4, and MW-7.

Specific conductance ranged from 95 micromhos (umhos) in MW-1 to 4,600 umhos in MW-5. No MCL has been established for specific conductance in drinking water.

Chromium levels ranged from below the method detection limit of 0.01 mg/l to 0.220 mg/l in sample MW-7. The MCL for chromium in drinking water is 0.05 mg/l and was exceeded in monitoring well MW-7.

Copper levels ranged from below the method detection limits of 0.02 mg/l to a high of 0.035 mg/l in sample MW-1. Copper has a secondary MCL of 1.0 mg/l which was not exceeded in any of the samples.

Nickel levels ranged from below the method detection limits of 0.04 mg/l to a high of 0.269 mg/l in MW-4. An MCL has not been established for nickel in drinking water.

4.2.2 September 28, 1989, Sample Analytical Results

The VOCs detected in the groundwater samples collected on September 28 were the same as those detected in the August 29 and 30 samples with the exceptions that 1,2-dichloroethane was not detected in the September samples, and chloroform, undetected in the August samples, was detected in the September analyses. Total VOC concentrations ranged from a low of 348 ug/l in sample MW-10A to a high of 684,890 ug/l in sample MW-3. Selected VOCs were detected in all the samples at levels above their respective MCLs. TCE and methylene chloride were detected in all field QA/QC samples.

4.3 HYDROGEOLOGIC ANALYSIS

The results of the groundwater investigation indicate that two aquifers are present at the site and have both been impacted by VOC contamination. The shallow aquifer occurs in the unconsolidated soil and saprolite unit and a deeper aquifer occurs in the Conestoga Limestone. A summary of the monitoring well construction details and the monitored aquifers is presented in Table 10.

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Water table elevation measurements were obtained prior to each groundwater sampling event. A summary of the measured groundwater elevations is presented in Table 11. Groundwater flow in both aquifers is to the north-northeast and is shown in Figures 5 and 6. The lateral gradients are approximately 0.15 ft/ft in the area of the highest levels of groundwater contamination

The shallow and deep aquifers are evidenced by the difference in elevation of the water table observed at well clusters at the site. Wells monitoring shallow groundwater at each cluster generally have higher water table elevations than wells monitoring groundwater occurrence in the bedrock aquifer at each cluster. The elevation difference between the two aquifers indicates that the aquifers are not in equilibrium.

The vertical hydraulic gradients were determined at well cluster locations where wells exist that monitor the two different aquifers. An analysis of vertical gradients is summarized in Table 12. The results of this determination indicate that a downward vertical gradient exists at three of the four well cluster locations. Well cluster MW-15/MW-16 indicated an upward vertical gradient.

The upward vertical gradient at well cluster MW-15/MW-16 may be resulting from the void encountered in MW-15 during drilling. The void maybe connected to areas hydraulically upgradient of the well and the water levels being measured in the well may be representative of hydraulic conditions in the upgradient areas.

Well cluster MW-13/MW-14, located hydraulically downgradient of the site, and approximately 250 feet west of well cluster MW-15/MW-16, had a downward hydraulic gradient. The discrepancy between the vertical hydraulic gradients prevents a determination of groundwater gradients in the offsite area. This discrepancy also emphasizes the heterogeneities present in the fractured and solution channel-bearing limestone aquifer.

5.0 DISCUSSION OF RESULTS

The results of the soil and groundwater investigation indicate that elevated levels of VOCs are present in onsite soils and in onsite and offsite groundwater.

5.1 SOIL SAMPLING RESULTS

The soil sample analytical results indicate that VOC contamination is present in nearly all soils at the site. Generally, the detected levels of VOC contamination increased with increasing depth, suggesting that VOCs may have migrated upward into the soils after volatilizing from VOC contaminated groundwater.

The highest levels of VOCs detected in soils by headspace and laboratory analyses were in Borings B-5, B-6, B-10, B-11, and B-12. Borings B-5 and B-6 were drilled adjacent to the aboveground solvent storage tank. The locations of these soil borings were selected based on the results of the soil vapor survey (SVS) that was conducted in this area in October 1988. The soil sample analyses support the findings of the SVS which identified the tank as a potential source for the VOC contamination in soil and groundwater.

Borings B-10, B-11, and B-12 were drilled in the vicinity of the degreaser inside the building. Samples B-11 (6.5) and B-12 (4.5) contained the highest levels of total VOCs detected in soil in this study (3,367 and 157 mg/kg, respectively). These soil sample analytical results indicate that the degreaser tank is a likely source of VOC contamination in groundwater and soil at this site.

5.2 GROUNDWATER SAMPLING RESULTS

The groundwater sample analytical results indicate the presence of VOCs in groundwater in all wells except the background well (MW-1). Specific VOCs were detected in all wells at levels above their respective MCLs. The downgradient extent and the vertical extent of the contaminant plume have not been determined. The VOC contaminant plume appears to trend to the northeast and originates from the aboveground solvent storage tank and degreaser tank areas. The VOC contaminant plume is shown in Figures 7 and 8 for the August 29 and 30 and the September 28 sampling events, respectively.

The VOC plume appears to be oriented slightly to the east of the groundwater flow direction which is to the north northeast. The difference between groundwater flow direction and contaminant distribution may be the result of heterogeneities in the Conestoga

Limestone aquifer. The Conestoga Limestone aquifer has numerous dissolution channels and fractures which act as the primary conduits for groundwater flow in the aquifer. The orientation of these conduits in the rock strata will effect the groundwater and contaminant flow direction.

The most prevalent VOCs detected in groundwater were TCE and TCA and their degradation products. TCE was consistently the VOC detected at the highest levels in the well samples followed in concentration by TCA and trans-1,2-dichloroethene. TCE and TCA are both heavier than water and will tend to sink in the aquifer when released as product. Trans-1,2-dichloroethene is slightly lighter than water and will tend to float on water when released as product. TCE, TCA, and trans-1, 2-dichloroethene have relatively low solubilities ranging from approximately 0.1 percent (TCE) to 0.63 percent (trans-1,2-dichloroethene).

The highest levels of VOCs detected in groundwater in both aquifers in both sampling events were at the well cluster MW-2/MW-3 which is located adjacent to the aboveground solvent storage tank. Monitoring well MW-2 monitors the uppermost portion of the Conestoga Limestone aquifer and monitoring well MW-3 monitors the unconsolidated aquifer above it. The results of both sampling rounds indicated that the shallow aquifer contains significantly higher levels of VOCs than the deeper limestone aquifer. Three other well clusters are situated in the vicinity of the plant and are at greater distances from the potential source area. Sample analytical results from well clusters MW-15/MW-16 and MW-8/MW-9 determined that the deep wells monitoring the rock aquifer have higher levels of VOCs than the shallow wells monitoring the unconsolidated aquifer. These results are consistent with the concept that the contaminants have migrated into the deeper rock aquifer and impacted the downgradient well clusters MW-15/MW-16 and MW-8/MW-9.

The well cluster MW-13/MW-14 showed inconsistent results between the two sampling rounds. The deep well (MW-13) monitoring the rock aquifer contained higher levels of total VOCs than the shallow well (MW-14) monitoring the unconsolidated aquifer in the August sampling. Lower levels of total VOCs were detected in the deep well than in the shallow well in the September sampling. These results suggest that the samples may have been mislabeled. The VOC levels in these wells will be confirmed by samp- ling and analyses to be conducted in subsequent phases of the investi- gation.

The results of the quarterly monitoring of groundwater wells in the vicinity of the NPDES-permitted cooling water discharge area detected fluoride and chromium at levels above their respective MCLs in selected wells. Continued quarterly monitoring of these wells will determine if the levels of these contaminants will decrease with time as expected by the repair of the sump in the shop, the suspected source area for these contaminants in groundwater.

The secondary MCL for pH was exceeded in MW-1, MW-4, and MW-7. MW-1 is situated hydraulically upgradient of the site and monitors the rock aquifer. MW-1 contained the lowest pH measurement which indicates that groundwater in the Wissahickon Formation may be naturally more acidic than groundwater in the Conestoga Formation.

5.3 HYDROGEOLOGY

The information obtained from the hydrogeologic investigation indicates that contaminated groundwater is apparently migrating from the above-ground solvent storage tank and degreaser tank areas towards the north-east. The analysis of vertical hydraulic gradients indicates that a downward vertical hydraulic gradient exists in the vicinity of the source areas at the plant. This analysis concurs with the groundwater analytical results from the offsite well clusters which document the presence of higher levels of VOCs in the Conestoga Limestone aquifer than in the unconsolidated aquifer. This analysis further indicates that contamination appears to be entering the limestone aquifer in the vicinity of the source areas and is migrating to the northeast through the rock aquifer. Lower levels of VOC contamination exist in the shallow aquifer and are migrating offsite to the northeast.

The release of TCE or TCA solvent product into the aquifer may have resulted in the occurrence of a discrete body of solvent product in the aquifer. These solvents are more dense than water and have relatively low solubilities, which will cause the body of solvent to migrate downward in the aquifer as it solubilizes. The primary control over flow in the limestone aquifer is the occurrence of solution channels and fractures; therefore, the rate of migration of the solvent product (dense non-aqueous phase liquid or DNAPL) or the dissolved solvent in groundwater will be primarily controlled by the occurrence and interconnection of fractures and solution channels in the vicinity of the source areas. No estimates on the rate of migration of the contaminant plume can be developed without conducting aquifer testing.

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ORIGINAL (Red)

6.0 CONCLUSIONS

The results of the Phase I investigation determined that VOCs are present in groundwater at levels above their respective MCLs for drinking water. A VOC contaminant plume exists in the groundwater extending to the northeast from the plant. The apparent sources of the VOC contaminant plume are the aboveground solvent storage tank and the degreaser tank. VOC contamination exists in both the shallow unconsolidated soil aquifer and the deeper (Conestoga Formation) aquifer. The depth and downgradient extent of the contamination in the aquifer can not be determined without additional aquifer characterization.

Soil sample analytical results indicate the presence of VOCs in soil in the vicinity of the aboveground solvent storage tank and the degreaser. In general, the highest levels of soil contamination are found at depth near the groundwater surface indicating that the volatilized VOCs may have migrated upward into the soil from contaminated groundwater. The highest levels of VOC contamination in soils was observed in borings drilled adjacent to the aboveground solvent storage tank and degreaser tank.

Fluoride and chromium were detected above their respective MCLs in groundwater in the vicinity of the NPDES-permitted cooling water discharge location. Continued quarterly monitoring of groundwater quality in this area will enable an evaluation of the effectiveness of repairing the sump, the suspected source of the fluoride contamination in groundwater.

BCM

ORIGINAL (Red)

7.0 RECOMMENDATIONS

BCM recommends that additional investigations be conducted and that Phase II - Aquifer Testing be implemented to enable Christiana to proceed with remediation of onsite VOC contamination in groundwater. The additional investigations should include the following:

- Conducting a tracer test on the solvent handling areas to characterize the integrity of the solvent handling apparatus (i.e. storage tank, piping, and degreaser tank)

- Conducting a well records search in the vicinity of the site to identify potential groundwater users and downgradient water quality

- Implementing a drilling and sampling investigation to delineate downgradient (offsite) and vertical extent of VOC contamination in the aquifer.

- Incorporating the results of the above tasks into an investigation of possible risk-based cleanup levels applicable to this site

BCM recommends that Christiana proceed with Phase II: Aquifer Testing of the June 1989 Groundwater Remediation Work Plan to expedite remediation of the highest levels of VOC contamination detected in onsite groundwater concurrent with the additional investigations defined above.

BCM

ORIGINAL (Red)

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BCM

ORIGINAL (Red)

TABLES

BCM

ORIGINAL (Red)

TABLE 1

SUMMARY OF OVA SOIL SAMPLE HEAD SPACE ANALYSES*

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample I.D.**		Reading (PPM)***
MW-10	(0-2)	140
	(2-4)	30
B-5	(0-2)	90
	(2-4)	>1000
	(4-6)	>1000
	(6-8)	300
B-6	(0-2)	600
	(2-4)	---
	(4-6)	120
B-7	(0-2)	1
	(4-6)	8
	(10-12)	60
B-8	(0-2)	NIR
and	(4-6)	NIR
MW-11	(8-10)	2
	(12-14)	NIR
	(14-16)	NIR
	(16-17.5)	NIR
MW-12	(0-2)	NIR
	(2-4)	NIR
	(4-6)	NIR
	(6-8)	NIR
	(8-10)	NIR
	(12-14)	NIR
	(14-16)	NIR
	(16-18)	NIR
	(18-20)	NIR

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TABLE 1 (Continued)

Sample I.D.**		Reading (PPM)***
B-9	(0-2)	2
	(6-8)	1
	(10-12)	300
	(12-14)	20
	(20-22)	2
MW-14	(5-7)	NIR
	(10-12)	NIR
B-10	(0-2)	10
	(3-5)	8
	(5-7)	6
	(9-11)	NIR
	(11-13)	NIR
	(13-15)	NIR
B-11	(0-2)	250
	(3-5)	>1000
	(5-7)	>1000
	(9-11)	160
	(13-15)	>1000
	(15-17)	>1000
B-12	(3-5)	>1000
	(5-7)	>1000
	(7-9)	45

Notes:

* = Summarized from Field Log Book
** = Boring Number (depth of sample in feet)
*** = All readings obtained using portable flame ionization vapor analyzer
NIR = No Instrument Response

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

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TABLE 2

SUMMARY OF SOIL BORING AND STREAM BED ELEVATIONS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Boring/Stream Location	Elevation (in feet, referenced to NGVD 1929)
B-5	384.48
B-6	384.35
B-7	384.05
B-9	383.07
Stream 1	358.50
Stream 2	368.90
Stream 3	378.20

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01).

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TABLE 3

SUMMARY OF MONITORING WELL ELEVATION SURVEY *

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Well No.	Elevation (feet)[a] Ground	Top Inner Casing	Top Outer Casing
MW-1	423.86	424.21	424.66
MW-2	384.00	384.37	384.72
MW-3	383.94	384.66	385.04
MW-4	386.74	387.08	387.52
MW-5	387.24	387.89	388.45
MW-6	387.48	388.48	388.64
MW-7	396.96	398.69	399.20
MW-8	388.09	384.14	384.31
MW-9	382.81	NM[b]	384.10
MW-10	384.56	383.87	384.54
MW-11	384.00	383.42	384.03
MW-12	383.15	382.46	383.15
MW-13	373.45	374.83	375.21
MW-14	373.18	374.30	375.08
MW-15	367.94	369.68	370.07
MW-16	367.91	369.80	370.20

Notes:

NM = Not measured.
a. Elevations are references to the NGVD 1929.
b. MW-9 was not constructed with an inner casing. This well is an open rock well. Depth to water was measured from the top of the steel casing.
* Well Elevations Surveyed by James M. Stewart, Inc.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 4

SUMMARY OF AUGUST 1989 SOIL SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sampling Location: Sample Depth: Sampling Date: BCM Sample Number:	Units	MW-10A[a] 1.5 08/01/89 923863	B-5[a] 1.5 08/01/89 923864	B-5[a] 3.5 08/01/89 923865	B-5[a] 4.5 08/01/89 923866	B-5[a] 6.5 08/01/89 923867	B-6[a] 1.5 08/01/89 923868	B-6[a] 5.5 08/01/89 923869
Volatile Organic Compounds (VOCs)								
Bromodichloromethane	mg/kg	<0.0114	<0.0141	>4.0	>0.1	>0.5	<0.115	<0.118
1,1-Dichloroethane	mg/kg	<0.0114	<0.0141	>1.0	>1.0	>1.0	>3.0	>0.7
1,2-Dichloroethane	mg/kg	<0.0114	<0.0141	<0.116	>0.116	<0.116	<0.115	<0.118
1,1-Dichloroethene	mg/kg	<0.0114	>0.2	>20	>20	>3.0	>10	>10
Methylene Chloride	mg/kg	<0.0114	<0.0141	>0.5[b]	>1.0[b]	>0.1[b]	>0.2[b]	>0.1[b]
1,1,1-Trichloroethane	mg/kg	<0.0114	>0.0141	>40	>50	>4.0	>5.0	>5.0
Trichloroethene (TCE)	mg/kg	<0.0114	>2.0	>20	>10	>8.0	>10	>10
Total VOCs	mg/kg	ND	>2.2	>85.5	>82.2	>16.7	>28.2	>25.8

TABLE 4 (Continued)

Sampling Location: Sample Depth: Sampling Date: BCM Sample Number:	Units	MW-11 1.5 08/02/89 924150	MW-11 9.5 08/02/89 924151	B-7 1.5 08/02/89 924152	B-7 10.5 08/02/89 924153	B-7(Dup) 10.5A 08/02/89 924154	B-7 13.0 08/02/89 924155
Volatile Organic Compounds (VOCs)							
Chloroform	mg/kg	<0.0116	<0.0117	<0.0116	<0.0119	<0.0117	0.582
1,1-Dichloroethene	mg/kg	<0.0116	<0.0117	<0.0116	0.0705	0.0420	0.0481
Methylene Chloride	mg/kg	0.0301[c]	0.0281[c]	0.0337[c]	0.0311[c]	0.0350[c]	<0.0134
1,1,1-Trichloroethane	mg/kg	<0.0116	<0.0117	<0.0116	<0.0119	<0.0117	0.728
Trichloroethene (TCE)	mg/kg	<0.0116	0.0223	<0.0116	<0.0119	0.219	0.781
Total VOCs		0.0301	0.0504	0.0337	0.1016	0.2960	2.139

ORIGINAL (Red)

TABLE 4 (Continued)

Sampling Location: Sample Depth: Sampling Date: BCM Sample Number:	Units	MW-12 1.5 08/03/89 924156	MW-12 7.5 08/03/89 924157	MW-12 15.0 08/03/89 924158	B-9 1.5 08/03/89 924159	B-9 7.5 08/03/89 924160	B-9(Dup) 7.5A 08/03/89 924161	B-9 10.5 08/03/89 924162
Volatile Organic Compounds (VOCs)								
Chloroform	mg/kg	<0.0115	<0.0124	0.0237	<0.0118	<0.0117	<0.0115	0.0763
Methylene Chloride	mg/kg	<0.0115	<0.0124	<0.0158	<0.0118	<0.0117	<0.0115	0.0157[c]
trans-1,2-Dichloroethene	mg/kg	<0.0115	<0.0124	<0.0158	0.0662	0.0653	0.229	0.0182
1,1,1-Trichloroethane	mg/kg	<0.0115	<0.0124	0.117	<0.0118	<0.0117	<0.0115	<0.0121
Trichloroethene (TCE)	mg/kg	<0.0115	0.0136	0.758	0.0225	<0.0117	0.0311	0.0702
Total VOCs		ND	0.0136	0.8987	0.0887	0.0653	0.2601	0.1804

ORIGINAL (Red)

TABLE 4 (Continued)

Sampling Location: Sample Depth: Sampling Date: BCM Sample Number:	Units	B-10 1.5 08/18/89 926125	B-10 6.5 08/18/89 926126	B-11 1.5 08/18/89 926127	B-11 6.5 08/18/89 926128	B-12 4.5 08/18/89 926129	B-12 6.5 08/18/89 926130
Volatile Organic Compounds (VOCs)							
1,1-Dichloroethene	mg/kg	<0.0117	<0.0116	<0.0119	39.8	<1.15	<0.0605
Methylene Chloride	mg/kg	<0.0117	<0.0116	<0.0119	1.44	<1.15	0.357
Tetrachloroethene (PCE)	mg/kg	<0.0117	<0.0116	<0.0119	10.2	<1.15	<0.0605
1,1,1-Trichloroethane	mg/kg	<0.0117	<0.0116	<0.0119	36.0	<1.15	<0.0605
Trichloroethene (TCE)	mg/kg	1.03	<0.0116	0.0226	3280	157	6.99
Total VOCs		1.03	<0.0116	0.0226	3367	157	7.347

Notes:

ND = None detected.

a. Peak areas for these samples were outside of the calibration curve, consequently, a quantitative value could not be determined (see Appendix F).

b. Compound also detected in the field blank dated 08/01/89.

c. Compound also detected in the trip blank dated 08/01/89. This trip blank is associated with the 08/02/89 samples.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

ORIGINAL (Red)

TABLE 5

SUMMARY OF SOIL QA/QC SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample ID: Sampling Date: BCM Sample Number:	Units	Trip Blank 07/31/89 923870	Field Blank 08/01/89 923871	Trip Blank 08/01/89 924163	Field Blank 08/02/89 924164	Field Blank 08/03/89 924165	Trip Blank 08/17/89 926131	Field Blank 08/17/89 926132
Volatile Organic Compounds (VOCs)[a]								
Methylene chloride	*ug/l*	*<1.0*	*5.6*	*2.1*	*<1.0*	*<1.0*	*<1.0*	*<1.0*

Notes:

a. With the exception of methylene chloride, no other VOCs were detected in these samples.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

ORIGINAL

TABLE 6

SUMMARY OF AUGUST 29 AND 30, 1989 GROUNDWATER SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-1 Unfiltered 08/29/89 927566	MW-1 Filtered 08/29/89 927571	MW-2 Unfiltered 08/30/89 927720	MW-3 Unfiltered 08/30/89 927721	MW-4 Unfiltered 08/29/89 927567	MW-4 Filtered 08/29/89 927572
Volatile Organic Compounds (VOCs)								
1,1-Dichloroethane	ug/l	NL	<1.0	NT	157	14.0	11.2	NT
1,2-Dichloroethane	ug/l	5.0	<1.0	NT	1,050 *	<10.0	<1.0	NT
1,1-Dichloroethene	ug/l	7.0	<1.0	NT	611 *	103 *	5.5	NT
Methylene Chloride	ug/l	NL	<1.0	NT	10.9	<10.0	<1.0	NT
Tetrachloroethene (PCE)	ug/l	NL	<1.0	NT	85.6	124	24.9	NT
trans-1,2-Dichloroethene	ug/l	NL	<1.0	NT	685	236	316	NT
1,1,1-Trichloroethane	ug/l	200	<1.0	NT	17,300 *	3,130 *	18.9	NT
Trichloroethene (TCE)	ug/l	5.0	<1.0	NT	36,100 *	199,000 *	1110 *	NT
Vinyl Chloride	ug/l	2.0	<1.0	NT	<10.0	<10.0	42.2 *	NT
Total VOCs[d]		NL	ND	NT	56,000	202,607	1,529	NT
Inorganic and Physical Parameters								
Fluoride	mg/l	2.0-4.0[a]	<0.1	NT	NT	NT	14.1 *	NT
Nitrate	mg/l	10.0	0.789	NT	NT	NT	7.13	NT
pH-field	Stnd.Units	6.5-8.5[b]	5.93 *	NT	NT	NT	6.28 *	NT
Specific Conductance	umhos	NL	95	NT	NT	NT	500	NT
Metals								
Chromium	mg/l	0.05	NT	<0.01	NT	NT	NT	0.011
Copper	mg/l	1.0[b]	NT	0.035	NT	NT	NT	0.027
Nickel	mg/l	NL	NT	<0.04	NT	NT	NT	0.269

ORIGINAL

TABLE 6 (Continued)

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-5 Unfiltered 08/29/89 927568	MW-5 Filtered 08/29/89 927573	MW-6 Unfiltered 08/29/89 927569	MW-6 Filtered 08/29/89 927574	MW-7 Unfiltered 08/29/89 927570	MW-7 Filtered 08/29/89 927575
Volatile Organic Compounds (VOCs)								
Chloroethane	ug/l	NL	3.3	NT	<1.0	NT	<1.0	NT
1,1-Dichloroethane	ug/l	NL	16.6	NT	9.9	NT	1.3	NT
1,1-Dichloroethene	ug/l	7.0	<1.0	NT	6.5	NT	<1.0	NT
Tetrachloroethene (PCE)	ug/l	NL	<1.0	NT	<1.0	NT	<1.0	NT
trans-1,2-Dichloroethene	ug/l	NL	18.5	NT	82.4	NT	49.3	NT
1,1,1-Trichloroethane	ug/l	200	<1.0	NT	70.1	NT	2.5	NT
Trichloroethene (TCE)	ug/l	5.0	<1.0	NT	526 *	NT	78.9 *	NT
Vinyl Chloride	ug/l	2.0	4.2 *	NT	8.7 *	NT	<1.0	NT
Total VOCs[d]	ug/l	NL	42.6	NT	704	NT	132	NT
Inorganic and Physical Parameters								
Fluoride	mg/l	2.0-4.0[a]	9.56 *	NT	8.02 *	NT	5.66 *	NT
Nitrate	mg/l	10.0	0.099	NT	1.67	NT	2.21	NT
pH-field	Stnd. Units	6.5-8.5[b]	6.62	NT	6.58	NT	5.83 *	NT
Specific Conductance	umhos	NL	4,600	NT	710	NT	250	NT
Metals								
Chromium	mg/l	0.05	NT	<0.01	NT	0.01	NT	0.220*
Copper	mg/l	1.0[b]	NT	0.022	NT	0.021	NT	<0.02
Nickel	mg/l	NL	NT	0.090	NT	<0.04	NT	0.251

ORIGINAL (Red)

TABLE 6 (Continued)

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-8 Unfiltered 08/29/89 927714	MW-8 Filtered 08/29/89 927717	MW-8A[c] Unfiltered 08/29/89 927715	MW-8A[c] Filtered 08/29/89 927718	MW-9 Unfiltered 08/29/89 927716	MW-9 Filtered 08/29/89 927719
Volatile Organic Compounds (VOCs)								
Chloroethane	ug/l	NL	16.6	NT	<1.0	NT	<1.0	NT
1,1-Dichloroethane	ug/l	NL	3.2	NT	2.8	NT	20.6	NT
1,1-Dichloroethene	ug/l	7.0	37.7 *	NT	<1.0	NT	63.3 *	NT
Methylene Chloride	ug/l	NL	1.6	NT	1.1	NT	2.4	NT
Tetrachloroethene (PCE)	ug/l	NL	9.3	NT	9.2	NT	14.9	NT
trans-1,2-Dichloroethene	ug/l	NL	803	NT	798	NT	482	NT
1,1,1-Trichloroethane	ug/l	200	399 *	NT	395 *	NT	621 *	NT
Trichloroethene (TCE)	ug/l	5.0	2,860 *	NT	2,750 *	NT	4,130 *	NT
Vinyl Chloride	ug/l	2.0	86.8 *	NT	60.8 *	NT	14.4	NT
Total VOCs[d]	ug/l	NL	4,217	NT	4,008	NT	5,349	NT
Inorganic and Physical Parameters								
Fluoride	mg/l	2.0-4.0[a]	1.11	NT	1.02	NT	2.57	NT
Nitrate	mg/l	10.0	0.327	NT	0.121	NT	0.106	NT
pH-field	Stnd. Units	6.5-8.5[b]	6.91	NT	6.91	NT	6.98	NT
Specific Conductance	umhos	NL	440	NT	440	NT	450	NT
Metals								
Chromium	mg/l	0.05	NT	0.012	NT	<0.01	NT	<0.01
Copper	mg/l	1.0[b]	NT	<0.02	NT	<0.02	NT	<0.02
Nickel	mg/l	NL	NT	<0.04	NT	<0.04	NT	<0.04

TABLE 6 (Continued)

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-10 Unfiltered 08/30/89 927722	MW-11 Unfiltered 08/30/89 927723	MW-12 Unfiltered 08/30/89 927724	MW-13 Unfiltered 08/30/89 927576	MW-14A Unfiltered 08/29/89 927577	MW-14B[c] Unfiltered 08/29/89 927578	MW-15 Unfiltered 08/29/89 927579	MW-16 Unfiltered 08/29/89 927580
Volatile Organic Compounds (VOCs)										
Chloroethane	ug/l	NL	<1.0	<10.0	<10.0	<1.0	<1.0	<1.0	<1.0	18.6
1,1-Dichloroethane	ug/l	NL	1.4	900	12.8	33.6	8.9	7.3	53.8	419
1,2-Dichloroethane	ug/l	5.0	<1.0	103 *	<10.0	<1.0	<1.0	<1.0	<1.0	41.8 *
1,1-Dichloroethene	ug/l	7.0	<1.0	600 *	<1.0	<10.0	16.6 *	13.2 *	564 *	140 *
Methylene Chloride	ug/l	NL	<1.0	15.0	14.8	<1.0	<1.0	<1.0	1.8	<1.0
Tetrachloroethene (PCE)	ug/l	NL	<1.0	32.1	14.7	23.5	<1.0	<1.0	39.3	7.4
trans-1,2-Dichloroethene	ug/l	NL	4.6	1,970	85.9	110	12.5	10.6	570	169
1,1,1-Trichloroethane	ug/l	200	84.2	20,700 *	540 *	3,470 *	287 *	323 *	7,800 *	2,340 *
Trichloroethene (TCE)	ug/l	5.0	93.8 *	17,100 *	3,940 *	10,600 *	666 *	751 *	44,400 *	4,580 *
Vinyl Chloride	ug/l	2.0	<1.0	<10.0	<10.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs[d]	ug/l	NL	184	41,420	4,608	14,401	991	1,105	53,429	7,716
Physical Parameters										
pH-field	Stnd.Units	6.5-8.5[b]	NT	NT	NT	7.34	6.95	6.95	7.13	7.18
Specific Conductance	umhos	NL	NT	NT	NT	380	430	430	610	380

Notes:

USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.
ND = None detected.
NL = No USEPA MCL is listed.
NT = Not tested as part of this study.
* = Compound detected above USEPA MCL.
a. The MCL for fluoride ranges from 2 mg/l, the secondary MCL, to 4 mg/l. This range of values depends on the average air temperature of the region.
b. This value is a secondary MCL.
c. Sample is a duplicate of the previous sample.
d. Total VOC values are rounded as appropriate.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

ORIGINAL (Red)

BCM

TABLE 7

SUMMARY OF AUGUST 29 AND 30, 1989, GROUNDWATER QA/QC SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample ID: Sampling Date: BCM Sample Number:	Units	Trip Blank 08/29/89 927581	Field Blank 08/29/89 927582	Trip Blank 08/30/89 927725	Field Blank 08/30/89 927726
Volatile Organic Compounds		ND	ND	ND	ND

Notes:

ND = No compounds detected.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 8

SUMMARY OF SEPTEMBER 28, 1989, GROUNDWATER SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sampling Location: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-2 09/28/89 930389	MW-3 09/28/89 930390	MW-10A 09/28/89 930391	MW-10B[a] 09/28/89 930392
Volatile Organic Compounds (VOCs)						
1,1-Dichloroethane	ug/l	NL	157	<1,000	4.3	6.3
1,1-Dichloroethene	ug/l	7.0	1,190 *	<1,000	2.6	4.9
Methylene Chloride[b]	ug/l	NL	152	2,160	2.8	<1.0
Tetrachloroethene (PCE)	ug/l	NL	102	<1,000	<1.0	1.0
trans-1,2-Dichloroethene	ug/l	NL	623	<1,000	9.9	14.2
1,1,1-Trichloroethane	ug/l	200	16,500 *	2,730 *	84.4	112
Trichloroethene (TCE)[c]	ug/l	5.0	48,900 *	680,000 *	244 *	227 *
Vinyl Chloride	ug/l	2.0	<100	<1,000	<1.0	1.5
Total VOCs[d]	ug/l	NL	67,624	684,890	348	367

TABLE 8 (Continued)

Sampling Location: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-11 09/28/89 930393	MW-12 09/28/89 930394	MW-13 09/28/89 930395	MW-14 09/28/89 930396	MW-15 09/28/89 930397	MW-16 09/28/89 930398
Volatile Organic Compounds (VOCs)								
Chloroethane	ug/l	NL	<100	<1.0	<10.0	<10.0	<1.0	5.7
Chloroform	ug/l	100	<100	<1.0	<10.0	<10.0	4.9	<1.0
1,1-Dichloroethane	ug/l	NL	711	12.0	<10.0	35.9	66.4	265
1,1-Dichloroethene	ug/l	7.0	884 *	53.1 *	22.6 *	229 *	789 *	103 *
Methylene Chloride[b]	ug/l	NL	237	<1.0	19.2	16.7	<1.0	<1.0
Tetrachloroethene (PCE)	ug/l	NL	<100	7.5	<10.0	31.3	97.6	3.0
trans-1,2-Dichloroethene	ug/l	NL	2,170	69.5	12.3	140	446	110
1,1,1-Trichloroethane	ug/l	200	19,600 *	425 *	490 *	3,930 *	10,100 *	1,320 *
Trichloroethene (TCE)[c]	ug/l	5.0	15,500 *	3,150 *	863 *	13,800 *	116,000 *	1,144 *
Vinyl chloride	ug/l	2.0	<100	15.6 *	<10.0	<10.0	<1.0	<1.0
Total VOCs[d]		NL	39,102	3,733	1,407	18,183	127,504	2,951

Notes:

USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.
NL = No USEPA MCL is listed.
* = Compound detected above USEPA MCL.
a. MW-10B is a duplicate of MW-10A.
b. The method blank contained 2.8 ug/l of methylene chloride. This is equivalent to 28 ug/l, 280 ug/l, and 2800 ug/l in samples where the method detection limit was <10.0 ug/l, <100 ug/l, and <1,000 ug/l, respectively. Methylene chloride was also detected in the trip and field blanks at 1.2 ug/l.
c. TCE was detected in the trip and field blank at 12.7 and 3.5 ug/l, respectively.
d. Total VOC values are rounded off to at least three significant figures.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

ORIGINAL

BCM

TABLE 9

SUMMARY OF SEPTEMBER 28, 1989, GROUNDWATER QA/QC SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample ID: *Sampling Date:* BCM Sample Number:	Units	Trip Blank 09/28/89 930399	Field Blank 09/28/89 930400
Volatile Organic Compounds (VOCs)			
Methylene chloride[a]	ug/l	1.2	1.2
Trichloroethene (TCE)	ug/l	12.7	3.5

Notes:

a. The method blank contained 2.4 ug/l of methylene chloride.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

TABLE 10

SUMMARY OF MONITORING WELL CONSTRUCTION DETAILS
AND MONITORED AQUIFERS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Well Identification	Depth to base of Well*	Depth to Top of Rock*	Depth of Monitored Interval*	Elevation of Top of Rock (AMSL)	Monitored Aquifer
MW-1	48	---	28-48	---	Rock
MW-2	24	13	15-24	371.00	Rock
MW-3	13.5	13	8-13.5	370.94	Unconsolidated
MW-4	20	9	7-20	377.74	Rock
MW-5	20	---	10-20	---	Unconsolidated
MW-6	20.66	---	10.66-20.66	---	Unconsolidated
MW-7	19.8	---	9.8-19.8	---	Unconsolidated
MW-8	18	---	8-18	---	Unconsolidated
MW-9**	63	26	46-63	356.81	Rock
MW-10	15	4	5-15	380.56	Rock
MW-11	16	17	6-16	367.00	Unconsolidated
MW-12	21	20	8-21	363.15	Unconsolidated
MW-13	37	15	27-37	358.45	Rock
MW-14	15	15	5-15	358.18	Unconsolidated
MW-15	78	21	68-78	346.94	Rock
MW-16	21	17	7-21	350.91	Unconsolidated

Notes:

* = Feet below grade.
** = MW-9 is an open rock well.
AMSL = Above mean sea level.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

TABLE 11

SUMMARY OF GROUNDWATER ELEVATIONS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Well No.	Depth to Groundwater (feet)[a] 8/29/89 & 8/30/89	Depth to Groundwater (feet)[a] 9/28/89	Groundwater Elevation(feet)[b] 8/29/89 & 8/30/89	Groundwater Elevation(feet)[b] 9/28/89
MW-1	13.25	NM	410.96	NM
MW-2	6.35	7.77	378.02	376.60
MW-3	6.10	7.51	378.56	377.15
NW-4	10.71	NM	376.37	NM
MW-5	12.10	NM	375.79	NM
MW-6	16.22	NM	372.26	NM
MW-7	12.62	NM	386.07	NM
MW-8	13.73	NM	370.41	NM
MW-9	15.45	NM	368.65	NM
MW-10	2.52	2.79	381.35	381.08
MW-11	9.01	8.64	374.41	374.78
MW-12	8.63	10.11	373.83	372.35
MW-13	10.32	13.29	364.51	361.54
MW-14	9.12	8.45	365.18	365.68
MW-15	*	*	*	*
MW-16	7.18	5.55	362.62	364.25

Notes:

* = An accurate water level measurement not available because the water level is above the casing.
NM = Not measured.
a. Depth to water measured from the top of the inner well casing with electronic depth to water probes in all wells except MW-9 which is an open rock well and measurement was from top of protective steel casing.
b. Elevations are referenced to the NGVD 1929.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

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TABLE 12

VERTICAL FLOW GRADIENT COMPUTATIONS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

	Well Depth (feet)	Depth to Center of Monitored Interval (feet)	Water Table Elevation (AMSL) 8/29/89 & 8/30/89	9/28/89
CLUSTER MW-2/MW-3				
MW-2	24	19.50	378.02	376.60
MW-3	13.5	10.75	378.56	377.15
Difference		8.75	-0.54	-0.55
Vertical Gradient 8/29/89 & 8/30/89:			-0.54/8.75 =	-0.0617
Vertical Gradient 9/28/89:			-0.55/8.75 =	-0.0628
CLUSTER MW-8/MW-9				
MW-9	63	54.5	368.65	NM
MW-8	18	13	370.41	NM
Difference		41.5	-1.76	
Vertical Gradient 8/29/89 & 8/30/89:			-1.76/41.5 =	-0.0424

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TABLE 12 (Continued)

	Well Depth (feet)	Depth to Center of Monitored Interval (feet)	Water Table Elevation (AMSL) 8/29/89 & 8/30/89	9/28/89
CLUSTER MW-13/MW-14				
MW-13	37	32	364.51	361.54
MW-14	15	10	365.18	365.68
Difference		22	-0.67	-4.14
Vertical Gradient 8/29/89 & 8/30/89:			-0.67/22 =	-0.030
Vertical Gradient 9/28/89:			-4.14/22 =	-0.188
CLUSTER MW-15/MW-16				
MW-15*	78	73	369.68	369.68
MW-16	21	14	362.62	364.25
Difference		59	+7.06	+5.43
Vertical Gradient 8/29/89 & 8/30/89:			+7.06/59 =	+0.119
Vertical Gradient 9/28/89:			+5.43/59 =	+0.092

Notes:

* = Groundwater surface in MW-15 is above the casing. Reported groundwater elevation is actually the elevation of the top of the inner casing.

AMSL = Above mean sea level.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

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ORIGINAL

FIGURES

BCM

CHRISTIANA METALS CORP.

BCM Project No. 00-6471-01

0 2000 Feet

North

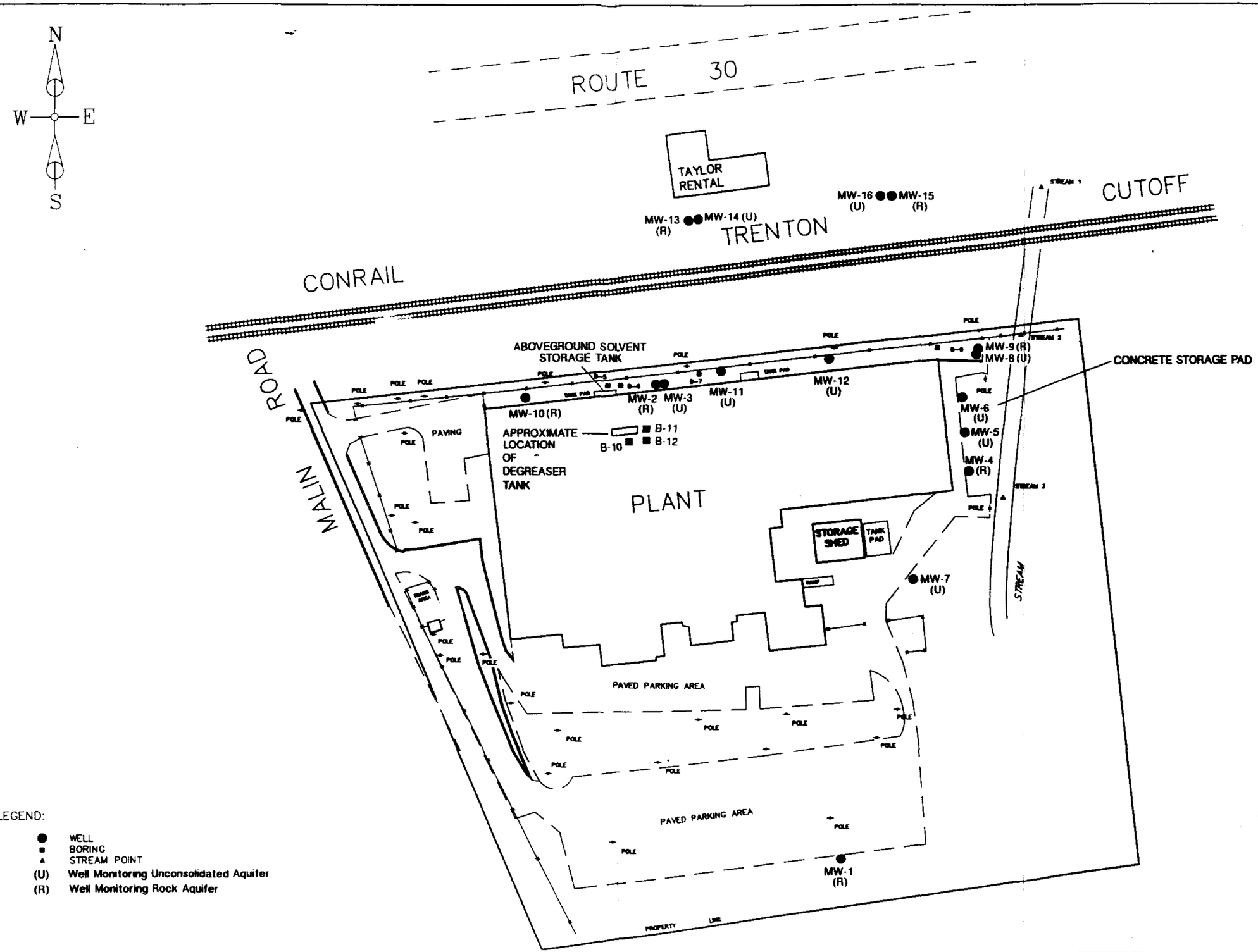
Figure 1

Site Location Map

BCM

CHRISTIANA METAL

ORIGINAL (Red)



LEGEND:

- ● WELL
- ■ BORING
- ▲ STREAM POINT
- (U) Well Monitoring Unconsolidated Aquifer
- (R) Well Monitoring Rock Aquifer

Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

0 120 FT

BCM Project No. 00-6471-01

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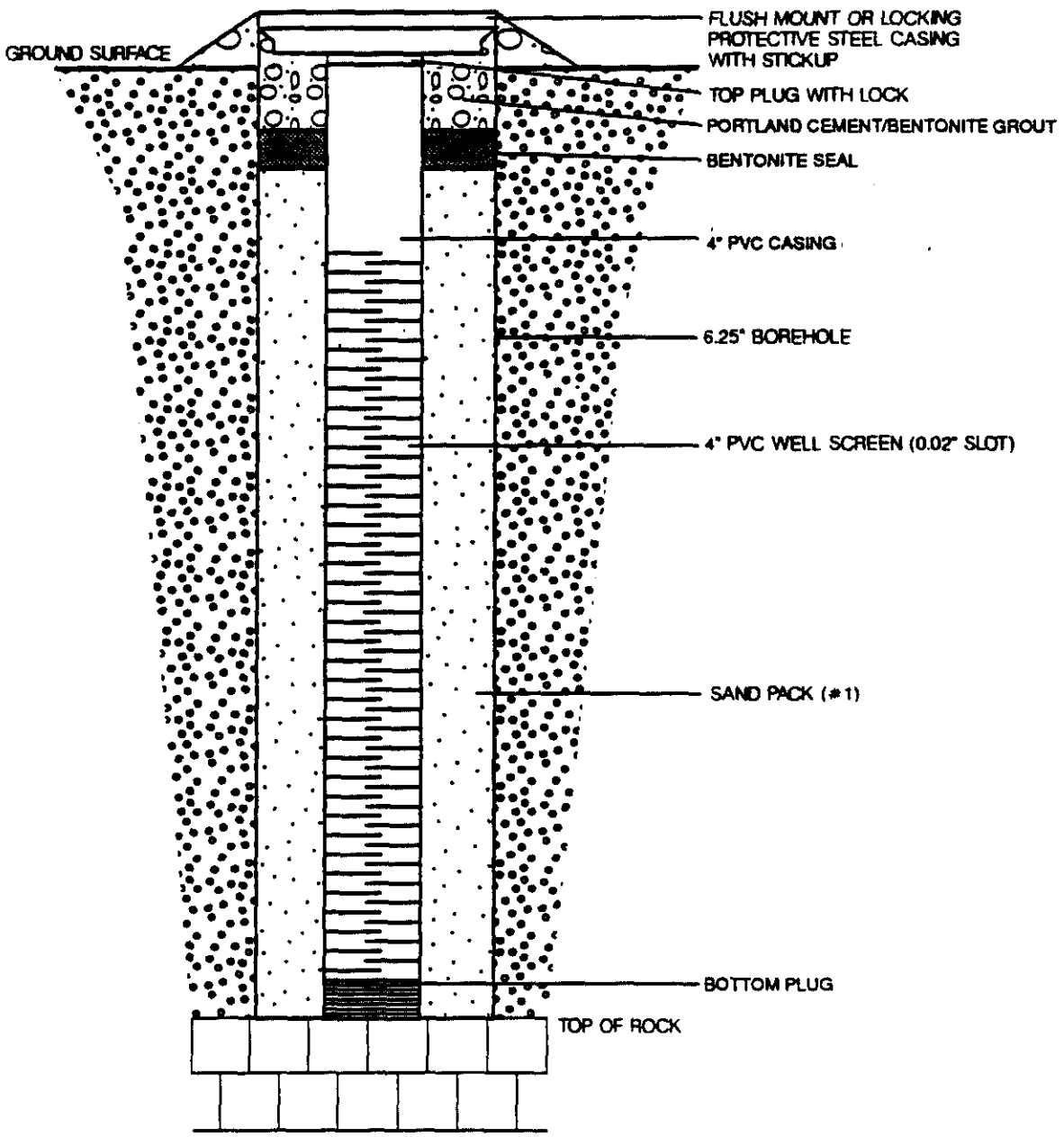
Figure 2
SITE PLAN

BCM

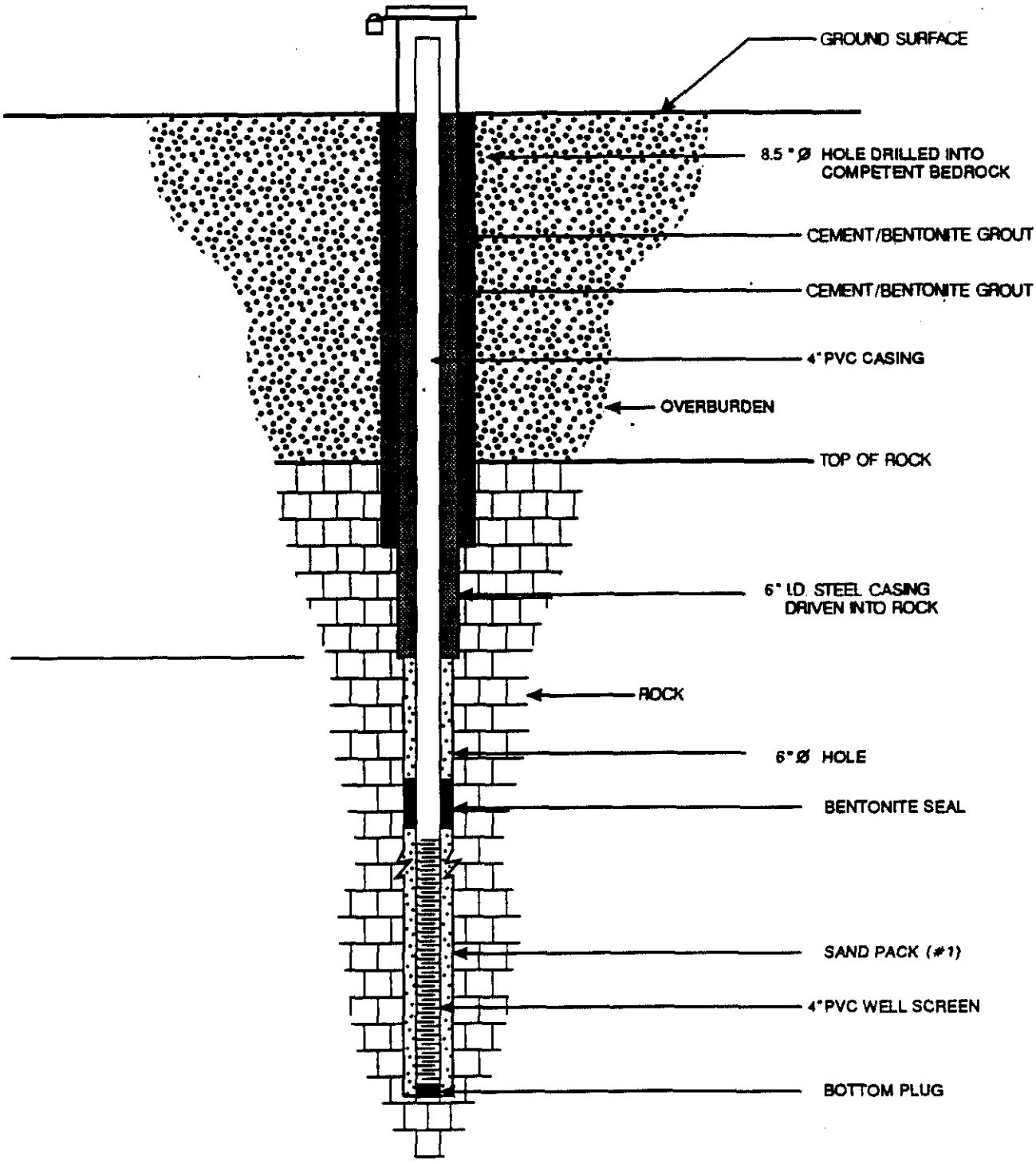
CHRISTIANA METALS CORPORATION
BISHOP TUBE[illegible]TY
Frazer, [illegible]



NOT TO SCALE

BCM Project No. 00-6471-01

Figure 3
Schematic Unconsolidated Aquifer Monitoring Well Construction Diagram



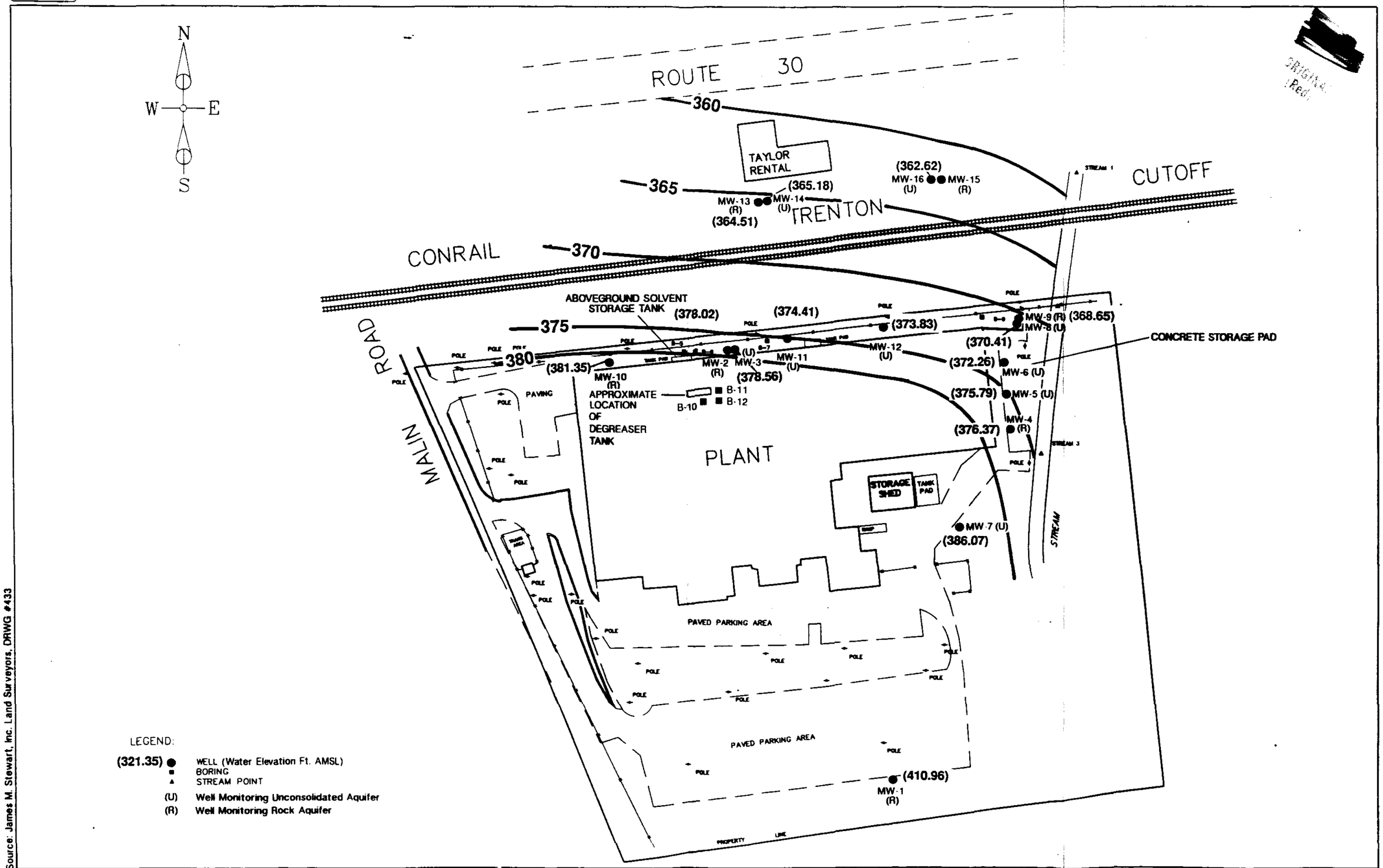
NOT TO SCALE

BCM Project No. 00-6471-01

Figure 4
Schematic Rock Aquifer Monitoring Well Construction Diagram

BCM

CHRISTIANA METALS



Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

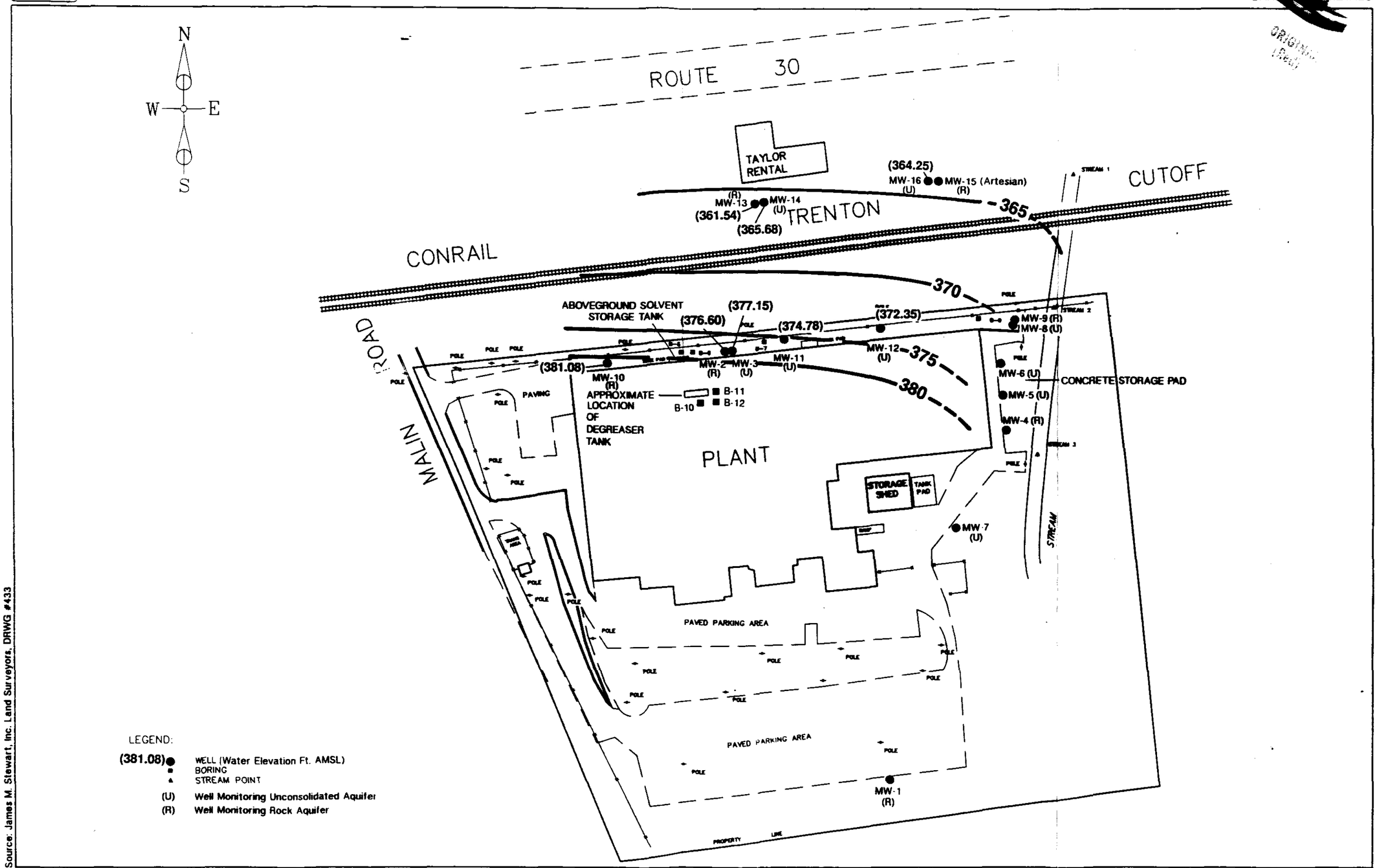
BCM Project No. 00-6471-01

Figure 5

Shallow Groundwater Elevation Contour Map • August 29 and 30, 1989

BCM

CH[redacted] METALS



Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

BCM Project No. 00-6471-01

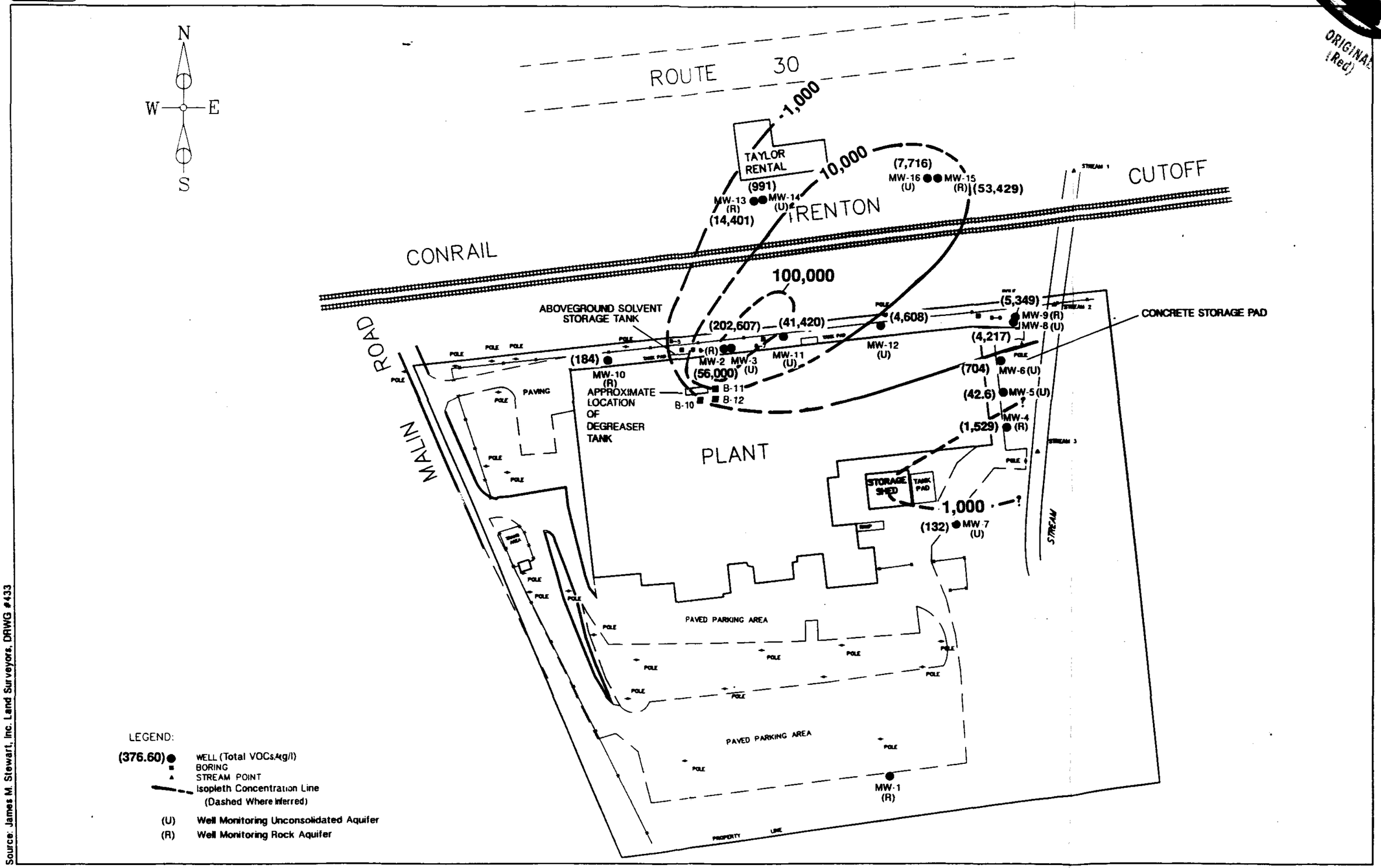
Figure 6

Shallow Groundwater Elevation Contour Map-September 28, 1989

BCM

CHRISTIANA METALS

ORIGINAL (Red)



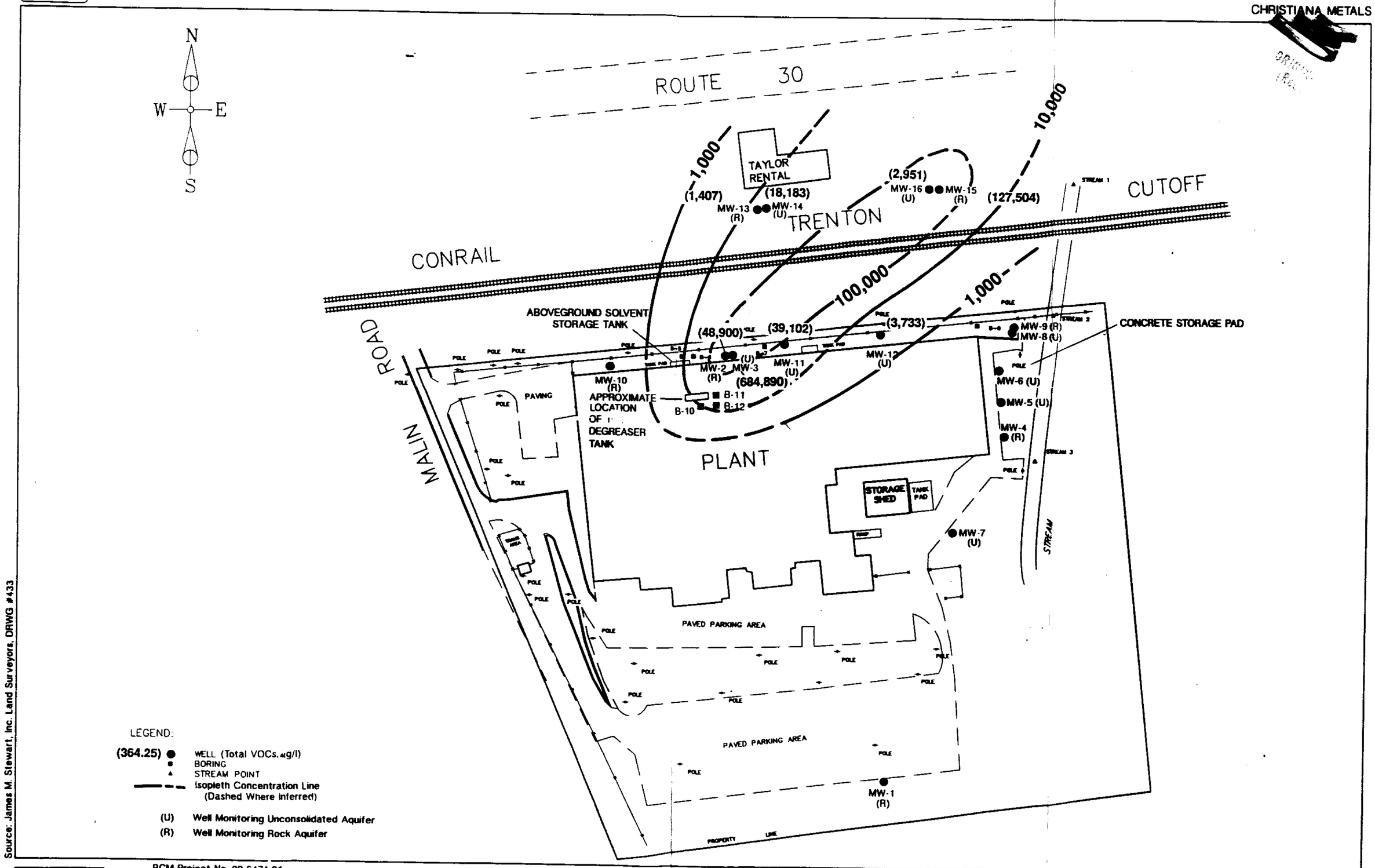
Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

BCM Project No. 00-6471-01

Figure 7
Isopleth Map of Total VOCs in Groundwater August 29 and 30, 1989

BCM

CHRISTIANA METALS



Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

BCM Project No. 00-6471-01

Figure 8

Isopleth Map of Total VOCs in Groundwater September 28,1989

- 5C

BCM

APPENDIX A

TEST BORING LOGS AND WELL DRILLING LOGS

BCM TEST BORING LOG			SHEET 1 OF 1
			BORING NO: B-5
PROJECT: Christiana Metals Corp. Groundwater Investigation			PROJECT NO: 00-6471-01
BORING LOCATION: ~~Adjacent to above ground TCE~~ tank along fire land			DATE(S) DRILLED: 8/1/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.			DRILLING METHOD: Hollow Stem Auger
BORING DIAMETER: 6.25"	SAMPLING METHOD: 2" O.D. Split-Spoon		TOTAL DEPTH: 8'
BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted			
LOGGED BY: (b) (4) [redacted]		DEPTH TO STATIC WATER: 4.4 FT. BELOW GRADE	
REMARKS:			

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-1'	0-2'	14,9,10,11	14"	FILL: Limestone gravel and sand
1-6'	2-4'	6,5,4,6	16"	CLAYEY SAND (SC): Fine, some very fine sand; little to some angular carbonate and schist clasts (1/8-1/2"); poorly sorted; orange brown, grey-blue; matrix, moderately plastic; clasts, dry.
	4-6'	2,2,2,2	12"	
6-8'	6-8'	2,3,2,1	10"	SILTY SAND (SM): Fine sand, some very fine sand, trace medium sand, trace carbonate and schist fragments (1/8-1/4:); poorly sorted; grey-brown matrix, brown to blue clasts, moist.
8'				END OF BORING. Limestone bedrock.

BCM TEST BORING LOG			SHEET 1 OF [redacted]
			BORING NO: B-6
PROJECT: Christiana Metals Corp. Groundwater Investigation			PROJECT NO: 00-6471-01
BORING LOCATION: 10' from B-5, adjacent to above ground TCE tank along fire lane			DATE(S) DRILLED: 8/1/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.			DRILLING METHOD: Hollow Stem Auger
BORING DIAMETER: 6.25"	SAMPLING METHOD: 2" O.D. Split-Spoon		TOTAL DEPTH: 8.5'
BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted			
LOGGED BY: (b) (4) [redacted]		DEPTH TO STATIC WATER: 4.7 FT. BELOW GRADE	
REMARKS:			

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-1'	0-2'	12,9,9,8	12"	FILL: Limestone gravel and sand.
1-6'	2-4'	2,2,3,3	0"	CLAYEY SAND (SC): Fine, some very fine sand; little to some angular carbonate and schist fragments (1/8-1/2")' poorly sorted; orange-brown moderately plastic; matrix, grey-blue clasts; dry.
	4-6'	2,2,3,2	12"	
6-8.5'	6-8'	2,6,6,4	14"	SILTY SAND (SM): Fine sand, little very fine sand, trace mica; trace carbonate clasts (1/2-1"); yellow-brown matrix, grey-blue clasts; wet.
8.5'				END OF BORING. Limestone bedrock

[redacted]

BCM TEST BORING LOG	SHEET 1 OF 1
	BORING NO: B-7
PROJECT: Christiana Metals Corp. Groundwater Investigation	PROJECT NO: 00-6471-01
BORING LOCATION: Adjacent to stairs at middle of plant along fire lane	DATE(S) DRILLED: 8/2/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.	DRILLING METHOD: Hollow-Stem Auger
BORING DIAMETER: 6.25" / SAMPLING METHOD: 2" O.D. Split-Spoon	TOTAL DEPTH:
BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted	
LOGGED BY: [redacted] (b) (4) [redacted]	DEPTH TO STATIC WATER: 8.0' FT. BELOW GRADE
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-1'	0-2'	9,11,12,11	18"	FILL: Limestone gravel and sand
1-11'	2-4'	7,7,7,13	0"	CLAYEY SAND (SC): Fine, some to little very fine sand, trace medium to coarse sand, little, angular carbonate clasts (1/8-1/2") trace angular schist fragments (1/8-1/4"); yellow-brown matrix, blue-grey to brown clasts, dry.
	4-5'	8,10,9,7	14"	
	6-8'	6,8,7,8	0"	
	8-10'	3,5,7,7	16"	
11-13.5'	10-12'	2,3,2,2	24"	SILTY SAND (SM): Fine, some very fine sand, trace angular schist clasts (1/8-1/4"), trace mica; dark grey; wet.
13.5-14.5"	12-14'	1,3,31,7	18"	SILTY GRAVEL (GM): Angular, pebble to cobble (1/4-1") size carbonate clasts, little medium to fine sand; clasts blue-grey; wet.
14.5'				END OF BORING. Limestone bedrock

[redacted]

ORIGINAL (Red)

BCM TEST BORING LOG			SHEET 1 OF 1
			BORING NO: B-9
PROJECT: Christiana Metals Corp. Groundwater Investigation			PROJECT NO: 00-6471-01
BORING LOCATION: At end of plant building along fire lane			DATE(S) DRILLED: 8/3/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.			DRILLING METHOD: Hollow-Stem Auger
BORING DIAMETER: 6.25"	SAMPLING METHOD: 2" O.D. Split-Spoon		TOTAL DEPTH: 21'
BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted			
LOGGED BY: (b) (4) [redacted]		DEPTH TO STATIC WATER: 14' FT. BELOW GRADE	
REMARKS:			

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-1'	0-2'	8,5,5,5	12"	FILL: Limestone gravel and sand
1-9'	6-8'	3,4,8,8	16"	CLAYEY SILT (ML): Some very fine sand, little very angular 1/8-1/2" schist clasts; yellow-brown matrix, yellow-brown to red clasts; dry.
9-13'	10-12'	2,3,4,4	12"	SILTY CLAY (CL): Little very fine sand, trace very weathered schist clasts (1/8") yellow-brown matrix, very plastic; micaceous; moist.
	12-14'	8,12,12,10	18"	
13-16'	14-16'	9,7,5,7	0"	SILTY GRAVEL (GM): Very angular carbonate clasts (>1"); little to some very fine sand, trace very coarse sand; yellow-brown matrix, blue-grey clasts; dry.
16-21'	20-22'	3,7,6,9	24"	SAND (SM): Coarse to very coarse; micaceous, weathered muscoite schist grains, angular clasts of carbonate (1/2"); brown matrix; wet.
21'				END OF BORING. Limestone Bedrock

[redacted]

BCM TEST BORING LOG			SHEET 1 OF
			BORING NO: B-10
PROJECT: Christiana Metals Corp. Groundwater Investigation			PROJECT NO: 00-6471-01
BORING LOCATION: Inside of plant, adjacent to south side of degreaser			DATE(S) DRILLED: 8/18/89
DRILLING CONTRACTOR: J.E. Fritts and Associates			DRILLING METHOD: Hollow-Stem Auger
BORING DIAMETER: 3.25"	SAMPLING METHOD: 2" O.D. Split-Spoon		TOTAL DEPTH: 15'
BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted			
LOGGED BY: (b) (4) [redacted]		DEPTH TO STATIC WATER: N/A	FT. BELOW GRADE
REMARKS:			

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-5'	1-3'	4,12,12,21	18"	CLAYEY SILT (ML): Little fine to medium sand, trace angular schist clasts (1/8"); yellow-brown, moderately plastic matrix, white to grey clasts; dry.
	3-5"	7,7,6,7	24"	
5-14.5'				SAND (SM): Fine, some medium, little very fine sand, trace coarse sand, micaceous; red-brown; wet; weathered schistose gruz.
14.5'-15'				LIMESTONE: Angular clasts (1/2-1") of blue-grey limestone.
15'				END OF BORING

ORIGINAL (Red)

BCM TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-11

PROJECT: Christiana Metals Corp. Groundwater Investigation

PROJECT NO: 00-6471-01

BORING LOCATION: Inside of plant, adjacent to northeast corner of degreaser

DATE(S) DRILLED: 8/18/89

DRILLING CONTRACTOR: J.E. Fritts and Associates

DRILLING METHOD: Hollow-Stem Auger

BORING DIAMETER: 3.25"

SAMPLING METHOD: 2" O.D. Split-Spoon

TOTAL DEPTH:

BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted

LOGGED BY: [redacted] (b) (4)

DEPTH TO STATIC WATER: N/A FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-6.5'	1-3'	18,20,19,18	18"	CLAYEY SILT (ML): Some medium sand, little fine to very fine sand; trace angular schist clasts (1/8-1/2"); yellow-brown moderately plastic matrix, red-brown clasts; dry.
	3-5'	7,10,7,10,	18"	
	5-7'	4,4,4,8	12"	
6.5-14'	7-9'	7,6,4,4	0"	SAND (SM): Medium, some fine sand, little very fine sand, angular schist clasts (1/8-1/2"); micaceous, yellow brown to red-brown; wet at 7'.
	9-11'	1,1/12, 1	6"	
14'	13-15'	1/18,2	6"	END OF BORING. Limestone bedrock.

BCM TEST BORING LOG			SHEET 1 OF 1
			BORING NO: B-12
PROJECT: Christiana Metals Corp. Groundwater Investigation			PROJECT NO: 00-6471-01
BORING LOCATION: Inside of plant, adjacent to southeast corner of degreaser			DATE(S) DRILLED: 8/18/89
DRILLING CONTRACTOR: J.E. Fritts and Associates			DRILLING METHOD: Hollow-Stem Auger
BORING DIAMETER: 3.25"	SAMPLING METHOD: 2" O.D. Split-Spoon		TOTAL DEPTH:
BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted			
LOGGED BY: (b) (4) [redacted]		DEPTH TO STATIC WATER: N/A FT. BELOW GRADE	

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
	1-3'	7,9,10,15	0"	
0-6.5'	3-5'	13,14,17,15	12"	CLAYEY SILT (ML): Some fine sand, little to trace angular schist clasts (1/8-3/4" yellow-)brown moderately plastic matrix, red-brown clasts; dry.
	5-7'	3,4,4,4	12"	
6.5-9'	7-9'	4,4,3,4	18"	SAND (SM): Medium, some fine sand, little very fine sand; micaceous; red-brown; wet at 7'.
9'				END OF BORING

BCM WELL DRILLING LOG				WELL NO: MW-10
				SHEET 1 OF: 1
PROJECT: Christiana Metals Corp. Groundwater Investigation				PROJECT NO: 00-6471-01
WELL LOCATION: Adjacent to west end of plant along F.L.				DATE(S) DRILLED 8/4/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.				DRILLING METHOD Air Percussion
BORING DIAMETER: 8.5"	SAMPLING METHOD: N/A			SAMPLE INTERVAL: N/A
LOGGED BY: [redacted]				TOTAL DEPTH: 15'
SCREEN SIZE AND MATERIAL: 0.020" slot, 4" I.D. schedule 40 PVC				SCREENED INTERVAL: 5-15'
CASING SIZE AND MATERIAL: 4" I.D. schedule 40 PVC				CASED INTERVAL: 0-5'
GRAVEL PACK SIZE: Jessie Morie #1 silica sand				PACKED INTERVAL: 4-15'
GROUT TYPE: Type I Portland Cement and Bentonite (10%)				GROUTED INTERVAL: 0-3'
GROUTING METHOD: Pressure grout				BENTONITE SEAL: 3-4'
DEVELOPMENT METHOD: Centrifugal pump	TIME: 30 mins.			ESTIMATED YIELD: 25 gpm
STATIC WATER DEPTH: 2.6'	DATE: 8/10/89	REFERENCE: Top of PVC		

REMARKS: A hollow-stem auger rig equipped with a 2-inch O.D. split-spoon completed the first four feet of the hole.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-1'	0-2'	18,12,9,14	18"	FILL: Limestone gravel and sand.
1-4'	2-4'	9,9,8,10	12"	SILTY SAND (SM): Fine, some very fine sand, little clay, trace to little angular carbonate clasts (1/8-1/4"); grey brown matrix, moderately plastic, orange-brown to grey clasts; dry.
4-15'				Limestone
15'				END OF BORING. Limestone bedrock.

BCM	WELL DRILLING LOG	WELL NO: MW-11
		SHEET 1 OF: 1
PROJECT: Christiana Metals Corp. Groundwater Investigation		PROJECT NO: 00-6471-01
WELL LOCATION: Adjacent to midpoint of plant along fire lane		DATE(S) DRILLED 8/2/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.		DRILLING METHOD Hollow-Stem Auger
BORING DIAMETER: 6.25"	SAMPLING METHOD: 2" O.D. split-spoon	SAMPLE INTERVAL: 4'
LOGGED BY: (b) (4) [redacted]		TOTAL DEPTH: 16'
SCREEN SIZE AND MATERIAL: 0.020" slot, 4" I.D. schedule 40 PVC		SCREENED INTERVAL: 6-16'
CASING SIZE AND MATERIAL: 4" I.D. schedule 40 PVC		CASED INTERVAL: 0-6'
GRAVEL PACK SIZE: Jessie Morie #1 silica sand		PACKED INTERVAL: 4-16'
GROUT TYPE: Type I Portland Cement and Bentonite (10%)		GROUTED INTERVAL: 0-2'
GROUTING METHOD: Pressure grout		BENTONITE SEAL: 2-4'
DEVELOPMENT METHOD: Centrifugal pump	TIME: 1 hour	ESTIMATED YIELD: <1 gpm
STATIC WATER DEPTH: 9.4'	DATE: 8/10/89	REFERENCE: Top of PVC
REMARKS:		

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-1'	0-2'	3,7,12,14	14"	FILL: Limestone gravel and sand.
	4-6'	5,10,11,13	18"	CLAYEY SAND (SC): Fine, some very fine sand, little silt, trace weathered angular schist clasts (1/8-1/4"), yellow-brown moderately plastic matrix; gray-blue clasts; dry.
1-10'	8-10'	3,6,5,6	20"	
10-15.5'	10-12'	3,2,1,2	2"	SILTY SAND (ML): Fine, some very fine sand, micaceous, trace schist clasts (1/8") grey-black; wet at 13'.
	12-14'	3,4,3,2	12"	
15.5-17'	14-16'	1,1,2,4	12"	CLAYEY SILT (CL): Trace very fine sand, trace angular schist clasts (1/2-1") yellow-brown matrix, grey-brown clasts, wet.
	16-18'	4,31/3"	12"	
17'				END OF BORING. Limestone bedrock.

ORIGINAL (Red)

BCM WELL DRILLING LOG

WELL NO:	MW-12
SHEET 1 OF:	2
PROJECT: Christiana Metals Corp. Groundwater Investigation	PROJECT NO: 00-6471-01
WELL LOCATION: Adjacent to east end of plant along fire lane	DATE(S) DRILLED: 8/3/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.	DRILLING METHOD: Hollow-Stem Auger
BORING DIAMETER: 6.25" / SAMPLING METHOD: 2" O.D. split-spoon	SAMPLE INTERVAL: Continuous
LOGGED BY: (b) (4) [redacted]	TOTAL DEPTH: 21'
SCREEN SIZE AND MATERIAL: 0.020" slot, 4" I.D. schedule 40 PVC	SCREENED INTERVAL: 8-21'
CASING SIZE AND MATERIAL: 4" I.D. schedule 40 PVC	CASED INTERVAL: 0-8'
GRAVEL PACK SIZE: Jessie Morie #1 silica sand	PACKED INTERVAL: 6-21'
GROUT TYPE: Type I Portland Cement and Bentonite (10%)	GROUTED INTERVAL: 0-4'
GROUTING METHOD: Pressure grouted	BENTONITE SEAL: 4-6'
DEVELOPMENT METHOD: Centrifugal pump / TIME: 1 hour	ESTIMATED YIELD: <1 gpm
STATIC WATER DEPTH: 9.2' / DATE: 8/10/89	REFERENCE: Top of PVC
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-1'	0-2'	12,11,10,10	14"	FILL: Gravel and sand
1-7'	2-4'	5,8,8,12	18"	CLAYEY SILT (ML): Some very fine sand, trace angular schist clasts (1/8-1/2") yellow-brown matrix, blue-grey clasts; dry.
	4-6'	5,6,5,6	8"	
	6-8'	2,3,3,5	14"	
7-8.5'	8-10'	8,14,9,3	18"	SILTY CLAY (CL): Trace very fine sand, trace angular schist clasts (1/8"); yellow-brown, very plastic matrix; moist.
8.5-10'				CLAYEY GRAVEL (GC): angular schist clasts (1/2-1"); little very fine sand; micaceous; yellow-brown moderately plastic matrix; dry.
	10-12'	1/24"	24"	

WELL NO. MW-12

SHEET 2 OF 2

ORIGINAL (Red)

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (in.)	CLASSIFICATION
10-21'	12-14'	4,1,2,8	24"	SAND (SM): Medium, some coarse sand, little fine sand, trace clay and silt, trace angular schist clasts (1/8-1/4"), micaceous, gray-brown; wet; weathered schistose grains.
	14-16'	2,3,10,17	24"	
	16-18'	2/24"	2"	
	18-20'	1,7,1/12"	24"	
	20-22'	50/0"	0"	Augered to 21'.
21'				END OF BORING. Limestone bedrock.

ORIGINAL

BCM WELL DRILLING LOG

WELL NO:	MW-13
SHEET	1 OF: 1
PROJECT: Christiana Metals Corp. Groundwater Investigation	PROJECT NO: 00-6471-01
WELL LOCATION: Offsite at west end of Taylor Rental	DATE(S) DRILLED: 8/7/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.	DRILLING METHOD: Air Percussion
BORING DIAMETER: 8.5" / SAMPLING METHOD: N/A	SAMPLE INTERVAL: N/A
LOGGED BY: E. (b) [redacted]	TOTAL DEPTH: 37'
SCREEN SIZE AND MATERIAL: 0.020" slot, 4" I.D. schedule 40 PVC	SCREENED INTERVAL: 27-37'
CASING SIZE AND MATERIAL: 4" I.D. schedule 40 PVC	CASED INTERVAL: 0-27'
GRAVEL PACK SIZE: Jessie Morie #1 silica sand	PACKED INTERVAL: 25-37'
GROUT TYPE: Type I Portland Cement and Bentonite (10%)	GROUTED INTERVAL: 0-23'
GROUTING METHOD: Pressure grouted	BENTONITE SEAL: 23-25'
DEVELOPMENT METHOD: Submersible pump / TIME: 1 hour	ESTIMATED YIELD: <1 gpm
STATIC WATER DEPTH: 10.0' / DATE: 8/10/89	REFERENCE: Top of PVC

REMARKS: For description of lithology from 0-15' see log for MW-14.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-15'				Overburden (see MW-14 log)
15-37'				Limestone bedrock: void from 27-28' (first water)
37'				END OF BORING

[redacted]

ORIGINAL

BCM WELL DRILLING LOG

WELL NO:	MW-14
SHEET	1 OF:
PROJECT: Christiana Metals Corp. Groundwater Investigation	PROJECT NO: 00-6471-01
WELL LOCATION: Offsite adjacent to MW-13 at west end of Taylor Rental	DATE(S) DRILLED 8/7/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.	DRILLING METHOD Hollow-Stem Auger
BORING DIAMETER: 6.25" / SAMPLING METHOD: 2" O.D. split-spoon	SAMPLE INTERVAL: 5'
LOGGED BY: (b) [redacted]	TOTAL DEPTH: 15'
SCREEN SIZE AND MATERIAL: 0.020" slot, 4" I.D. schedule 40 PVC	SCREENED INTERVAL: 5-15'
CASING SIZE AND MATERIAL: 4" I.D. schedule 40 PVC	CASED INTERVAL: 0-5'
GRAVEL PACK SIZE: Jessie Morie #1 silica sand	PACKED INTERVAL: 3-15'
GROUT TYPE: Type I Portland Cement and Bentonite (10%)	GROUTED INTERVAL: 0-2'
GROUTING METHOD: Pressure grouted	BENTONITE SEAL: 2-3'
DEVELOPMENT METHOD: Centrifugal pump / TIME: 1 hour	ESTIMATED YIELD: <1 gpm
STATIC WATER DEPTH: 15.0' / DATE: 8/10/89	REFERENCE: Top of PVC
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-10'	5-7'	4,8,10,12	6"	CLAYEY SILT (ML): Some very fine sand, little angular schist clasts (1/8-1/4") yellow-brown matrix, moderately plastic; dry.
10-15'	10-12'	2,1,1,3	12"	SAND (SM): Medium, some fine sand, little silt to clay, moderate to low plasticity; brown-grey; wet.
	15-17'	50/0"		
15'				END OF BORING. Limestone bedrock.

ORIGINAL

BCM WELL DRILLING LOG		WELL NO: MW-15
		SHEET 1 OF: 1
PROJECT: Christiana Metals Corp. Groundwater Investigation		PROJECT NO: 00-6471-01
WELL LOCATION: Offsite at east end of Taylor Rental		DATE(S) DRILLED 8/7/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.		DRILLING METHOD Air Percussion
BORING DIAMETER: 8.5"	SAMPLING METHOD: N/A	SAMPLE INTERVAL: N/A
LOGGED BY: [redacted]		TOTAL DEPTH: 78'
SCREEN SIZE AND MATERIAL: 0.020" slot, 4" I.D. schedule 40 PVC		SCREENED INTERVAL: 68-78'
CASING SIZE AND MATERIAL: 4" I.D. schedule 40 PVC		CASED INTERVAL: 0-68'
GRAVEL PACK SIZE: Jessie Morie #1 silica sand		PACKED INTERVAL: 66-78'
GROUT TYPE: Type I Portland Cement and Bentonite (10%)		GROUTED INTERVAL: 0-64'
GROUTING METHOD: Pressure grouted with tremmie		BENTONITE SEAL: 64-66''
DEVELOPMENT METHOD: Submersible pump	TIME: 1 hour	ESTIMATED YIELD: 2-3 gpm
STATIC WATER DEPTH: 0.04'	DATE: 8/10/89	REFERENCE: Top of PVC

REMARKS: For description of lithology see log for MW-16.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-21'				Overburden (see MW-16 log).
21-78'				Limestone bedrock: void at 68 to 69-feet (first water).
78'				END OF BORING

BCM WELL DRILLING LOG		WELL NO: MW-16
		SHEET 1 OF: 1
PROJECT: Christiana Metals Corp. Groundwater Investigation		PROJECT NO: 00-6471-01
WELL LOCATION: Offsite adjacent to MW-15 at east end of Taylor Rental		DATE(S) DRILLED 8/8/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.		DRILLING METHOD Hollow-Stem Auger
BORING DIAMETER: 6.25"	SAMPLING METHOD: 2" O.D. split-spoon	SAMPLE INTERVAL: 5'
LOGGED BY: [redacted]		TOTAL DEPTH: 21'
SCREEN SIZE AND MATERIAL: 0.020" slot, 4" I.D. schedule 40 PVC		SCREENED INTERVAL: 7-21'
CASING SIZE AND MATERIAL: 4" I.D. schedule 40 PVC		CASED INTERVAL: 0-7'
GRAVEL PACK SIZE: Jessie Morie #1 silica sand		PACKED INTERVAL: 5-21'
GROUT TYPE: Type I Portland Cement and Bentonite (10%)		GROUTED INTERVAL: 0-3'
GROUTING METHOD: Pressure grouted		BENTONITE SEAL: 3-5'
DEVELOPMENT METHOD: Centrifugal pump	TIME: 1 hour	ESTIMATED YIELD: <1 gpm
STATIC WATER DEPTH: 7.5'	DATE: 8/10/89	REFERENCE: Top of PVC
REMARKS:		

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-10.5'	5-7'	4,7,18,15	18"	CLAYEY SILT (CL): Trace angular schist clasts (1/8-1/4"); damp; grey mottling.
10.5-15'	10-12'	1,2,1,3	20"	CLAYEY SILT (CL): Trace very fine sand, highly plastic; orange-grey mottling; wet.
15-17'	15-17'	1/24"(W.O.H.)	24"	SILTY SAND (SM): Trace to little angular schist clasts (1/8-1/2"); brown-grey; wet.
17-21'	20-22'	1,2,1,1	18"	LIMESTONE BEDROCK: Weathered limestone.
21'				END OF BORING

BCM

ORIGINAL

APPENDIX B

HEALTH AND SAFETY PLAN

BCM

ORIGINAL (Red)

HEALTH AND SAFETY PLAN

FOR

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

JUNE 27, 1989

BCM PROJECT NO. 00-6471-01

PREPARED BY:

(b) (4) [redacted]

SENIOR HEALTH AND SAFETY SPECIALIST

AND

(b) (4) [redacted]

HEALTH AND SAFETY DIRECTOR

BCM

ORIGINAL

1.0 BACKGROUND

SITE: Bishop Tube Facility

LOCATION: Frazer, Pennsylvania

PROJECT DESCRIPTION: Groundwater Investigation

PROPOSED STARTUP DATE: 7/6/89 PROJECTED LENGTH OF WORK: 3 weeks

FACILITY DESCRIPTION: The facility is a redraw mill that fabricates speciality items in the stainless steel tubing field.

Unusual Features (containers, buildings, underground tanks, dikes, power lines, terrain, etc.)

Underground and overhead utilities and close proximity to railroad power lines.

Status: (X) Active
( ) Inactive

Overall Hazard is: (See Section 2.2)

High: ____ Moderate: X
Low : ____ Unknown : ____

Site History (worker or non-worker injury; complaints from public; previous agency action):

In May of 1988, BCM performed a groundwater quality investigation at the Bishop Tube facility. Results of the investigation indicate that Bishop Tube is the apparent source of trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) contamination.

BCM

2.0 SCOPE OF WORK

BCM Engineers Inc. (BCM) has been retained by Christiana Metals Corporation to perform additional investigative tasks at the Bishop Tube facility located in Frazer, Pennsylvania. The purpose of the investigation is to further delineate soil and groundwater contamination. BCM will oversee the installation of five groundwater monitoring wells. Three shallow monitoring wells will be installed on the north side of the plant with a cluster of two wells, one shallow and one deep installed on the northeast side of the facility close to the small stream and one cluster of a deep and shallow well approximately midway in front of the plant. All shallow wells will be drilled using hollow stem augers and the deep wells drilled utilizing air rotary. Soil sampling will be performed continuously using split spoon samplers. In addition, BCM will perform groundwater sampling of all existing and newly installed monitoring wells.

2.1 PERSONNEL INVESTIGATING SITE

Name:	Position:
(b) (4) [redacted]	Project Geologist
(b) (4) [redacted]	Field Geologist

BCM

2.2 HAZARD EVALUATION

The following substances have been detected in groundwater samples collected at the site. The primary hazards of each are identified.

Chemical	OSHA PEL ACGIH TLV ACGIH STEL NIOSH IDLH	Primary Hazards
CHLOROFORM CAS: 67-66-3	PEL: 2 ppm TLV: 10 ppm STEL: None IDLH: None CA	Poison to humans by ingestion and inhalation. Human central nervous system (CNS) effects and systemic effects.
CHLOROETHANE (ETHYL CHLORIDE) CAS: 75-00-3	PEL: 1,000 ppm TLV: 1,000 ppm STEL: None IDLH: 20,000 ppm	Moderately toxic by ingestion and inhalation routes. An irritant to skin, eyes, and mucous membranes.
1,1 DICHLOROETHANE CAS: 75-34-3	PEL: 100 ppm TLV: 200 ppm STEL: 250 ppm IDLH: None	Moderate toxicity by ingestion. Explosive when exposed to heat. Dangerous when heated to decomposition; it emits phosgene fumes. Colorless liquid.
1,2 DICHLOROETHANE (ETHYLENE DICHLORIDE) CAS: 107-06-2	PEL: 1 ppm TLV: 10 ppm STEL: 2 ppm IDLH: None CA	Toxic by ingestion, inhalation, and skin absorption. Strong irritant to eyes and skin. A carcinogen. Colorless liquid. Flammable, dangerous fire risk, explosive limits in air 6-16%.
1,1-DICHLOROETHYLENE (VINYLIDENE CHLORIDE) CAS: 75-35-4	PEL: 1 ppm TLV: 5 ppm STEL: 20 ppm IDLH: None	Poison by inhalation and injestion. An experimental carcinogen and mutagen by skin contact, inhalation, and other routes. A dangerous fire hazard when exposed to heat and flames.

BCM

Hazard Evaluation
Continued (Page 2)

Chemical	OSHA PEL ACGIH TLV ACGIH STEL NIOSH IDLH	Primary Hazards
1,2 DICHLOROETHENE CAS: 540-59-0	PEL: 200 ppm TLV: 200 ppm STEL: None IDLH: 4,000 ppm	Toxic by inhalation, ingestion, and skin contact; irritant. Narcotic in high concentrations. Flammable, dangerous fire risk.
METHYLENE CHLORIDE CAS: 75-09-2	PEL: 500 ppm TLV: 175 ppm STEL: None IDLH: None CA	Moderately toxic by inhalation and other routes; poison by ingestion and intervenous routes. Blood and central nervous system (CNS) effects by inhalation. An eye and skin irritant. A suspect human carcinogen. Narcotic, dizziness, nausea, dermatitis.
TETRACHLOROETHENE (PCE) CAS: 127-18-4	PEL: 25 ppm TLV: 50 ppm STEL: 200 ppm IDLH: None	Toxic by inhalation, ingestion, or repeated skin contact. Exposure to high concentrations can cause irritation to eyes, nose, and throat. Colorless liquid.
1,1,1-TRICHLOROETHANE (METHYL CHLOROFORM) CAS: 75-55-6	PEL: 350 ppm TLV: 350 ppm STEL: 450 ppm IDLH: 1,000 ppm	Toxic by inhalation. A moderate skin and severe eye irritant. CNS effects. Narcotic in high concentrations. Colorless liquid.
TRICHLOROETHENE (TCE) CAS: 79-01-6	PEL: 50 ppm TLV: 50 ppm STEL: 200 ppm IDLH: None CA	Non-flammable. CNS depressant. Skin and eye irritant. Chloroform-like odor. Suspect animal carcinogen. Toxic by inhalation.

BCM

Hazard Evaluation
Continued (Page 3)

Chemical	OSHA PEL ACGIH TLV ACGIH STEL NIOSH IDLH	Primary Hazards
TRICHLOROFLUOROMETHANE CAS: 75-69-4	PEL: 1,000 ppm (ceil) TLV: 1,000 ppm (ceil) STEL: None IDLH: 4,500 ppm	High concentrations cause narcosis and anesthesia. Dangerous when heated to decomposition; it emits toxic fumes.
VINYL CHLORIDE CAS: 75-01-4	PEL: 1 ppm TLV: 5 ppm STEL: 5 ppm IDLH: None CA	A human brain carcinogen. A severe irritant by inhalation to skin, eyes and mucous membranes. Causes skin burns by rapid evaporation and consequent freezing.

OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit for an 8-hour time-weighted average.

ACGIH TLV = American Conference of Governmental Industrial Hygienists Threshold Limit Value for an 8-hour time-weighted average.

ACGIH STEL = American Conference of Governmental Industrial Hygienists Short Term Exposure Limit for a 15-minute time-weighted average.

NIOSH IDLH = National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health Concentration

CA = NIOSH has identified numerous chemicals that they recommend shall be treated as potential human carcinogens.

NOTE: Material Safety Data Sheets can be obtained by request from the BCM Information Center upon contacting the BCM Safety Department.

The following additional hazards are expected onsite:

Caution must be given to overhead and underground utilities

BCM

ORIGINAL

2.3 PERSONNEL PROTECTIVE EQUIPMENT

LEVEL OF PROTECTION

B ( ) C ( ) D (X) Location/Activity: SHALLOW MONITORING WELL INSTALLATION

The drilling of all shallow wells will be initiated at Level D respiratory protection wilth the associated dermal protection. See Section 2.4 for action level requirements.

B ( ) C (X) D ( ) Location/Activity: DEEP MONITORING WELL INSTALLATION

The drilling of both deep wells will be initiated at Level C respiratory protection with the associated dermal protection. Level C is required due to the potential release of volatile organic compounds caused by air rotary drilling. A downgrade to Level D respiratory protection will be permitted if the action level is not exceeded. See Section 2.4 for action level requirements.

B ( ) C ( ) D (X) Location/Activity: MONITORING WELL SAMPLING

The level of protection to be utilized during monitoring well sampling will be directly dependant on the level used to install the wells. However, it is anticipated that Level D will be utilized during sampling with continuous monitoring of the workers' breathing zone. See Section 2.4 for action level requirments.

B ( ) C (X) D ( ) Location/Activity: DECONTAMINATION OF HEAVY EQUIPMENT

Heavy equipment that comes in contact with potentially contaminated materials must be decontaminated at Level C respiratory and dermal protection. If volatile organic concentrations are not detected above the set action levels, decontamination will be performed using a splash shield with dermal protection.

BCM

RESPIRATOR ( ) N/A

(X) Full-Face Respirator (Level C) (MSA Cartridge GMC-H)

( ) Half-Face Respirator (MSA Cartridge _____)

( ) Self-Contained Breathing Apparatus

( ) Escape Mask

( ) Airline Respirator

NOTE: GMC-H = organic vapor/acid gas/high efficiency particulate filter
See Attachment A for respirator inspection check list and positive negative fit test/procedures.

CLOTHING ( ) N/A

( ) Tyvek Coverall

( ) Fully Encapsulating Suit

(X) Polycoated Tyvek Coverall

( ) Chemical-Resistant Splash Suit

( ) Saranex Coverall

( ) Other _____

NOTE: _____

HAND PROTECTION ( ) N/A

(X) Undergloves Latex
Type

(X) Overgloves Nitrile
Type

( ) Gloves _____
Type

( ) Other _____

FOOT PROTECTION ( ) N/A

(X) Safety Workboots/Shoes

( ) Heavy Outer Boots

(X) Disposable Overboots

( ) Other _____

BCM

HEAD, EYE, & HEARING ( ) N/A

(X) Hard Hat

( ) Chemical Splash Goggles

(X) Hearing Protection (as needed)

(X) Safety Glasses (NIOSH or ANSI approved)

(X) Face Shield (Decontamination)

NOTE: Safety glasses must be worn if eye protection is not afforded by a full-face respirator.

2.4 MONITORING EQUIPMENT ( ) N/A

(X) Photoionization Detector (HNu PI-101)

(X) Flame Ionization Detector (Century Organic Vapor Analyzer)

(X) Combustible Gas/Oxygen/Hydrogen Sulfide Meter (MSA Model 361)

( ) Radiation Meter (Ludlum Model 3 Survey Meter)

( ) Detector Tubes (Type - _____)

( ) Other: _____

NOTE: Real-time monitoring of volatile organics will be performed using an HNu PI-101 photoionization detector or an OVA 128 flame ionization detector. At any time if sustained organic concentrations exceed 5 ppm above background levels in the workers' breathing zone during Level D activities, an upgrade to Level C will be warranted. If sustained volatile organic concentrations exceed 50 ppm above background levels in the workers' breathing zone for Level C activities, an upgrade to Level B will be warranted. Monitoring will also be performed using the MSA 361 O_2/LEL/H_2S meter during drilling activities. If concentrations detected exceed 25 percent of the LEL, all work will stop and the site conditions re-evaluated. In addition, a background reading will be collected with each instrument. A background area is defined as an area free of site-generated airborne contaminants. This area will be located upwind of the work area. All instruments will be calibrated and operated in accordance with manufacturer's specifications.

BCM

3.0 DECONTAMINATION PROCEDURES

Personnel and equipment leaving the Exclusion Zone (work area) shall be thoroughly decontaminated. The minimum Level C decontamination protocol shall be used with the following decontamination stations:

1. Equipment drop
2. Glove wash
3. Glove rinse
4. Boot wash
5. Boot rinse
6. Protective clothing removal
7. Respirator removal

NOTE: The above wash and rinse stations may be eliminated if a total disposable outfit is utilized; however, protective clothing removal shall be performed as stated above.

Clothing known to be contaminated should be contained and left onsite for proper disposal along with decontamination solutions. All equipment coming in contact with contaminated soil or groundwater must be properly decontaminated before leaving the site. See Attachment B for respirator sanitizing procedures.

The following decontamination equipment is required:

Tubs, buckets, brushes, liquinox, sprayer, and trash bags.

3.1 EQUIPMENT

Heavy equipment that comes in contact with contaminated materials must be cleaned by approved means before leaving the site. Heavy equipment decontamination shall be performed by the Contractor at the designated washdown station using approved means (water and/or steam). Level C personal protection will be used while decontaminating the equipment. Section 2.3 lists the dermal protection to be utilized for this task.

BCM

4.0 GENERAL WORK REQUIREMENTS

All BCM personnel must comply with the following requirements:

1. Satisfy the medical surveillance requirements as listed in 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response, Final Rule

2. Receive appropriate safety training (29 CFR Part 1910.120)

3. Complete 3 days of prior fieldwork under a qualified supervisor

4. Review the HASP and are fully aware of the requirements in the plan

5. Dressed out in accordance with the task-specific plans

6. No eating, drinking, smoking, or gum or tobacco chewing is allowed in the work zone

7. Wash hands and face before leaving the work area. Individuals will shower, as soon as possible, after leaving the job site at the end of the day

8. Contact with contaminated surfaces or surfaces suspected of being contaminated should be avoided while the worker is unprotected. In the event that protective clothing is ripped or torn, work is to stop and the protective clothing removed and replaced as soon as possible. In the event of direct skin contact, the affected area is to be washed immediately with soap and water

9. Any person under a physician's care, taking medication, or those who experience allergic reactions must inform the Health and Safety Officer

All personnel entering areas requiring Level B or C protection shall:

1. Be respirator fit-tested (within previous 6 months). Documentation must be provided to show respirator size, model, and manufacturer.

2. Be cleanly shaven

3. Have been trained in the level of respiratory protection being used at the site

4. Work in a minimum of a two-person team with a line of sight to a third person (Level B)

BCM

4.1 CONTRACTOR

This provision imposes upon the contractor the responsibility for the health and safety of his employees and others while performing work on the site.

- The contractor shall satisfy all federal, state, and local statutes, regulations and ordinances regarding health and safety, including the most recent OSHA standards which are specifically referenced.

- Contractor shall review the HASP and attend a safety briefing given by BCM and sign the Approval/Sign Off format found in the back of the HASP prior to site entry.

- Contractors shall supply the necessary safety equipment (as outlined by this Health and Safety Plan [HASP]) for their crews. BCM is not responsible for contractor safety equipment.

BCM

5.0 SITE ENTRY AND EXIT PROCEDURES

Startup

1. Team briefing to review intended daily operations and safety procedure update
2. Daily check of all monitoring and safety equipment
3. Personnel dress out and team proceeds to the work area

Shutdown

1. All personnel exit from the work zone and decontaminate
2. Ensure that the work area and all equipment are secured

BCM

6.0 VISITOR PROTOCOL

All visitors who proceed downrange in the Work Area must comply with the following requirements and those set forth in Section 4.0.

1. Visitors must have reviewed the site-specific HASP and must agree to comply with the guidelines set forth in this plan

2. Visitors will be limited to Level D work areas

3. Visitors must be escorted by onsite personnel

BCM

7.0 HEAT EXPOSURE

7.1 HEAT STRESS

Heat stress is a major hazard, especially for workers wearing protective clothing. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly - within as little as 15 minutes. The key to preventing excessive heat stress is educating personnel on the hazards associated with working in heat and the benefits of implementing proper controls and work practices.

7.1.1 Heat Rash

Heat rash (prickly heat) may result from continuous exposure to heat or humid air where the skin remains wet due to lack of evaporation, sweat ducts become plugged, and a skin rash appears. This uncomfortable rash can be prevented by resting in a cool place during breaks and by good daily personal hygiene.

7.1.2 Heat Cramps

Heat cramps are muscular spasms, usually in abdomen or limbs due to loss of salt following profuse sweating. The drinking of large quantities of water tends to dilute the body's fluids, while the body continues to lose salt.

First Aid:

1. Apply warm moist heat and pressure to reduce pain
2. Give electrolyte drinks by mouth

7.1.3 Heat Exhaustion

Caution: Persons with heart problems or on a "low sodium" diet who work in hot environments should consult a physician about what to do under these conditions.

Heat exhaustion is a result of overexertion in hot or warm weather. It is highly possible for an onsite worker to experience heat exhaustion due to the use of worker protective coveralls, boots, gloves, and respiratory protection, even if ambient temperatures are mild.

Symptoms:

1. Pale, clammy skin
2. Profuse perspiration
3. Weakness
4. Headache
5. Nausea

First Aid:

1. Get victim into shade or cooler place
2. Immediately remove any protective clothing
3. Victim should drink plenty of fluids
4. Victim should lie down with feet raised
5. Fan and cool victim with wet compresses
6. If vomiting occurs, transport to hospital
7. Victim should rest for a few days

Prevention:

1. If possible, schedule work for early morning or evening during warm weather
2. Work in shifts; limit downrange time of personnel and follow with frequent breaks
3. Have cool liquids at Exclusion Zone border for downrange personnel to continuously replace body fluids
4. The HSO or designee should continually monitor personnel for signs of heat stress

7.1.4 Heat Stroke

The body's temperature control system that causes sweating stops functioning correctly in the case of heat stroke. Brain damage and death may occur if body core temperature is extremely elevated and is not reduced.

BCM

ORIGINAL (Red)

Symptoms:

1. Flushed, hot dry skin
2. High body core temperature (≥105°F)
3. Dizziness
4. Nausea
5. Headache
6. Rapid pulse
7. Unconsciousness

First Aid:

Immediately take precautions to cool body core temperature by removing clothing and sponging body with alcohol, or cool water, or placing in tub of cold water until temperature is lowered sufficiently (102°F). Stop cooling and observe victim for 10 minutes. Once temperature remains lowered, dry person off. Use fans or air conditioning, if available. Do not give the victim stimulants. Transfer to medical facility.

BCM

8.0 DRILLING SAFETY

The drilling contractor is required to comply with all local, state, and federal regulations regarding the safe operation of a drill rig. The following items serve as guidelines for drilling operations.

1. Prior to drilling, adequate site clearing and leveling should be performed to accommodate the drill rig and supplies and provide a safe working area.

2. Overhead and buried utilities must be located prior to start-up of drilling activities.

3. All onsite personnel should stand clear of the drill rig immediately prior to and during starting of the engine.

4. Organic vapor monitoring will be conducted continuously in the workers breathing zone during drilling operations.

5. If Level B (Airline respirators) is utilized, particular attention should be given to the airline hose in order to ensure that workers do not trip on the hose and that the hose does not become entangled or severed from moving parts.

6. Immediately following the completion of drilling operations, the entire work area will be monitored to determine if vapor concentrations have returned to background levels. If elevated levels are detected, the source will be determined and the appropriate action will be taken.

BCM

9.0 EMERGENCY CONTINGENCY PLAN

If an incident occurs that requires declaring an emergency, all personnel will assemble at the decontamination station for further instruction. Arrangement for decontamination, evacuation, and/or transport will be made at that time. The client and the appropriate BCM personnel will be notified of the incident as soon as is practicable.

9.1 NOTIFICATION/REPORTING PROCEDURES

In the event of an emergency, Russell Levering will be notified as soon as possible as to the nature of the incident (vapor release, injury, etc.), and emergency services will be notified as needed (see Section 9.6 - Contingency Contacts).

9.2 UNEXPECTED VAPOR RELEASES

In the event that airborne contaminants migrate from the work zone and potentially endanger unprotected personnel or the community, all onsite activities will cease until the release is brought under control.

9.3 PERSONNEL INJURY

In the event of an injury, all personnel will assemble at the decontamination station. If the injured person is immobile, one or more persons should remain nearby to provide any necessary first aid. If medical help is needed, the Project Geologist will summon the appropriate assistance as outlined below, or transport as necessary. The extent of decontamination of any injured personnel, and those coming to his or her aid, is a judgement that must be made on a case-by-case basis.

While onsite activity is in progress, it is recommended that at least one qualified person will be available at all times to administer first aid, including CPR.

If an eye or skin injury is chemical in nature (e.g., overexposure), the following first aid procedures are to be instituted:

- Eye Exposure - If contaminated solids or liquids gets into the eyes, wash eyes immediately for 15 minutes at the emergency eye wash station (Contamination Reduction Zone) using large amounts of water and occasionally lifting the lower and upper eye lids. Obtain medical attention immediately.

- Skin Exposure - If contaminated solid or liquid gets on the skin, promptly wash the contaminated skin using soap or mild detergent and water. If solids or liquids penetrate the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Obtain medical attention immediately.

BCM

9.4 EVACUATION PLAN

In the event of an onsite evacuation, the following plan will be put into effect:

- A signal consisting of five 1-second blasts of vehicle or air horn will be used.
- All personnel will immediately evacuate downwind areas and report to the decontamination station for further instruction.

9.5 SPILL PREVENTION AND RESPONSE

In the event of a leak or a spill, the area will be cordoned off and the spill contained and cleaned up by authorized personnel. All materials will be disposed of in a proper manner.

BCM

9.6 CONTINGENCY CONTACTS

Agency	Contact	Phone Number
Fire Department	Paoli Fire Department	(215) 644-1224
Police Department	Paoli Area Police Dept.	(215) 647-1440
Health Department	Health Department	(215) 344-6160
Poison Control Center	Poison Control	(215) 386-2100
Hospital Emergency Room	Paoli	(215) 648-1043
Ambulance	Paoli Fire Department	(215) 953-0800
State Agency Hotline	PADER	(215) 270-1900
Drilling Contractor	C.S. Garber & Sons, Inc.- Dennis Stoudt	(215) 367-2861
State Police	West Chester Barracks	(215) 692-2290
Onsite Coordinator	(b) (4) [redacted]	Onsite
Primary Plant Contact	Russell Levering	(215) 647-3450
Secondary Plant Contact	George Meyer	(215) 647-3450
BCM Contact	(b) (4) [redacted]	(215) 825-3800

Directions to Hospital (Emergency Route)

Paoli Hospital

Depart facility turning onto Route 30 east. Follow Route 30 East approximately 2 to 3 miles. Paoli Hospital is located on the left hand side of Route 30.

BCM

ORIGINAL

ATTACHMENT A

BCM

ATTACHMENT A

MSA ULTRATWIN
INSPECTION CHECKLIST PRIOR TO FIELD USE

1. Exhalation Valve - pull off plastic cover and check valve for debris or for tears in the neoprene valve (which could cause leakage).

2. Inhalation Valves (two) - screw off cartridges and visually inspect neoprene valves for tears. Make sure that the inhalation valves and cartridge receptacle gaskets are in place.

3. Make sure a protective cover lens is attached to the lens.

4. Make sure you have the right cartridge.

5. Make sure that the facepiece harness is not damaged. The serrated portion of the harness can fragment which will prevent proper face seal adjustment.

6. Make sure the speaking diaphragm retainer ring is hand tight.

7. Don the respirator and perform a negative pressure test.

POSITIVE/NEGATIVE FIT TEST PROCEDURES

The respirator must be subjected to the following tightness test before each use:

Test respirator for leakage using a positive pressure method. Lightly place palm over exhalation valve cover. Gently exhale. A slight positive pressure should build up inside the respirator. If any leakage is detected around the facial seal, readjust head harness straps and repeat test until there is no leakage. If other facial seal leakage is detected, the condition must be investigated and corrected before another test is made. A negative pressure test may also be performed on certain types of respirators. Lightly place palms over cartridges or filter holders. Gently inhale and the facepiece should collapse against the face. The respirator must pass the tightness tests before the respirator is used. The respirator will not furnish protection unless all inhaled air is drawn through suitable cartridges or filters.

BCM

ATTACHMENT B

BCM

ATTACHMENT B

PROCEDURE FOR CLEANING AND DISINFECTING RESPIRATORS

1. Remove cartridges (if of the air-purifying type) and put in container provided.

2. Remove regulator of airline respirator.

3. Remove any gross contamination with water and paper towels, taking care not to scratch the plastic lens.

4. Mix 70 ml of concentrated cleaning solution into 3 gallons of water in the bucket provided.

5. Soak respirator in solution for about 10 minutes (remove regulator if airline respirator).

6. Dip respirator into rinse bucket several times.

7. Rinse respirator with copious amounts of fresh water from the eye wash station.

8. Shake excess water from respirator, dry with paper towels, ensure that exhalation valve is clean, dry, and operable, and place into new plastic bag.

BCM

HEALTH AND SAFETY PLAN
APPROVAL/SIGN-OFF FORMAT

I have read, understood, and agree with information set forth in this Health and Safety Plan and discussed in the Personnel Health and Safety

(b) (4)

[redacted]

8-4-89

8-4-89
Date

8-4-89
Date

8-1-89
Date

8/1/89
Date

8/1/89
Date

Date

7/10/89
Date

Date

Date

Personnel Health and Safety Briefing Conducted by:

Name	Signature	Date

BCM

APPENDIX C

FIELD DATA SHEETS

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

DAY 1

Client: CHRISTIANA METALS
Location: FRAZER, PA.
Contact Person:
Sampling Team: BLM + ARH
Reason for Sampling: 1ST ROUND

Date: 8-29-89
Project No.: 6470(0)
Phone No.:
Weather: OVERCAST 80°F

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	pH	Cond.	Temp.	Sampling Time	Sampling Method	Well Yield-Recovery
MW 1	13.25' TO PVC	48'	4"	24 gals	73 gals	HOMELITE PUMP	5.93	95	18°C	11:40	TEFLON BAILER	HNU-NIR CLEAR 10 gpm
MW 4	10.71 TO PVC	20'	4"	6.5 gals	45 gals		6.28	500	18°C	1215		HNU-NIR TAN CLEARS ~6 gpm
MW 5	12.10' TO PVC	20'	4"	5.5 gals	16 gals	PVC BAILER	6.62	4600	19°C	120		HNU .5 ppm OIL SHEEN BLACK, SILTY BAIL DRY 3X
MW 6	16.22' TO PVC	20.5'	4"	3 gals	10 gals	PVC BAILER	6.58	710	17°C	1250		HNU-NIR DARK BROWN SILTY BAIL DRY 3X
MW 7	12.62' TO PVC	20'	4"	5 gals	15 gals		6.83	250	17°C	155		HNU-20 ppm BROWN SILTY BAIL DRY 3X <½ gpm
MW 13	10.32' TO PVC	37'	4"	18.7 gals	40 gals	HOMELITE PUMP	7.34	380	18°C	3:25		TAN CLEARS HNU-18 ppm PUMPED DRY 3X <½ gpm

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client: CHRISTIANA METALS — DAY 2 — Date: 8-29-89
Location: FRAZER, Pa. — Project No.:
Contact Person: — Phone No.:
Sampling Team: BLM & ARH — Weather: OVERCAST 80's
Reason for Sampling: 1ST ROUND

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery
* MW 14A	9.12' TO PVC	17'	4"	5.5 gals	16 gals	PVC BAILER	6.95	430	18°C	3:00	TEFLON BAILER	BROWN SILTY HNU - .0 ppm BAIL DRY 3X
✓ MW 15	ARTESIAN	78'	4"	55 gals	90 gals	HOMELITE PUMP	7.13	610	18°C	3:30	↓	TAN CLEARS SILTY HNU - 9 ppm <1 gpm
MW 16	7.18' TO PVC	21'	4"	9.7 gals	30 gals	PVC BAILER	7.18	380	18°C	4:30	↓	TAN SILTY HNU - 5 ppm <1 gpm

* DUPLICATE TAKEN AT MW-14A, LABELED MW-14B

(Day 2 . (10.0

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client Christiana Metals
Location Malvern Pa.
Contact Person
Sampling Team (b) (4) [redacted]
Reason for Sampling

Date 8/30/89
Project No. 6471-01
Phone No.
Weather Partly Cloudy 80±5 - to Sunny

	Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery	
✓	MW 9	15.45 T.O.S.	63'	6"		275 gallons	Homelite Pump	6.98	450	21°C	13:10	Teflon Bailer	Orangish 15 gpm	no reading on H-Nu
Dupe on this well Marked 8a	MW 8	13.73 TO PVC	20'	4"	4.3 gallons	14 gallons	PVC Bailer	6.91	440	23°C	13:40		Greenish Muddy 1 gpm poor yield	No reading on H-Nu
*	MW 12	8.63 TO PVC	21'	4"	8.6 gallons	25 gallons	PVC Bailer	6.95	500	21°C	14:40		Brown Muddy poor yield	no read. in well
*	MW 11	9.01 TO PVC	16'	4"	4.8 gallons	15 gallons	PVC Bailer	6.98	650	21°C	15:30		Brown Poor yield	no reading in well
	MW 3	6.10 TO PVC	14'	4"	5.5 gallons	17 gallons	PVC Bailer	7.14	400	21°C	16:15		Clear to muddy fair yield	Zeroed H-Nu no reading in well
	MW 2	6.35 TO PVC	21'	4"	10.2 gallons	31 gallons	Homelite Pump	6.88	500	22°C	16:00	Teflon Bailer	Clear 1 gpm	0-20 scale H-Nu read 10

6.99
.7
4.893

7.90
.7
5.510

* H-Nu was picking up whatever they were welding inside building. We could smell it.

MW-12 on 0-20 scale the H-Nu was reading the air around us at 3, when put in well needle went to 4.

MW-11 - on 0-20 scale the H-Nu was reading 2, when well was opened needle jumped to 11 then went down and held between 7 + 8. Purge water

21.00
6.35
14.65
10 [redacted]

(Day 2. y 7.0 + -

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client: Christiana Metals
Location: Malvern Pa.
Contact Person: _____ Phone No. _____
Sampling Team: (b) (4) [redacted]
Reason for Sampling: _____

Date: 8/30/89
Project No.: 6478-01
Weather: Partly cloudy 80's to Sunny

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery	
MW 10	2.52 To PVC	15'	4"	8.7 gallons	110 gallons	Homelite pump	7.01	470	22°C	16:30	Teflon Bailer	muddy to clear 25 gpm	operator no reading purged water reading was 22

12.48
.7
8.736

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client CHRISTIANA METALS
Location FRAZER, PA
Contact Person
Phone No.
Sampling Team (b) (4) [redacted]
Reason for Sampling 2ND ROUND

Date 9-28-89
Project No. 6471-01
Weather SUNNY 70'S

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery
MW 13	13.29' TO PVC	37'	4"	16.6 gal	50 gals	KECK PUMP				1230	DEDICATED TEFLON BAILER	BROWN SILTY FAIR YIELD
MW 14	8.45' TO PVC	17'	4"	6 gals	18 gals	PVC BAILER				1240		CLEAR W/ A TAN TINT PUMPED DRY 3x
MW 15	ARTESIAN TO PVC	78'	4"	55 gals	110 gals	TANAKA PUMP				1350		CLEAR <1 gpm
MW 16	5.55' TO PVC	21'	4"	10.8 gals	33 gals	KECK PUMP				1345		TAN, TURBID CLEARS SOME ~1.5 gpm
MW 10A	2.79' TO PVC	15'	4"	8.5 gals	55 gals	TANAKA PUMP				1422		TAN COLOR CLEAR ~15 gpm
MW 12	10.11' TO PVC	21'	4"	7.6 gals	23 gals	KECK PUMP				1400		TAN, TURBID CLEARS SOME ~1.5 gpm

- DUPLICATED TAKEN AT MW-10A, LABELLED MW-10B
- FIELD BLANK TAKEN BEFORE MW-15 WAS SAMPLED

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client CHRISTIANA METALS
Location FRAZER PA.
Contact Person
Phone No.
Sampling Team (b) (4) [redacted]
Reason for Sampling 2ND ROUND

Date 9/28/89
Project No. 6471-01
Weather SUNNY 70'S

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery
MW 11	8.64' TO PVC	16'	4"	5.2 gals	18 gals	PIC BAILER				1455	DEDICATED TEFLON BAILER	BROWN TURBID FAIR YIELD
MW 2	7.77' TO PVC	21'	4"	9.2 gals	28 gals	TANAKA PUMP				1520	↓	TAN TURBID CLEARS SOME ~1 GPM
MW 3	7.51' TO PVC	14'	4"	4.5 gals	14 gals	PVC BAILER				1540	↓	BROWN TURBID BAILS DRY

BCM

ORIGINAL COPY

APPENDIX D

CHAIN-OF-CUSTODY DOCUMENTATION

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 641147

PROJECT NAME Christian Bros

SAMPLERS.

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	W.M. VOAS								TYPE	FIELD ANALYSES			REMARKS/ ANALYSES
					Empties		14												VOCs by method 602
	7/31/89	5:16		X	Trip Blank		2												
	7/31/89	5:16		X	Field Water Blank		4												
	8/1/89	1405		X	MW-6A-1.5	1	1												"
	8/1/89	1430		X	B-5-1.5	1	1												
	8/1/89	1445		X	B-5-3.5	1	1												
	8/1/89	1450		X	B-5-4.5	1	1												"
	8/1/89	1500		X	B-5-6.5	1	1												"
	8/1/89	1550		X	B-6-1.5	1	1												"
	8/1/89	1620		X	B-6-5.5	1	1												
	8/1/89	1405		X	Field Blank	1	1												"
	7/31/89	—		X	Trip Blank	1	1												"

***NOTE ANY KNOWN OR SUSPECTED HAZARDS* All samples contain high concentrations of TCE + TCA (100% >1000 ppm)

(b) (4) [redacted]

Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)

Date/Time	(Shipping/Receiving) Remarks
8/1/89 1510	Airbill Number:
CUSTODY SEALS INTACT (Y,N,NA)	

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 64

PROJECT NAME: E Christiana Metals

SAMPLERS: (b) (4) [redacted]

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	WM VOA	TYPE	FIELD ANALYSES	REMARKS/ ANALYSES
	8/1/89	1020		X	Trip Blank	1	X			
	8/1/89	1030		X	Field Blank	1	X			

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

(b) (4) [redacted]

Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)

Date/Time	(Shipping/Receiving) Remarks
8/3/89 1830	Airbill Number:

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 6471-07

PROJECT NAME Christiana ~~Brothers~~ FS Mills

SAMPLE: (b) (4) [redacted]

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	4 4 VOAs									TYPE	FIELD ANALYSES				REMARKS/ ANALYSES
					Empties	24	x									S					
	8/1/09	1520		x	Trip Blanks	2	x									S					
	8/1/09	1520		x	Field Blank Water Rinsate	4	x									S					
	8/2/09	1110		x	MW-11-1.5	1	x									S					
	8/2/09	1120		x	MW-11-9.5	1	x									S					
	8/2/09	0825		x	B-7-1.5	1	x									S					
	8/2/09	0855		x	B-7-10.5	1	x									S					
	8/2/09	0855		x	B-7-10.5A	1	x									S					
	8/2/09	0910		x	B-7-13	1	x									S					
	8/3/09	0415		x	MW-12-1.5	1	x									S					
	8/3/09	0445		x	MW-12-7.5	1	x									S					
	8/3/09	0520		x	MW-12-15	1	x									S					
	8/3/09	1445		x	B-9-1.5	1	x									S					
	8/3/09	1455		x	B-9-7.5	1	x									S					
	8/3/09	1455		x	B-9-7.5A	1	x									S					
	8/3/09	1510		x	B-9-10.5	1	x									S					
	8/1/09	1520		x	Trip Blank	1	x									AQ					
	8/2/09	1045		x	Field Blank	1	x									AQ					

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

(b) (4) [redacted]

Relinquished by: (SIGNATURE) | Date/Time | Received by: (SIGNATURE)

Date/Time 8/3/09 1830

CUSTODY SEALS INTACT (Y,N,NA)

(Shipping/Receiving) Remarks

Airbill Number:

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 8544-03

PROJECT NAME GE Morristown

SAMPLERS (b) (4) [redacted]

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Amber Qt (unfixed)	Clear Gl. Qt (fixed w/ H_2SO_4)	Pl Qt (unfixed)	Pl. Pt. (fixed HNO3)	Pl. Pt. (fixed H_2SO_4)	40 ml VOA	40 ml VOA 12 ml	TYPE	FIELD ANALYSES				REMARKS/ ANALYSES
	8/17/89	1630		X	MW-5	9	2	1	1	2	1	2				AQ				Samples contain * free phase #6 oil
	8/17/89	1730		X	MW-7	9	2	1	1	2	1	2				AQ				Samples contain ** free phase #6 oil
	8/17/89	1600		X	Field Blank	5	2	1				2				AQ				
	8/16/89	1400		X	Trip Blank	5	2	1				2				AQ				
	8/17/89	1800		X	Lab QA/QC (MW-7)	9	4	3				2				AQ				
	8/17/89	1530		X	MW-6 - Free Prod	1							1			O				Viscosity sample

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

* the filtered plastic pint sample for MW-5 was not filtered due to free phase, sample is in separate amber qt.
** the filtered plastic pint sample for MW-7 is filtered.

(b) (4) [redacted]

Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)	Date/Time
(b) (4) [redacted]	8/17/89 1900	(b) (4) [redacted]	8-18-89 8:51am

CUSTODY SEALS INTACT (Y,N,NA)

(Shipping/Receiving) Remarks
Airbill Number:

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO.	PROJECT NAME
	Christina Metals

SAMPLERS.

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	WM VOAs	TYPE	FIELD ANALYSES	REMARKS/ ANALYSES
					Empties	16	24			
					[illegible] Blank	1	1			
					[illegible]	2	2			
	8/18/84	1315		X	B-10-1.5	1	1	S		
	8/18/84	1330		X	B-10-6.5	1	1	S		
	8/18/84	1515		X	B-11-1.5	1	1	S		
	8/18/84	1530		X	B-11-6.5	1	1	S		
	8/18/84	1730		X	B-12-4.5	1	1	S		
	8/18/84	1745		X	B-12-6.5	1	1	S		
	8/18/84	1830		X	Field Blank	1	1	S		

***NOTE ANY KNOWN OR SUSPECTED HAZARDS: B-11 & B-12 samples pegged OVA at >1000 ppm (TCE)

(b) (4) [redacted]

Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)

Date/Time	(Shipping/Receiving) Remarks
8/18/84 1440	Airbill Number:

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 6471-CV

PROJECT NAME CHRISTIANA PLUMES

SAMPLERS (b) (4) [redacted]

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOAs	Acid Volatiles	Cyanide	Total Metals	Total Metals - Filtered					TYPE		FIELD ANALYSES pH		Sp.C.	REMARKS/ ANALYSES Temp °C
	8/29/95	11:40		X	MW-1	5	2	1	1	1						AQ	5	8.3		955	18
		11:45			MW-4	5	2	1	1	1							6	7.2		500	12
		12:10			MW-5	5	2	1	1	1							6	6.3		1000	19
		12:40			MW-6	5	2	1	1	1										710	17
					MW-7	5	2	1	1	1										370	17
					MW-8	2	2	-	-	-										280	18
		3:00			MW-9	2	2	-	-	-							6	6.5		430	12
		3:00			MW-10	2	2	-	-	-							6	6.5		430	12
		3:30			MW-13	2	2	-	-	-							7	7.3		610	12
		11:30			MW-16	2	2	-	-	-							7	7.2		540	17
		1130			FIELD BLANK	2	2	-	-	-											
					TRIP BLANK	2	2	-	-	-											

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

(b) (4) [redacted]

Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)

Date/Time	(Shipping/Receiving) Remarks
8/29/95 1:10	Airbill Number:
CUSTODY SEALS INTACT (Y,N,NA)	

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

PROJ NO.	PROJECT NAME
6471-01	Christiana Metals

SAMP[redacted]

KEY
AQ-Aqueous
S-Solid
A-Air
L-Liquid
O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA's Sa-matter	HNO3 PL. PT. filter	H2SO4 PL. PT.	Unfixed PL. PT.					TYPE	FIELD ANALYSES				REMARKS/ ANALYSES
	8/30/89	1600		X	MW-[redacted]2	2	2								AQ					
		1615		X	MW-3	2	2								AQ					
		1340		X	MW-8	5	2	1	1	1					AQ					
		1340		X	MW-8a	5	2	1	1	1					AQ					
		1310		X	MW-9	5	2	1	1	1					AQ					
		1630		X	MW-10	2	2								AQ					
		1530		X	MW-11	2	2								AQ					
	8/30/89	1440		X	MW-12	2	2								AQ					
	8/30/89	—		—	Trip Blank	2	2								AQ					
	8/30/89	1340		—	Field Blank	2	2								AQ					

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

[redacted]

Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)

Date/Time	(Shipping/Receiving) Remarks
8/30/89 1235	Airbill Number:

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

M

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 01 6471-05

PROJECT NAME: CHRISTIANA [illegible]

SAMPLERS (b) (4) [redacted]

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS										TYPE	FIELD ANALYSES				REMARKS/ ANALYSES
	1/27/[illegible]	[illegible]			[illegible]		1														
					[illegible]		4														
					TRIP BLANK		2														
	9/28/[illegible]	[illegible]		X	MW-2	2	2									AQ					
		[illegible]			MW-3	2	2														
		1422			MW-10A	2	2														
		[illegible]			MW-11	2	2														
		1450			MW-12	2	2														
		1230			MW-13	2	2														
		1240			MW-14	2	2														
		1350			MW-15	2	2														
		[illegible]			MW-16	2	2														
		1422			MW-10B	2	2														
		1347			FIELD BLANK	2	2														
					TRIP BLANK		2														

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

Empties	Date/Time	Received by: (SIGNATURE)	Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)
(b) (4) [redacted]					

Date/Time: 1/28/[illegible]

(Shipping/Receiving) Remarks
Airbill Number:

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

APPENDIX E

LABORATORY ANALYTICAL DATA SHEETS

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923863
Location : MW-10A-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0114	mg/kg	
1,3-Dichlorobenzene	< 0.0114	mg/kg	
1,4-Dichlorobenzene	< 0.0114	mg/kg	
Bromoform	< 0.0114	mg/kg	
Carbon Tetrachloride	< 0.0114	mg/kg	
Chlorobenzene	< 0.0114	mg/kg	
Dibromochloromethane	< 0.0114	mg/kg	
Bromodichloromethane	< 0.0114	mg/kg	
Chloroethane	< 0.0114	mg/kg	
Chloroform	< 0.0114	mg/kg	
1,1-Dichloroethane	< 0.0114	mg/kg	
1,2-Dichloroethane	< 0.0114	mg/kg	
1,1-Dichloroethene	< 0.0114	mg/kg	
1,2-Dichloropropane	< 0.0114	mg/kg	
Cis-1,3-Dichloropropene	< 0.0114	mg/kg	
Trans-1,3-Dichloropropene	< 0.0114	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0114	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0114	mg/kg	
Methylene Chloride	< 0.0114	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0114	mg/kg	
Tetrachloroethene (PCE)	< 0.0114	mg/kg	
Trans-1,2-Dichloroethene	< 0.0114	mg/kg	
1,1,1-Trichloroethane	< 0.0114	mg/kg	
1,1,2-Trichloroethane	< 0.0114	mg/kg	
Trichloroethene (TCE)	< 0.0114	mg/kg	
Trichlorofluoromethane	< 0.0114	mg/kg	
Vinyl Chloride	< 0.0114	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	88.1	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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FINAL REPORT

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923863
Location : MW-10A-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923864
Location : B-5-1..5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/18/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0141	mg/kg	
1,3-Dichlorobenzene	< 0.0141	mg/kg	
1,4-Dichlorobenzene	< 0.0141	mg/kg	
Bromoform	<. 0.0141	mg/kg	
Carbon Tetrachloride	< 0.0141	mg/kg	
Chlorobenzene	< 0.0141	mg/kg	
Dibromochloromethane	< 0.0141	mg/kg	
Bromodichloromethane	< 0.0141	mg/kg	
Chloroethane	< 0.0141	mg/kg	
Chloroform	< 0.0141	mg/kg	
1,1-Dichloroethane	< 0.0141	mg/kg	
1,2-Dichloroethane	< 0.0141	mg/kg	
1,1-Dichloroethene	> 0.2	mg/kg	
1,2-Dichloropropane	< 0.0141	mg/kg	
Cis-1,3-Dichloropropene	< 0.0141	mg/kg	
Trans-1,3-Dichloropropene	< 0.0141	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0141	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0141	mg/kg	
Methylene Chloride	< 0.0141	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0141	mg/kg	
Tetrachloroethene (PCE)	< 0.0141	mg/kg	
Trans-1,2-Dichloroethene	< 0.0141	mg/kg	
1,1,1-Trichloroethane	< 0.0141	mg/kg	
1,1,2-Trichloroethane	< 0.0141	mg/kg	
Trichloroethene (TCE)	> 2	mg/kg	
Trichlorofluoromethane	< 0.0141	mg/kg	
Vinyl Chloride	< 0.0141	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	70.7	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4)
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923864
Location : B-5-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE OF CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923865
Location : B-5-3.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.116	mg/kg	
1,3-Dichlorobenzene	< 0.116	mg/kg	
1,4-Dichlorobenzene	< 0.116	mg/kg	
Bromoform	< 0.116	mg/kg	
Carbon Tetrachloride	< 0.116	mg/kg	
Chlorobenzene	< 0.116	mg/kg	
Dibromochloromethane	< 0.116	mg/kg	
Bromodichloromethane	> 4	mg/kg	
Chloroethane	< 0.116	mg/kg	
Chloroform	< 0.116	mg/kg	
1,1-Dichloroethane	> 1	mg/kg	
1,2-Dichloroethane	< 0.116	mg/kg	
1,1-Dichloroethene	> 20	mg/kg	
1,2-Dichloropropane	< 0.116	mg/kg	
Cis-1,3-Dichloropropene	< 0.116	mg/kg	
Trans-1,3-Dichloropropene	< 0.116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.116	mg/kg	
Methylene Chloride	> 0.5	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.116	mg/kg	
Tetrachloroethene (PCE)	< 0.116	mg/kg	
Trans-1,2-Dichloroethene	< 0.116	mg/kg	
1,1,1-Trichloroethane	> 40	mg/kg	
1,1,2-Trichloroethane	< 0.116	mg/kg	
Trichloroethene (TCE)	> 20	mg/kg	
Trichlorofluoromethane	< 0.116	mg/kg	
Vinyl Chloride	< 0.116	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	86.0	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923865
Location : B-5-3.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923866
Location : B-5-4.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.116	mg/kg	
1,3-Dichlorobenzene	< 0.116	mg/kg	
1,4-Dichlorobenzene	< 0.116	mg/kg	
Bromoform	< 0.116	mg/kg	
Carbon Tetrachloride	< 0.116	mg/kg	
Chlorobenzene	< 0.116	mg/kg	
Dibromochloromethane	< 0.116	mg/kg	
Bromodichloromethane	> 0.1	mg/kg	
Chloroethane	< 0.116	mg/kg	
Chloroform	< 0.116	mg/kg	
1,1-Dichloroethane	> 1	mg/kg	
1,2-Dichloroethane	> 0.116	mg/kg	
1,1-Dichloroethene	> 20	mg/kg	
1,2-Dichloropropane	< 0.116	mg/kg	
Cis-1,3-Dichloropropene	< 0.116	mg/kg	
Trans-1,3-Dichloropropene	< 0.116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.116	mg/kg	
Methylene Chloride	> 1	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.116	mg/kg	
Tetrachloroethene (PCE)	< 0.116	mg/kg	
Trans-1,2-Dichloroethene	< 0.116	mg/kg	
1,1,1-Trichloroethane	> 50	mg/kg	
1,1,2-Trichloroethane	< 0.116	mg/kg	
Trichloroethene (TCE)	> 10	mg/kg	
Trichlorofluoromethane	< 0.116	mg/kg	
Vinyl Chloride	< 0.116	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	86.5	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923866
Location : B-5-4.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE OF CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923867
Location : B-5-6.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.116	mg/kg	
1,3-Dichlorobenzene	< 0.116	mg/kg	
1,4-Dichlorobenzene	< 0.116	mg/kg	
Bromoform	< 0.116	mg/kg	
Carbon Tetrachloride	< 0.116	mg/kg	
Chlorobenzene	< 0.116	mg/kg	
Dibromochloromethane	< 0.116	mg/kg	
Bromodichloromethane	> 0.5	mg/kg	
Chloroethane	< 0.116	mg/kg	
Chloroform	< 0.116	mg/kg	
1,1-Dichloroethane	> 1	mg/kg	
1,2-Dichloroethane	< 0.116	mg/kg	
1,1-Dichloroethene	> 3	mg/kg	
1,2-Dichloropropane	< 0.116	mg/kg	
Cis-1,3-Dichloropropene	< 0.116	mg/kg	
Trans-1,3-Dichloropropene	< 0.116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.116	mg/kg	
Methylene Chloride	> 0.1	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.116	mg/kg	
Tetrachloroethene (PCE)	< 0.116	mg/kg	
Trans-1,2-Dichloroethene	< 0.116	mg/kg	
1,1,1-Trichloroethane	> 4	mg/kg	
1,1,2-Trichloroethane	< 0.116	mg/kg	
Trichloroethene (TCE)	> 8	mg/kg	
Trichlorofluoromethane	< 0.116	mg/kg	
Vinyl Chloride	< 0.116	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.3	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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FINAL REPORT

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The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923867
Location : B-5-6.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE OF CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923868
Location : B-6-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.115	mg/kg	
1,3-Dichlorobenzene	< 0.115	mg/kg	
1,4-Dichlorobenzene	< 0.115	mg/kg	
Bromoform	< 0.115	mg/kg	
Carbon Tetrachloride	< 0.115	mg/kg	
Chlorobenzene	< 0.115	mg/kg	
Dibromochloromethane	< 0.115	mg/kg	
Bromodichloromethane	< 0.115	mg/kg	
Chloroethane	< 0.115	mg/kg	
Chloroform	< 0.115	mg/kg	
1,1-Dichloroethane	> 3	mg/kg	
1,2-Dichloroethane	< 0.115	mg/kg	
1,1-Dichloroethene	> 10	mg/kg	
1,2-Dichloropropane	< 0.115	mg/kg	
Cis-1,3-Dichloropropene	< 0.115	mg/kg	
Trans-1,3-Dichloropropene	< 0.115	mg/kg	
Bromomethane (Methyl Bromide)	< 0.115	mg/kg	
Chloromethane (Methyl Chloride)	< 0.115	mg/kg	
Methylene Chloride	> 0.2	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.115	mg/kg	
Tetrachloroethene (PCE)	< 0.115	mg/kg	
Trans-1,2-Dichloroethene	< 0.115	mg/kg	
1,1,1-Trichloroethane	> 5	mg/kg	
1,1,2-Trichloroethane	< 0.115	mg/kg	
Trichloroethene (TCE)	> 10	mg/kg	
Trichlorofluoromethane	< 0.115	mg/kg	
Vinyl Chloride	< 0.115	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.8	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO
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PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

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The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923868
Location : B-6-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE OF CALIBRATION CURVE.

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FINAL REPORT

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923869
Location : B-6-5.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.118	mg/kg	
1,3-Dichlorobenzene	< 0.118	mg/kg	
1,4-Dichlorobenzene	< 0.118	mg/kg	
Bromoform	< 0.118	mg/kg	
Carbon Tetrachloride	< 0.118	mg/kg	
Chlorobenzene	< 0.118	mg/kg	
Dibromochloromethane	< 0.118	mg/kg	
Bromodichloromethane	< 0.118	mg/kg	
Chloroethane	< 0.118	mg/kg	
Chloroform	< 0.118	mg/kg	
1,1-Dichloroethane	> 0.7	mg/kg	
1,2-Dichloroethane	< 0.118	mg/kg	
1,1-Dichloroethene	> 10	mg/kg	
1,2-Dichloropropane	< 0.118	mg/kg	
Cis-1,3-Dichloropropene	< 0.118	mg/kg	
Trans-1,3-Dichloropropene	< 0.118	mg/kg	
Bromomethane (Methyl Bromide)	< 0.118	mg/kg	
Chloromethane (Methyl Chloride)	< 0.118	mg/kg	
Methylene Chloride	> 0.1	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.118	mg/kg	
Tetrachloroethene (PCE)	< 0.118	mg/kg	
Trans-1,2-Dichloroethene	< 0.118	mg/kg	
1,1,1-Trichloroethane	> 5	mg/kg	
1,1,2-Trichloroethane	< 0.118	mg/kg	
Trichloroethene (TCE)	> 10	mg/kg	
Trichlorofluoromethane	< 0.118	mg/kg	
Vinyl Chloride	< 0.118	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	84.8	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923869
Location : B-6-5.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREA OUTSIDE OF CALIBRATION CURVE.

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FINAL REPORT

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923870
Location : TRIP BLANK
Client ID :

Date Sampled : 07/31/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/14/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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ORIGINAL (Red)

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923871
Location : FIELD BLANK
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	5.6	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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ORIGINAL (Red)

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923871
Location : FIELD BLANK
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

(b) (4) [redacted]

Certified by : [redacted]

BCM Laboratory Director

Lab Certifications:

PA - 46-007
AL - 40300
NJ - 77175
MD - 136
EPA BULK ASBESTOS QC - 3339

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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ORIGINAL (Red)

FINAL REPORT PAGE 1
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[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

BCM Number 924150
Location MW-11-1 3
Client ID

Date Sampled 08/02/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J([redacted] on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0116	mg/kg	
1,3-Dichlorobenzene	< 0.0116	mg/kg	
1,4-Dichlorobenzene	< 0.0116	mg/kg	
Bromoform	< 0.0116	mg/kg	
Carbon Tetrachloride	< 0.0116	mg/kg	
Chlorobenzene	< 0.0116	mg/kg	
Dibromochloromethane	< 0.0116	mg/kg	
Bromodichloromethane	< 0.0116	mg/kg	
Chloroethane	< 0.0116	mg/kg	
Chloroform	< 0.0116	mg/kg	
1,1-Dichloroethane	< 0.0116	mg/kg	
1,2-Dichloroethane	< 0.0116	mg/kg	
1,1-Dichloroethene	< 0.0116	mg/kg	
1,2-Dichloropropane	< 0.0116	mg/kg	
Cis-1,3-Dichloropropene	< 0.0116	mg/kg	
Trans-1,3-Dichloropropene	< 0.0116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0116	mg/kg	
Methylene Chloride	0.0301	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0116	mg/kg	
Tetrachloroethene (PCE)	< 0.0116	mg/kg	
Trans-1,2-Dichloroethene	< 0.0116	mg/kg	
1,1,1-Trichloroethane	< 0.0116	mg/kg	
1,1,2-Trichloroethane	< 0.0116	mg/kg	
Trichloroethene (TCE)	< 0.0116	mg/kg	
Trichlorofluoromethane	< 0.0116	mg/kg	
Vinyl Chloride	< 0.0116	mg/kg	
Solids, Total (4) by (b) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.5	%	

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215-825-3800

FINAL REPORT

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[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MAIL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924150
Location : MW-11-1.5
Client ID :

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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FINAL REPORT

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[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number 924151
Location : MW-11-9 S
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by ([redacted] on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0117	mg/kg	
1,3-Dichlorobenzene	< 0.0117	mg/kg	
1,4-Dichlorobenzene	< 0.0117	mg/kg	
Bromoform	< 0.0117	mg/kg	
Carbon Tetrachloride	< 0.0117	mg/kg	
Chlorobenzene	< 0.0117	mg/kg	
Dibromochloromethane	< 0.0117	mg/kg	
Bromodichloromethane	< 0.0117	mg/kg	
Chloroethane	< 0.0117	mg/kg	
Chloroform	< 0.0117	mg/kg	
1,1-Dichloroethane	< 0.0117	mg/kg	
1,2-Dichloroethane	< 0.0117	mg/kg	
1,1-Dichloroethene	< 0.0117	mg/kg	
1,2-Dichloropropane	< 0.0117	mg/kg	
Cis-1,3-Dichloropropene	< 0.0117	mg/kg	
Trans-1,3-Dichloropropene	< 0.0117	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0117	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0117	mg/kg	
Methylene Chloride	0.0281	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0117	mg/kg	
Tetrachloroethene (PCE)	< 0.0117	mg/kg	
Trans-1,2-Dichloroethene	< 0.0117	mg/kg	
1,1,1-Trichloroethane	< 0.0117	mg/kg	
1,1,2-Trichloroethane	< 0.0117	mg/kg	
Trichloroethene (TCE)	0.0223	mg/kg	
Trichlorofluoromethane	< 0.0117	mg/kg	
Vinyl Chloride	< 0.0117	mg/kg	
Solids, Total (%) by ([redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	85.3	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P O.# :
Order# : 29266

BCM Number 924151
Location HW-11-9.5
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924152
Location : 3-7-1 5
Client ID :

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0116	mg/kg	
1,3-Dichlorobenzene	< 0.0116	mg/kg	
1,4-Dichlorobenzene	< 0.0116	mg/kg	
Bromoform	< 0.0116	mg/kg	
Carbon Tetrachloride	< 0.0116	mg/kg	
Chlorobenzene	< 0.0116	mg/kg	
Dibromochloromethane	< 0.0116	mg/kg	
Bromodichloromethane	< 0.0116	mg/kg	
Chloroethane	< 0.0116	mg/kg	
Chloroform	< 0.0116	mg/kg	
1,1-Dichloroethane	< 0.0116	mg/kg	
1,2-Dichloroethane	< 0.0116	mg/kg	
1,1-Dichloroethene	< 0.0116	mg/kg	
1,2-Dichloropropane	< 0.0116	mg/kg	
Cis-1,3-Dichloropropene	< 0.0116	mg/kg	
Trans-1,3-Dichloropropene	< 0.0116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0116	mg/kg	
Methylene Chloride	0.0337	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0116	mg/kg	
Tetrachloroethene (PCE)	< 0.0116	mg/kg	
Trans-1,2-Dichloroethene	< 0.0116	mg/kg	
1,1,1-Trichloroethane	< 0.0116	mg/kg	
1,1,2-Trichloroethane	< 0.0116	mg/kg	
Trichloroethene (TCE)	< 0.0116	mg/kg	
Trichlorofluoromethane	< 0.0116	mg/kg	
Vinyl Chloride	< 0.0116	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.1	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted] R
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924152
Location : 8-7-1 5
Client ID :

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
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215-825-3800

FINAL REPORT

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The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 024153
Location : B-7-10.5
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0119	mg/kg	
1,3-Dichlorobenzene	< 0.0119	mg/kg	
1,4-Dichlorobenzene	< 0.0119	mg/kg	
Bromoform	< 0.0119	mg/kg	
Carbon Tetrachloride	< 0.0119	mg/kg	
Chlorobenzene	< 0.0119	mg/kg	
Dibromochloromethane	< 0.0119	mg/kg	
Bromodichloromethane	< 0.0119	mg/kg	
Chloroethane	< 0.0119	mg/kg	
Chloroform	< 0.0119	mg/kg	
1,1-Dichloroethane	< 0.0119	mg/kg	
1,2-Dichloroethane	< 0.0119	mg/kg	
1,1-Dichloroethene	0.0705	mg/kg	
1,2-Dichloropropane	< 0.0119	mg/kg	
Cis-1,3-Dichloropropene	< 0.0119	mg/kg	
Trans-1,3-Dichloropropene	< 0.0119	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0119	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0119	mg/kg	
Methylene Chloride	0.0311	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0119	mg/kg	
Tetrachloroethene (PCE)	< 0.0119	mg/kg	
Trans-1,2-Dichloroethene	< 0.0119	mg/kg	
1,1,1-Trichloroethane	< 0.0119	mg/kg	
1,1,2-Trichloroethane	< 0.0119	mg/kg	
Trichloroethene (TCE)	< 0.0119	mg/kg	
Trichlorofluoromethane	< 0.0119	mg/kg	
Vinyl Chloride	< 0.0119	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	83.7	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN (b) (4) [redacted]
BCM MALL
00-6471-07

Date : 08/16/89
BCM # : 00-6471-07
P.O.#
Order# : 29266

BCM Number 924153
Location 8-7-10.5
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler ES

Lab Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MAIL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.#
Order# : 29266

BCM Number 924154
Location : B-7-10.5A
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by ([redacted] on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0117	mg/kg	
1,3-Dichlorobenzene	< 0.0117	mg/kg	
1,4-Dichlorobenzene	< 0.0117	mg/kg	
Bromoform	< 0.0117	mg/kg	
Carbon Tetrachloride	< 0.0117	mg/kg	
Chlorobenzene	< 0.0117	mg/kg	
Dibromochloromethane	< 0.0117	mg/kg	
Bromodichloromethane	< 0.0117	mg/kg	
Chloroethane	< 0.0117	mg/kg	
Chloroform	< 0.0117	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0117	mg/kg	
1,1-Dichloroethane	< 0.0117	mg/kg	
1,1-Dichloroethene	0.0420	mg/kg	
1,2-Dichloropropane	0.0117	mg/kg	
Cis-1,3-Dichloropropene	< 0.0117	mg/kg	
Trans-1,3-Dichloropropene	< 0.0117	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0117	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0117	mg/kg	
Methylene Chloride	0.0350	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0117	mg/kg	
Tetrachloroethene (PCE)	< 0.0117	mg/kg	
Trans-1,2-Dichloroethene	< 0.0117	mg/kg	
1,1,1-Trichloroethane	< 0.0117	mg/kg	
1,1,2-Trichloroethane	< 0.0117	mg/kg	
Trichloroethene (TCE)	0.219	mg/kg	
Trichlorofluoromethane	< 0.0117	mg/kg	
Vinyl Chloride	< 0.0117	mg/kg	
Solids, Total (%) by (b) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	85.7	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

BCM Number 924154
Location 8-7-10.5A
Client ID

Date Sampled 08/02/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Comment All applicable results for this sample reported on dry weight basis			

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[redacted] CLIENT [redacted]

CHRISTIANA [redacted] CORP
ATTN. [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.#
Order# : 29266

ECM Number 924155
Location 8-7-13
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by [redacted] on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0134	mg/kg	
1,3-Dichlorobenzene	< 0.0134	mg/kg	
1,4-Dichlorobenzene	< 0.0134	mg/kg	
Bromoform	< 0.0134	mg/kg	
Carbon Tetrachloride	< 0.0134	mg/kg	
Chlorobenzene	< 0.0134	mg/kg	
Dibromochloromethane	< 0.0134	mg/kg	
Bromodichloromethane	< 0.0134	mg/kg	
Chloroethane	< 0.0134	mg/kg	
Chloroform	0.382	mg/kg	
1,1-Dichloroethane	< 0.0134	mg/kg	
1,2-Dichloroethane	< 0.0134	mg/kg	
1,1-Dichloroethene	0.0461	mg/kg	
1,2-Dichloropropane	< 0.0134	mg/kg	
Cis-1,3-Dichloropropene	< 0.0134	mg/kg	
Trans-1,3-Dichloropropene	< 0.0134	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0134	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0134	mg/kg	
Methylene Chloride	< 0.0134	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0134	mg/kg	
Tetrachloroethene (PCE)	< 0.0134	mg/kg	
Trans-1,2-Dichloroethene	< 0.0134	mg/kg	
1,1,1-Trichloroethane	0.728	mg/kg	
1,1,2-Trichloroethane	< 0.0134	mg/kg	
Trichloroethene (TCE)	0.781	mg/kg	
Trichlorofluoromethane	< 0.0134	mg/kg	
Vinyl Chloride	< 0.0134	mg/kg	
Solids, Total (%) by [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	74.9	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN [redacted]
BCM WALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 024155
Location : H-T-13
Client ID :

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

BCM Number 324150
Location MW-12-1 5
Client ID

Date Sampled 08/03/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Volatile Halocarbons by (b) (4) [redacted] on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0115	mg/kg	
1,3-Dichlorobenzene	< 0.0115	mg/kg	
1,4-Dichlorobenzene	< 0.0115	mg/kg	
Bromoform	< 0.0115	mg/kg	
Carbon Tetrachloride	< 0.0115	mg/kg	
Chlorobenzene	< 0.0115	mg/kg	
Dibromochloromethane	< 0.0115	mg/kg	
Bromodichloromethane	< 0.0115	mg/kg	
Chloroethane	< 0.0115	mg/kg	
Chloroform	< 0.0115	mg/kg	
1,1-Dichloroethane	< 0.0115	mg/kg	
1,2-Dichloroethane	< 0.0115	mg/kg	
1,1-Dichloroethene	< 0.0115	mg/kg	
1,2-Dichloropropane	< 0.0115	mg/kg	
cis-1,3-Dichloropropene	< 0.0115	mg/kg	
trans-1,3-Dichloropropene	< 0.0115	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0115	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0115	mg/kg	
Methylene Chloride	< 0.0115	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0115	mg/kg	
Tetrachloroethene (PCE)	< 0.0115	mg/kg	
trans-1,2-Dichloroethene	< 0.0115	mg/kg	
1,1,1-Trichloroethane	< 0.0115	mg/kg	
1,1,2-Trichloroethane	< 0.0115	mg/kg	
Trichloroethene (TCE)	< 0.0115	mg/kg	
Trichlorofluoromethane	< 0.0115	mg/kg	
Vinyl Chloride	< 0.0115	mg/kg	
Solids, Total % by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	87.1	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
CO-6471-01

Date : 08/16/89
BCM # CO-6471-07
P O # :
Order# : 29266

BCM Number 924156
Location MW-12-1.5
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on DRY weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

BCM Number 024157
Location MW-12-7.5
Client ID

Date Sampled 08/03/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Volatile Halocarbons by (b) (4) [redacted] on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0124	mg/kg	
1,3-Dichlorobenzene	< 0.0124	mg/kg	
1,4-Dichlorobenzene	< 0.0124	mg/kg	
Bromoform	< 0.0124	mg/kg	
Carbon Tetrachloride	< 0.0124	mg/kg	
Chlorobenzene	< 0.0124	mg/kg	
Dibromochloromethane	< 0.0124	mg/kg	
Bromodichloromethane	< 0.0124	mg/kg	
Chloroethane	< 0.0124	mg/kg	
Chloroform	< 0.0124	mg/kg	
1,1-Dichloroethane	< 0.0124	mg/kg	
1,2-Dichloroethane	< 0.0124	mg/kg	
1,1-Dichloroethene	< 0.0124	mg/kg	
1,2-Dichloropropane	< 0.0124	mg/kg	
1,2,3-Trichlorobromopropane	< 0.0124	mg/kg	
1,2,3-Trichloropropane	< 0.0124	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0124	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0124	mg/kg	
Methylene Chloride	< 0.0124	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0124	mg/kg	
Tetrachloroethene (PCE)	< 0.0124	mg/kg	
Trans-1,2-Dichloroethene	< 0.0124	mg/kg	
1,1,1-Trichloroethane	< 0.0124	mg/kg	
1,1,2-Trichloroethane	< 0.0124	mg/kg	
Trichloroethene (TCE)	0.0136	mg/kg	
Trichlorofluoromethane	< 0.0124	mg/kg	
Vinyl Chloride	< 0.0124	mg/kg	
Solids, Total % by (b) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	80.6	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MAIL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O #
Order# : 29266

BCM Number 924157
Location MW-16-7 S
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment All applicable results for this sample reported on dry weight basis			

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[redacted] CLIENT [redacted]

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
20-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

BCM Number 924158
Location MW-12-15
Client ID

Date Sampled 08/03/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0158	mg/kg	
1,3-Dichlorobenzene	< 0.0158	mg/kg	
1,4-Dichlorobenzene	< 0.0158	mg/kg	
Bromoform	< 0.0158	mg/kg	
Carbon Tetrachloride	< 0.0158	mg/kg	
Chlorobenzene	< 0.0158	mg/kg	
Dibromochloromethane	< 0.0158	mg/kg	
Bromodichloromethane	< 0.0158	mg/kg	
Chloroethane	< 0.0158	mg/kg	
Chloroform	0.0237	mg/kg	
1,1-Dichloroethane	< 0.0158	mg/kg	
1,2-Dichloroethane	0.0158	mg/kg	
1,1-Dichloroethene	< 0.0158	mg/kg	
1,2-Dichloropropane	0.0158	mg/kg	
1,3-1,3-Dichloropropene	< 0.0158	mg/kg	
Trans 1,3-Dichloropropene	< 0.0158	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0158	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0158	mg/kg	
Methylene Chloride	< 0.0158	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0158	mg/kg	
Tetrachloroethene (PCE)	< 0.0158	mg/kg	
Trans 1,2-Dichloroethane	< 0.0158	mg/kg	
1,1,1-Trichloroethane	0.117	mg/kg	
1,1,2-Trichloroethane	< 0.0158	mg/kg	
Trichloroethene (TCE)	0.758	mg/kg	
Trichlorofluoromethane	< 0.0158	mg/kg	
Vinyl Chloride	< 0.0158	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	53.3	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924158
Location : W-12-15
Client ID :

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported in dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MAIL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P C #
Order# : 29266

BCM Number 924159
Location [illegible]
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0118	mg/kg	
1,3-Dichlorobenzene	< 0.0118	mg/kg	
1,4-Dichlorobenzene	< 0.0118	mg/kg	
Bromoform	< 0.0118	mg/kg	
Carbon Tetrachloride	< 0.0118	mg/kg	
Chlorobenzene	< 0.0118	mg/kg	
Dibromochloromethane	< 0.0118	mg/kg	
Bromodichloromethane	< 0.0118	mg/kg	
Chloroethane	< 0.0118	mg/kg	
Chloroform	< 0.0118	mg/kg	
1,1-Dichloroethane	0.0118	mg/kg	
1,2-Dichloroethane	< 0.0118	mg/kg	
1,1-Dichloroethene	< 0.0118	mg/kg	
1,2-Dichloropropane	< 0.0118	mg/kg	
Cis-1,3-Dichloropropene	< 0.0118	mg/kg	
Trans-1,3-Dichloropropene	< 0.0118	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0118	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0118	mg/kg	
Methylene Chloride	< 0.0118	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0118	mg/kg	
Tetrachloroethene (PCE)	< 0.0118	mg/kg	
Trans-1,2-Dichloroethene	0.0362	mg/kg	
1,1,1-Trichloroethane	< 0.0118	mg/kg	
1,1,2-Trichloroethane	< 0.0118	mg/kg	
Trichloroethene (TCE)	0.0225	mg/kg	
Trichlorofluoromethane	< 0.0118	mg/kg	
Vinyl Chloride	0.0118	mg/kg	
Solids, Total (%) by [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	84.6	%	

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BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MAIL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O. #
Order# : 29266

BCM Number 024159
Location [illegible]
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

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[illegible] have been checked and authorized for release

CLIENT

CHRISTIANA METALS CORP
ATTN (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 024160
Location : 8-9-7 5
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	0.0117	mg/kg	
1,3-Dichlorobenzene	< 0.0117	mg/kg	
1,4-Dichlorobenzene	< 0.0117	mg/kg	
Bromoform	< 0.0117	mg/kg	
Carbon Tetrachloride	< 0.0117	mg/kg	
Chlorobenzene	< 0.0117	mg/kg	
Dibromochloromethane	< 0.0117	mg/kg	
Bromodichloromethane	< 0.0117	mg/kg	
Chloroethane	0.0117	mg/kg	
Chloroform	0.0117	mg/kg	
1,1-Dichloroethane	< 0.0117	mg/kg	
1,2-Dichloroethane	< 0.0117	mg/kg	
1,1-Dichloroethene	< 0.0117	mg/kg	
1,2-Dichloropropane	0.0117	mg/kg	
Cis-1,3-Dichloropropene	< 0.0117	mg/kg	
Trans-1,3-Dichloropropene	< 0.0117	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0117	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0117	mg/kg	
Methylene Chloride	< 0.0117	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0117	mg/kg	
Tetrachloroethene (PCE)	< 0.0117	mg/kg	
Trans-1,2-Dichloroethene	0.0653	mg/kg	
1,1,1-Trichloroethane	< 0.0117	mg/kg	
1,1,2-Trichloroethane	< 0.0117	mg/kg	
Trichloroethene (TCE)	0.0117	mg/kg	
Trichlorofluoromethane	< 0.0117	mg/kg	
Vinyl Chloride	< 0.0117	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	35.7	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

BCM Number 24160
Location [illegible]
Client ID

Date Sampled 08/03/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

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[redacted] CLIENT

CHRISTIAN [redacted] (b) (4) CORP
ATTN: JAN [redacted]
BCM MALL [redacted]
00-6471-[redacted]

Date 08/16/89
BCM # 00-6471-07
P.O. #
Order# 29266

Job Number 924161
Location [illegible]
Client ID

Date Sampled 08/03/89
Date Received 08/03/89
Sampler ES

[illegible]	Results	Units	Test Method
[illegible] (b) (4) [redacted] on 08/07/89			EPA # 8010
1-Dichlorobenzene	< 0.0115	mg/kg	
3-Dichlorobenzene	< 0.0115	mg/kg	
4-Dichlorobenzene	< 0.0115	mg/kg	
Bromoform	< 0.0115	mg/kg	
Carbon Tetrachloride	< 0.0115	mg/kg	
Chlorobenzene	< 0.0115	mg/kg	
Dibromochloromethane	< 0.0115	mg/kg	
Bromodichloromethane	< 0.0115	mg/kg	
Chloroethane	< 0.0115	mg/kg	
Chloroform	< 0.0115	mg/kg	
1,1-Dichloroethane	< 0.0115	mg/kg	
1,2-Dichloroethane	< 0.0115	mg/kg	
1,1-Dichloroethene	< 0.0115	mg/kg	
1,2-Dichloropropane	< 0.0115	mg/kg	
1,3-1,4-Dichloropropene	< 0.0115	mg/kg	
Trans-1,3-Dichloropropene	< 0.0115	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0115	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0115	mg/kg	
Methylene Chloride	< 0.0115	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0115	mg/kg	
Tetrachloroethene (PCE)	< 0.0115	mg/kg	
Trans-1,2-Dichloroethene	0.220	mg/kg	
1,1,1-Trichloroethane	< 0.0115	mg/kg	
1,1,2-Trichloroethane	< 0.0115	mg/kg	
Trichloroethene (TCE)	0.0311	mg/kg	
Trichlorofluoromethane	< 0.0115	mg/kg	
Vinyl Chloride	< 0.0115	mg/kg	
Solids, Total (4) by [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.6	%	

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[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MAIL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.#
Order# : 29266

BCM Number : 024161
Location : B-9-7 CA
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

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CHRISTIANA METALS CORP
(b) (4) [redacted]

Date : 08/16/89
BCM # : 00-6471-07
P.O.#
Order# : 29266

BCM Number : 924162
Location : 8-9-10.5
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/09/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0121	mg/kg	
1,3-Dichlorobenzene	< 0.0121	mg/kg	
1,4-Dichlorobenzene	< 0.0121	mg/kg	
Bromoform	< 0.0121	mg/kg	
Carbon Tetrachloride	< 0.0121	mg/kg	
Chlorobenzene	< 0.0121	mg/kg	
Dibromochloromethane	< 0.0121	mg/kg	
Bromodichloromethane	< 0.0121	mg/kg	
Chloroethane	< 0.0121	mg/kg	
Chloroform	0.0703	mg/kg	
1,1-Dichloroethane	< 0.0121	mg/kg	
1,2-Dichloroethane	< 0.0121	mg/kg	
1,1-Dichloroethene	< 0.0121	mg/kg	
1,2-Dichloropropane	< 0.0121	mg/kg	
Cis-1,3-Dichloropropene	< 0.0121	mg/kg	
Trans-1,3-Dichloropropene	< 0.0121	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0121	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0121	mg/kg	
Methylene Chloride	0.0157	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0121	mg/kg	
Tetrachloroethene (PCE)	< 0.0121	mg/kg	
Trans-1,2-Dichloroethene	0.0182	mg/kg	
1,1,1-Trichloroethane	< 0.0121	mg/kg	
1,1,2-Trichloroethane	< 0.0121	mg/kg	
Trichloroethene (TCE)	0.0702	mg/kg	
Trichloro-fluoromethane	< 0.0121	mg/kg	
Vinyl Chloride	< 0.0121	mg/kg	
Solids, Total (4) by (b) (4) [redacted] on 08/14/89			Std Mtd. 209F
Total Solids	82.6	%	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
SCM # : 00-6471-07
P.O.#
Order# : 29266

BCM Number : 024162
Location : 8-9-10 5
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported in dry weight basis			

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CHRISTIANA METALS CORP
[redacted] (b) (4)
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

Lab Number 924103
Location TRIP BLANK
Client ID

Date Sampled : 08/01/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Volatile Halocarbons by [redacted] (b) (4) on 08/04/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	2.1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CHRISTIANA METALS CORP
[redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# : 29266

BCM Number 934164
Location : FIELD BLANK
Client ID :

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. [redacted] on 08/07/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

(b) (4)

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CHRISTIANA METALS CORP
ATTN (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number 924165
Location FIELD BLANK
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/07/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
SCM MALL
00-6471-01

Date : 08/16/89
SCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number 924165
Location : FIELD BLANK
Client ID :

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method

(b) (4) [redacted]

Certified By [redacted]
BCM Laboratory Director

Lab Certifications:

PA - 46-007 NJ - 77175 EPA BULK ASBESTOS QC - 3339
AL - 40300 MD - 136

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926125
Location : B-10-1.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0117	mg/kg	
1,3-Dichlorobenzene	< 0.0117	mg/kg	
1,4-Dichlorobenzene	< 0.0117	mg/kg	
Bromoform	< 0.0117	mg/kg	
Carbon Tetrachloride	< 0.0117	mg/kg	
Chlorobenzene	< 0.0117	mg/kg	
Dibromochloromethane	< 0.0117	mg/kg	
Bromodichloromethane	< 0.0117	mg/kg	
Chloroethane	< 0.0117	mg/kg	
Chloroform	< 0.0117	mg/kg	
1,1-Dichloroethane	< 0.0117	mg/kg	
1,2-Dichloroethane	< 0.0117	mg/kg	
1,1-Dichloroethene	< 0.0117	mg/kg	
1,2-Dichloropropane	< 0.0117	mg/kg	
Cis-1,3-Dichloropropene	< 0.0117	mg/kg	
Trans-1,3-Dichloropropene	< 0.0117	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0117	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0117	mg/kg	
Methylene Chloride	< 0.0117	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0117	mg/kg	
Tetrachloroethene (PCE)	< 0.0117	mg/kg	
Trans-1,2-Dichloroethene	< 0.0117	mg/kg	
1,1,1-Trichloroethane	< 0.0117	mg/kg	
1,1,2-Trichloroethane	< 0.0117	mg/kg	
Trichloroethene (TCE)	1.03	mg/kg	
Trichlorofluoromethane	< 0.0117	mg/kg	
Vinyl Chloride	< 0.0117	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	85.5	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926125
Location : B-10-1.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
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(215) 275-0281

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1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

[redacted] CLIENT

CHRISTIANA METALS (b) [redacted] (4)
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926126
Location : B-10-6.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0116	mg/kg	
1,3-Dichlorobenzene	< 0.0116	mg/kg	
1,4-Dichlorobenzene	< 0.0116	mg/kg	
Bromoform	< 0.0116	mg/kg	
Carbon Tetrachloride	< 0.0116	mg/kg	
Chlorobenzene	< 0.0116	mg/kg	
Dibromochloromethane	< 0.0116	mg/kg	
Bromodichloromethane	< 0.0116	mg/kg	
Chloroethane	< 0.0116	mg/kg	
Chloroform	< 0.0116	mg/kg	
1,1-Dichloroethane	< 0.0116	mg/kg	
1,2-Dichloroethane	< 0.0116	mg/kg	
1,1-Dichloroethene	< 0.0116	mg/kg	
1,2-Dichloropropane	< 0.0116	mg/kg	
Cis-1,3-Dichloropropene	< 0.0116	mg/kg	
Trans-1,3-Dichloropropene	< 0.0116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0116	mg/kg	
Methylene Chloride	< 0.0116	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0116	mg/kg	
Tetrachloroethene (PCE)	< 0.0116	mg/kg	
Trans-1,2-Dichloroethene	< 0.0116	mg/kg	
1,1,1-Trichloroethane	< 0.0116	mg/kg	
1,1,2-Trichloroethane	< 0.0116	mg/kg	
Trichloroethene (TCE)	< 0.0116	mg/kg	
Trichlorofluoromethane	< 0.0116	mg/kg	
Vinyl Chloride	< 0.0116	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	86.1	%	

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215-825-3800

ORIGINAL (Red)

FINAL REPORT

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CLIENT

CHRISTIANA METALS CORP
ATTN: JAM(b) (4)
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926128
Location : B-11-65
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 1.18	mg/kg	
1,3-Dichlorobenzene	< 1.18	mg/kg	
1,4-Dichlorobenzene	< 1.18	mg/kg	
Bromoform	< 1.18	mg/kg	
Carbon Tetrachloride	< 1.18	mg/kg	
Chlorobenzene	< 1.18	mg/kg	
Dibromochloromethane	< 1.18	mg/kg	
Bromodichloromethane	< 1.18	mg/kg	
Chloroethane	< 1.18	mg/kg	
Chloroform	< 1.18	mg/kg	
1,1-Dichloroethane	< 1.18	mg/kg	
1,2-Dichloroethane	< 1.18	mg/kg	
1,1-Dichloroethene	39.8	mg/kg	
1,2-Dichloropropane	< 1.18	mg/kg	
Cis-1,3-Dichloropropene	< 1.18	mg/kg	
Trans-1,3-Dichloropropene	< 1.18	mg/kg	
Bromomethane (Methyl Bromide)	< 1.18	mg/kg	
Chloromethane (Methyl Chloride)	< 1.18	mg/kg	
Methylene Chloride	1.44	mg/kg	
1,1,2,2-Tetrachloroethane	< 1.18	mg/kg	
Tetrachloroethene (PCE)	10.2	mg/kg	
Trans-1,2-Dichloroethene	< 1.18	mg/kg	
1,1,1-Trichloroethane	36.0	mg/kg	
1,1,2-Trichloroethane	< 1.18	mg/kg	
Trichloroethene (TCE)	3280	mg/kg	
Trichlorofluoromethane	< 1.18	mg/kg	
Vinyl Chloride	< 1.18	mg/kg	
Solids, Total (%) by (b) (4) on 08/30/89			Std. Mtd. 209F
Total Solids	84.5	%	

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FINAL REPORT

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CLIENT

CHRISTIANA METALS CORP
[redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926128
Location : B-11-65
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926129
Location : B-12-4.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 1.15	mg/kg	
1,3-Dichlorobenzene	< 1.15	mg/kg	
1,4-Dichlorobenzene	< 1.15	mg/kg	
Bromoform	< 1.15	mg/kg	
Carbon Tetrachloride	< 1.15	mg/kg	
Chlorobenzene	< 1.15	mg/kg	
Dibromochloromethane	< 1.15	mg/kg	
Bromodichloromethane	< 1.15	mg/kg	
Chloroethane	< 1.15	mg/kg	
Chloroform	< 1.15	mg/kg	
1,1-Dichloroethane	< 1.15	mg/kg	
1,2-Dichloroethane	< 1.15	mg/kg	
1,1-Dichloroethene	< 1.15	mg/kg	
1,2-Dichloropropane	< 1.15	mg/kg	
Cis-1,3-Dichloropropene	< 1.15	mg/kg	
Trans-1,3-Dichloropropene	< 1.15	mg/kg	
Bromomethane (Methyl Bromide)	< 1.15	mg/kg	
Chloromethane (Methyl Chloride)	< 1.15	mg/kg	
Methylene Chloride	< 1.15	mg/kg	
1,1,2,2-Tetrachloroethane	< 1.15	mg/kg	
Tetrachloroethene (PCE)	< 1.15	mg/kg	
Trans-1,2-Dichloroethene	< 1.15	mg/kg	
1,1,1-Trichloroethane	< 1.15	mg/kg	
1,1,2-Trichloroethane	< 1.15	mg/kg	
Trichloroethene (TCE)	157	mg/kg	
Trichlorofluoromethane	< 1.15	mg/kg	
Vinyl Chloride	< 1.15	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	87.1	%	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926129
Location : B-12-4.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

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ORIGINAL

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[redacted] CLIENT [redacted]

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926130
Location : B-12-6.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0605	mg/kg	
1,3-Dichlorobenzene	< 0.0605	mg/kg	
1,4-Dichlorobenzene	< 0.0605	mg/kg	
Bromoform	< 0.0605	mg/kg	
Carbon Tetrachloride	< 0.0605	mg/kg	
Chlorobenzene	< 0.0605	mg/kg	
Dibromochloromethane	< 0.0605	mg/kg	
Bromodichloromethane	< 0.0605	mg/kg	
Chloroethane	< 0.0605	mg/kg	
Chloroform	< 0.0605	mg/kg	
1,1-Dichloroethane	< 0.0605	mg/kg	
1,2-Dichloroethane	< 0.0605	mg/kg	
1,1-Dichloroethene	< 0.0605	mg/kg	
1,2-Dichloropropane	< 0.0605	mg/kg	
Cis-1,3-Dichloropropene	< 0.0605	mg/kg	
Trans-1,3-Dichloropropene	< 0.0605	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0605	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0605	mg/kg	
Methylene Chloride	0.357	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0605	mg/kg	
Tetrachloroethene (PCE)	< 0.0605	mg/kg	
Trans-1,2-Dichloroethene	< 0.0605	mg/kg	
1,1,1-Trichloroethane	< 0.0605	mg/kg	
1,1,2-Trichloroethane	< 0.0605	mg/kg	
Trichloroethene (TCE)	6.99	mg/kg	
Trichlorofluoromethane	< 0.0605	mg/kg	
Vinyl Chloride	< 0.0605	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	82.7	%	

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ORIGINAL (Red)

FINAL REPORT

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926130
Location : B-12-6.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

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ORIGINAL

FINAL REPORT

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926131
Location : TRIP BLANK
Client ID :

Date Sampled : 08/17/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CLIENT

CHRISTIANA METALS CORP
ATTN: J(b) (4)
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926132
Location : FIELD BLANK
Client ID :

Date Sampled : 08/17/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) on 08/21/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CLIENT

CHRISTIANA METALS CORP
ATTN: JAM(b) (4)
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926132
Location : FIELD BLANK
Client ID :

Date Sampled : 08/17/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Certified by : (b) (4)
BCM Laboratory Director

Lab Certifications:

PA - 46-007
AL - 40300
NJ - 77175
MD - 136
EPA BULK ASBESTOS QC - 3339

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 027566
Location : MW-1
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	< 0.1	mg/l	
Nitrate as N by (b) [redacted] on 09/05/89			EPA# 353.2

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CLIENT

CHRISTIANA METALS CORP
ATTN: J(b) (4)[redacted]
BCM MALL
30-6471-01

Date : 09/22/89
BCM # : 30-6471-01
P.O.# :
Order# : 29800

BCM Number : 127536
Location : MW-1
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as N	0.789	mg/l	
pH - Field by M. FISH on 08/30/89			EPA # 150.1
pH-Field	5.93	Std.Un	
Specific Conductance - Field by M. FISH on 08/30/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	95	umhos	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O # :
Order# : 29800

BCM Number : 927587
Location : MW-4
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J (b) (4) [redacted] on 09/03/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	11.2	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	5.5	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	24.9	ug/l	
Trans-1,2-Dichloroethene	316	ug/l	
1,1,1-Trichloroethane	18.9	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	1110	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	42.2	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	14.1	mg/l	
Nitrate as N by (. [redacted] on 09/05/89			EPA# 353.2

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927567
Location : MW-4
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as N	7.13	mg/l	
pH - Field by A [redacted] on 08/29/89			EPA # 150.1
pH-Field	6.28	Std.Un	
Specific Conductance - Field by A. SMUCKLER on 08/29/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	500	umhos	

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CHRISTIANA METALS CORP
ATTN: J[redacted]
BCM MAIL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927568
Location : MW-5
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. STOLDT on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	3.3	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	16.8	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	18.5	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	4.2	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	9.56	mg/l	
Nitrate as N by [redacted] on 09/21/89			EPA# 353.2

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CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927566
Location : MW-5
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as N	0.099	mg/l	
pH - Field by (b) (4) [redacted] on 08/29/89			EPA # 150.1
pH-Field	6.82	Std.un	
Specific Conductance - Field by [redacted] on 08/29/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	4600	umhos	

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CHRISTIANA METALS CORP
ATTN: J (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927569
Location : MW-6
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J (b) (4) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	9.9	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	8.5	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	82.4	ug/l	
1,1,1-Trichloroethane	70.1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	526	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	8.7	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	8.02	mg/l	
Nitrate as N by (b) (4) [redacted] on 09/05/89			EPA# 353.2

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CHRISTIANA METALS CORP
ATTN. JA(b) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927569
Location : MW-6
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as N	1.67	mg/l	
pH - Field by A. SMUCKLER on 08/29/89			EPA # 150.1
pH-Field	8.58	Std.Un	
Specific Conductance - Field by [redacted] on 08/29/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	710	umhos	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927570
Location : MW-7
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J (b) (4) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	1.3	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	49.3	ug/l	
1,1,1-Trichloroethane	2.5	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	78.9	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
Fluoride by J FICKE on 09/07/89			EPA # 340.2
Fluoride	5.66	mg/l	
Nitrate as N by ([redacted] on 09/05/89			EPA# 353.2

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CHRISTIANA METALS CORP
ATTN: [redacted] (b) (4)
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 87570
Location : MW-7
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as [redacted] (b) (4)	1.21	mg/l	
pH - Field by [redacted] on 08/29/89			EPA # 150.1
pH-Field	5.83	Std.Un	
Specific Conductance - Field by A. SMUCKLER on 08/29/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	250	umhos	

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CHRISTIANA METALS CORP
ATTN: [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927571
Location : MW-1
Client ID : FILTERED

Date Sampled 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr by [redacted] on 09/15/89			EPA # 6010
Chromium	< 0.01	mg/l	
Copper by P GOLDSTEIN on 09/13/89			EPA # 6010
Copper	0.035	mg/l	
Metal Digestion (No Charge) by [redacted] on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by P[redacted] on 09/15/89			EPA # 6010
Nickel	< 0.04	mg/l	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927572
Location : MW-4
Client ID : FILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr by P (b) (4) [redacted] on 09/15/89			EPA # 6010
Chromium	0.011	mg/l	
Copper by (b) (4) [redacted] on 09/15/89			EPA # 6010
Copper	0.027	mg/l	
Metal Digestion (No Charge) by LORI JONES on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by ([redacted] 09/15/89			EPA # 6010
Nickel	0.269	mg/l	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM HALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 327573
Location : MW-5
Client ID : FILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr by (b) (4) [redacted] on 09/15/89			EPA # 6010
Chromium	< 0.01	mg/l	
Copper by (b) (4) [redacted] on 09/15/89			EPA # 6010
Copper	0.022	mg/l	
Metal Digestion (No Charge) by (b) (4) [redacted] on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by (b) (4) [redacted] on 09/15/89			EPA # 6010
Nickel	0.090	mg/l	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 09/22/89
BCM # 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 027574
Location : MW-6
Client ID : FILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr (b) [redacted] on 09/15/89			EPA # 6010
Chromium	0.010	mg/l	
Copper by P. (b) (4) [redacted] on 09/15/89			EPA # 6010
Copper	0.021	mg/l	
Metal Digestion (No Charge) by (b) (4) [redacted] on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by ([redacted] on 09/15/89			EPA # 6010
Nickel	< 0.04	mg/l	

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[redacted]

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[redacted] CLIENT [redacted]

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O # :
Order# : 29800

BCM Number : 027575
Location : MW-7
Client ID : FILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr by P (b) (4) [redacted] on 09/15/89			EPA # 6010
Chromium	0.220	mg/l	
Copper by P (b) (4) [redacted] on 09/13/89			EPA # 6010
Copper	< 0.02	mg/l	
Metal Digestion (No Charge) by (b) (4) [redacted] on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by (b) (4) [redacted] on 09/15/89			EPA # 6010
Nickel	0.251	mg/l	

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[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927576
Location : MW-13
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	33.6	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	164	ug/l	
1,2-Dichloropropane	< 1	ug/l	
cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	23.5	ug/l	
Trans-1,2-Dichloroethene	110	ug/l	
1,1,1-Trichloroethane	3470	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	10600	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by (b) (4) [redacted] on 08/29/89			EPA # 150.1
pH-Field	7.34	Std.Un	
Specific Conductance - Field by (b) (4) [redacted] on 08/29/89			EPA #120.1

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CHRISTIANA METALS CORP
[redacted]NOR
BCM MALL
00-6471-01

Date : 09/22/89
BCM # 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927576
Location : MW-13
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(umhos/cm @15 deg C.	360	umhos	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 09/22/89
BCM # 00-6471-01
P.O #
Order# : 29800

BCM Number 027577
Location MW-14A
Client ID

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J([redacted] on 09/03/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	8.9	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	18.6	ug/l	
1,2-Dichloropropane	< 1	ug/l	
cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	12.5	ug/l	
1,1,1-Trichloroethane	257	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	666	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by A. SMUCKLER on 08/29/89			EPA # 150.1
pH-Field	6.05	Std.Un	
Specific Conductance - Field by ([redacted] on 08/29/89			EPA #120.1

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CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.#
Order# : 29800

BCM Number : 927577
Location : MW-14A
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(umhos/cm @25 Deg C)	430	umhos	

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CHRISTIANA METALS CORP
ATTN: J(b) (4)
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 027578
Location : MW-148
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by A. (b) (4) on 09/05/89			EPA # 3010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	7.3	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	13.2	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	10.6	ug/l	
1,1,1-Trichloroethane	323	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	751	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by A. SMUCKLER on 08/29/89			EPA # 150.1
pH-Field	6.95	Std.Un	
Specific Conductance - Field by A. (b) (4) (b) 08/29/89			EPA #120.1

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

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CLIENT

CHRISTIANA METALS CORP
ATTN. J(b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 427578
Location : MW-148
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(umhos/cm @25 Deg C)	430	umhos	

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CLIENT

CHRISTIANA METALS (b) RP
[redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927579
Location : MW-15
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	53.8	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	564	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.8	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	39 3	ug/l	
Trans-1,2-Dichloroethene	570	ug/l	
1,1,1-Trichloroethane	7600	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	44400	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by A. (b) (4) on 08/29/89			EPA # 150.1
pH-Field	7.13	Std.Un	
Specific Conductance - Field by A (b) (4) on 08/29/89			EPA #120.1

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CLIENT

[redacted] (b) (4)
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927579
Location : MW-15
Client ID

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(umhos/cm @25 Deg C)	610	umhos	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927560
Location : MW-16
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) [redacted] on 09/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	18.6	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	419	ug/l	
1,2-Dichloroethane	41.8	ug/l	
1,1-Dichloroethene	140	ug/l	
1,2-Dichloropropane	< 1	ug/l	
cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	7.4	ug/l	
Trans-1,2-Dichloroethene	169	ug/l	
1,1,1-Trichloroethane	2340	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	4580	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by (b) (4) [redacted] on 08/29/89			EPA # 150.1
pH-Field	7.18	Std.Un	
Specific Conductance - Field by (b) (4) [redacted] on 08/29/89			EPA #120.1

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P O.# :
Order# : 29800

BCM Number : 927580
Location : MW-16
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(Umhos/cm @25 Deg C)	580	Umhos	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O # :
Order# : 29800

BCM Number : 027581
Location : TRIP BLANK
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by [redacted] on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropane	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CHRISTIANA METALS CORP
ATTN: [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 027582
Location : FIELD BLANK
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by [redacted] : 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927582
Location : FIELD BLANK
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method

Certified by (b) (4) [redacted]

BCM Laboratory Director

Lab Certifications.

PA - 46-007 NJ - 77175 EPA BULK ASBESTOS QC - 3339
AL - 40300 MD - 155

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P O.# :
Order# : 29827

BCM Number 927714
Location : MW-8
Client ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J (b) (4) [redacted] on 09/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	16.6	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	3.2	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	37.7	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.6	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroetrene (PCE)	9.3	ug/l	
Trans-1,2-Dichloroethene	803	ug/l	
1,1,1-Trichloroethane	399	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	2860	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	86.8	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	1.11	mg/l	
Nitrate as N by (b) (4) [redacted] on 09/15/89			EPA# 353.2

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P O.# :
Order# : 29827

BCM Number : 127714
Location : MW-8
Client ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Nitrate as N	0 327	mg/l	
pH - Field by M (b) (4) [redacted] on 08/30/89			EPA # 150.1
pH-Field	6.91	Std.Un	
Specific Conductance - Field by M (b) (4) [redacted] on 08/30/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	440	umhos	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927715
Location : MW-8A
Client ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	2.8	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	9.2	ug/l	
Trans-1,2-Dichloroethene	798	ug/l	
1,1,1-Trichloroethane	395	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	2750	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	60.8	ug/l	
Fluoride by (b) (4) [redacted] on 09/07/89			EPA # 340.2
Fluoride	1.02	mg/l	
Nitrate as N by (b) (4) [redacted] on 09/05/89			EPA# 353.2

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O # :
Order# : 29827

BCM Number : 927715
Location : MW-8A
Client ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AR

Test Description	Results	Units	Test Method
Nitrate as N	0.121	mg/l	
pH - Field by M. FISH on 08/30/89			EPA # 150.1
pH-Field	6.91	Std.Un	
Specific Conductance - Field by (b) (4) [redacted] on 08/30/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	440	umhos	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.#
Order# : 29827

BCM Number : 927716
Location : MW-9
Client ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	20.6	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	63.3	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	2.4	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	14.9	ug/l	
Trans-1,2-Dichloroethene	482	ug/l	
1,1,1-Trichloroethane	621	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	4130	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	14.4	ug/l	
Fluoride by (b) (4) [redacted] on 09/07/89			EPA # 340.2
Fluoride	2.57	mg/l	
Nitrate as N by (b) (4) [redacted] on 09/05/89			EPA# 353.2

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927716
Location : MW-9
Client ID : UNFILTERED

Date Sampled 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Nitrate as N	0.106	mg/l	
pH - Field by (b) (4) [redacted] on 08/30/89			EPA # 150.1
pH-Field	6.98	Std.Un	
Specific Conductance - Field by (b) (4) [redacted] on 08/30/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	450	umhos	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927717
Location : MW-8
Client ID : FILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AM

Test Description	Results	Units	Test Method
Chromium as Cr by (b) (4) [redacted] on 09/15/89			EPA # 6010
Chromium	0.012	mg/l	
Copper by P. 60(b) (4) [redacted] on 09/19/89			EPA # 6010
Copper	< 0.02	mg/l	
Metal Digestion (No Charge) b(b) [redacted] on 09/14/89			EPA # 3010
Metal Digestion	9/14/89	M/D/Y	
Nickel by P. (b) (4) [redacted] N on 09/15 89			EPA # 6010
Nickel	< 0.04	mg/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
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ORIGINAL (Red)

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[redacted] CLIENT [redacted]

CHRISTIANA METALS CORP
ATTN: JA(b) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927718
Location : MW-8A
Client ID : FILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Chromium as Cr by P. [(b) (4)] on 09/15/89			EPA # 6010
Chromium	< 0.01	mg/l	
Copper by P. G[(b) (4)] on 09/19/89			EPA # 6010
Copper	< 0.02	mg/l	
Metal Digestion (No Charge) by [(b) (4)] on 09/14/89			EPA # 3010
Metal Digestion	9/14/89	M/D/Y	
Nickel by P. G[(b) (4)]N on 09/15/89			EPA # 6010
Nickel	< 0.04	mg/l	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927719
Location : MW-9
Client ID : FILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sample : AH

Test Description	Results	Units	Test Method
Chromium as Cr (b) (4) [redacted] on 09/15/89			EPA # 6010
Chromium	< 0.01	mg/l	
Copper by (b) (4) [redacted] on 09/15/89			EPA # 6010
Copper	< 0.02	mg/l	
Metal Digestion (No Charge) by (b) (4) [redacted] on 09/14/89			EPA # 3010
Metal Digestion	9/14/89	M/D/Y	
Nickel by (b) (4) [redacted] on 09/15/89			EPA # 6010
Nickel	< 0.04	mg/l	

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CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P O.# :
Order# : 29827

BCM Number : 027720
Location : MW-2
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Hydrocarbons by G. (b) (4) [redacted] on 09/12/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	157	ug/l	
1,2-Dichloroethane	1050	ug/l	
1,1-Dichloroethene	611	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	10.9	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	85.6	ug/l	
Trans-1,2-Dichloroethene	685	ug/l	
1,1,1-Trichloroethane	17300	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	36100	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927721
Location : MW-3
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/12/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	14.0	ug/l	
1,2-Dichloroethane	< 10	ug/l	
1,1-Dichloroethene	103	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	< 10	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	124	ug/l	
Trans-1,2-Dichloroethene	236	ug/l	
1,1,1-Trichloroethane	3130	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	199000	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927722
Location : MW-10
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	1.4	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	4.6	ug/l	
1,1,1-Trichloroethane	84.2	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	93.8	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927723
Location : MW-11
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J (b) (4) [redacted] on 09/11/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	900	ug/l	
1,2-Dichloroethane	103	ug/l	
1,1-Dichloroethene	600	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	15.0	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	32.1	ug/l	
Trans-1,2-Dichloroethene	1970	ug/l	
1,1,1-Trichloroethane	20700	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	17100	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

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CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927724
Location : MW-12
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	12.8	ug/l	
1,2-Dichloroethane	< 10	ug/l	
1,1-Dichloroethene	< 10	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	14.8	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	14.7	ug/l	
Trans-1,2-Dichloroethene	85.9	ug/l	
1,1,1-Trichloroethane	540	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	3940	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927725
Location : TRIP BLANK
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J(b) (4) [redacted] on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CHRISTIANA METALS [redacted] (b) (4)
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927726
Location : FIELD BLANK
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons [redacted] (b) (4) on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927726
Location : FIELD BLANK
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AM

Test Description	Results	Units	Test Method

(b) (4) [redacted]

Certified by :

BCM Laboratory Director

Lab Certifications:

PA - 46-007
AL - 40300
NJ - 77175
MD - 136
EPA BULK ASBESTOS QC - 3339

BCM Laboratory Division
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PLYMOUTH MEETING, PA 19462
215-825-3800

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CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 10/20/89
BCM # 00-6471-01
P.O. #
Order# 30302

BCM Number 930389
Location MW-2
Client ID

Date Sampled 09/28/89
Date Received 09/28/89
Sampler EM

Test Description	Results	Units	Test Method
Volatile Halocarbons by G (b) (4) [redacted] S on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 100	ug/l	
1,3-Dichlorobenzene	< 100	ug/l	
1,4-Dichlorobenzene	< 100	ug/l	
Bromoform	< 100	ug/l	
Carbon Tetrachloride	< 100	ug/l	
Chlorobenzene	< 100	ug/l	
Dibromochloromethane	< 100	ug/l	
Bromodichloromethane	< 100	ug/l	
Chloroethane	< 100	ug/l	
Chloroform	< 100	ug/l	
1,1-Dichloroethane	157	ug/l	
1,2-Dichloroethane	< 100	ug/l	
1,1-Dichloroethene	1190	ug/l	
1,2-Dichloropropane	< 100	ug/l	
Cis-1,3-Dichloropropene	< 100	ug/l	
Trans-1,3-Dichloropropene	< 100	ug/l	
Bromomethane (Methyl Bromide)	< 100	ug/l	
Chloromethane (Methyl Chloride)	< 100	ug/l	
Methylene Chloride	152	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	102	ug/l	
Trans-1,2-Dichloroethene	323	ug/l	
1,1,1-Trichloroethane	16500	ug/l	
1,1,2-Trichloroethane	< 100	ug/l	
Trichloroethene (TCE)	48900	ug/l	
Trichlorofluoromethane	< 100	ug/l	
Vinyl Chloride	< 100	ug/l	

Comment A BLANK CONTAINED 1.6 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 160 UG/L IN THIS SAMPLE. BASED ON 1 TO 100 DILUTION

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CHRISTIANA METALS CORP
ATTN (b) (4) [redacted]
BCM MALL
00-6471-01

Date 10/20/89
BCM # 00-6471-01
P.O.#
Order# 30302

BCM Number 930390
Location MW-3
Client #

Date Sampled 09/28/89
Date Received 09/28/89
Sampler BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1000	ug/l	
1,3-Dichlorobenzene	< 1000	ug/l	
1,4-Dichlorobenzene	< 1000	ug/l	
Bromoform	< 1000	ug/l	
Carbon Tetrachloride	< 1000	ug/l	
Chlorobenzene	< 1000	ug/l	
Dibromochloromethane	< 1000	ug/l	
Bromodichloromethane	< 1000	ug/l	
Chloroethane	< 1000	ug/l	
Chloroform	< 1000	ug/l	
1,1-Dichloroethane	< 1000	ug/l	
1,2-Dichloroethane	< 1000	ug/l	
1,1-Dichloroethene	< 1000	ug/l	
1,2-Dichloropropane	< 1000	ug/l	
Cis-1,3-Dichloropropene	< 1000	ug/l	
Trans-1,3-Dichloropropene	< 1000	ug/l	
Bromomethane (Methyl Bromide)	< 1000	ug/l	
Chloromethane (Methyl Chloride)	< 1000	ug/l	
Methylene Chloride	3160	ug/l	
1,1,2,2-Tetrachloroethane	< 1000	ug/l	
Tetrachloroethene (PCE)	< 1000	ug/l	
Trans-1,2-Dichloroethene	< 1000	ug/l	
1,1,1-Trichloroethane	2730	ug/l	
1,1,2-Trichloroethane	< 1000	ug/l	
Trichloroethene (TCE)	680000	ug/l	
Trichlorofluoromethane	< 1000	ug/l	
Vinyl Chloride	< 1000	ug/l	

Comment * BLANK CONTAINED 2.9 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 2900 UG/L IN THIS SAMPLE, BASED ON 1 TO 1000 DILUTION

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN: J[redacted] (b) (4)
BCM MALL
00-6471-01

Date : 10/20/89
BCM # 00-6471-01
P.O.#
Order# 30302

BCM Number : 930391
Location : MW-10A
Client ID :

Date Sampled 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by [redacted] (b) (4) on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	4.3	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	2.6	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	2.8	ug/l	
1,1,2,2-Tetrachloroethane	<	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	9.9	ug/l	
1,1,1-Trichloroethane	84.4	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	244	ug/l	
Trichlorofluoromethane	1	ug/l	
Vinyl Chloride	< 1	ug/l	

Comment: M. BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930392
Location : MW-10B
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	6.3	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	4.9	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	1.0	ug/l	
Trans-1,2-Dichloroethene	14.2	ug/l	
1,1,1-Trichloroethane	112	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	227	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	1.5	ug/l	

Comment: M. BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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215-825-3800

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 10/20/89
BCM # 00-6471-01
P.O #
Order# 30302

BCM Number 930393
Location : MW-11
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 100	ug/l	
1,3-Dichlorobenzene	< 100	ug/l	
1,4-Dichlorobenzene	< 100	ug/l	
Bromoform	< 100	ug/l	
Carbon Tetrachloride	< 100	ug/l	
Chlorobenzene	< 100	ug/l	
Dibromochloromethane	< 100	ug/l	
Bromodichloromethane	< 100	ug/l	
Chloroethane	< 100	ug/l	
Chloroform	< 100	ug/l	
1,1-Dichloroethane	711	ug/l	
1,2-Dichloroethane	< 100	ug/l	
1,1-Dichloroethene	834	ug/l	
1,2-Dichloropropane	< 100	ug/l	
Cis-1,3-Dichloropropene	< 100	ug/l	
Trans-1,3-Dichloropropene	< 100	ug/l	
Bromomethane (Methyl Bromide)	< 100	ug/l	
Chloromethane (Methyl Chloride)	< 100	ug/l	
Methylene Chloride	237	ug/l	
1,1,2,2-Tetrachloroethane	< 100	ug/l	
Tetrachloroethene (PCE)	< 100	ug/l	
Trans-1,2-Dichloroethene	2170	ug/l	
1,1,1-Trichloroethane	19600	ug/l	
1,1,2-Trichloroethane	< 100	ug/l	
Trichloroethene (TCE)	15500	ug/l	
Trichlorofluoromethane	< 100	ug/l	
Vinyl Chloride	< 100	ug/l	

Comment: BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 280 UG/L IN THIS SAMPLE, BASED ON 1 TO 100 DILUTION

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

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215-825-3600

FINAL REPORT
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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930394
Location : MW-12
Client ID

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	12.0	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	53.1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	7.5	ug/l	
Trans-1,2-Dichloroethene	69.5	ug/l	
1,1,1-Trichloroethane	425	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	3150	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	15.6	ug/l	

Comment M BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

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PLYMOUTH MEETING, PA 19462
215-825-3800

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.#
Order# : 30302

BCM Number : 930395
Location : MW-13
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	< 10	ug/l	
1,2-Dichloroethane	< 10	ug/l	
1,1-Dichloroethene	22.6	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	19.2	ug/l	
1,1,2,2-Tetrachloroethane	< 10	ug/l	
Tetrachloroethene (PCE)	< 10	ug/l	
Trans-1,2-Dichloroethene	12.3	ug/l	
1,1,1-Trichloroethane	490	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	863	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

Comment: M. BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 28 UG/L IN THIS SAMPLE, BASED ON 1 TO 10 DILUTION

-111-

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930396
Location : MW-14
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by G(b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	35.9	ug/l	
1,2-Dichloroethane	< 10	ug/l	
1,1-Dichloroethene	229	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	16.7	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	31.3	ug/l	
Trans-1,2-Dichloroethene	140	ug/l	
1,1,1-Trichloroethane	3930	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	13800	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

Comment: M. BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 28 UG/L IN THIS SAMPLE, BASED ON 1 TO 10 DILUTION

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930397
Location : MW-15
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. (b) (4) [redacted] on 10/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	4.9	ug/l	
1,1-Dichloroethane	66.4	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	789	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	97.6	ug/l	
Trans-1,2-Dichloroethene	446	ug/l	
1,1,1-Trichloroethane	10100	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	116000	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number 930398
Location : MW-16
Client ID

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by G (b) (4) [redacted] on 10/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	5.7	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	265	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	103	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	3.0	ug/l	
Trans-1,2-Dichloroethene	110	ug/l	
1,1,1-Trichloroethane	1320	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	1144	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930399
Location : TRIP BLANK
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.2	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	12.7	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

Comment: M. BLANK CONTAINED 2.4 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930400
Location : FIELD BLANK
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by G J J (b) (4) on 10/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.2	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	3.5	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

Comment: M. BLANK CONTAINED 2.4 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS [redacted] (b) (4)
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930400
Location : FIELD BLANK
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method

(b) (4) [redacted]

Certified by : [redacted]
BCM Laboratory Director

Lab Certifications.

PA - 46-007
AL - 40300
NJ - 77175
MD - 136
EPA BULK ASBESTOS QC - 3339

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215-825-3800

ORIGINAL (Red)

FINAL REPORT

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The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926126
Location : B-10-6.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926127
Location : B-11-1.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0119	mg/kg	
1,3-Dichlorobenzene	< 0.0119	mg/kg	
1,4-Dichlorobenzene	< 0.0119	mg/kg	
Bromoform	< 0.0119	mg/kg	
Carbon Tetrachloride	< 0.0119	mg/kg	
Chlorobenzene	< 0.0119	mg/kg	
Dibromochloromethane	< 0.0119	mg/kg	
Bromodichloromethane	< 0.0119	mg/kg	
Chloroethane	< 0.0119	mg/kg	
Chloroform	< 0.0119	mg/kg	
1,1-Dichloroethane	< 0.0119	mg/kg	
1,2-Dichloroethane	< 0.0119	mg/kg	
1,1-Dichloroethene	< 0.0119	mg/kg	
1,2-Dichloropropane	< 0.0119	mg/kg	
Cis-1,3-Dichloropropene	< 0.0119	mg/kg	
Trans-1,3-Dichloropropene	< 0.0119	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0119	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0119	mg/kg	
Methylene Chloride	< 0.0119	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0119	mg/kg	
Tetrachloroethene (PCE)	< 0.0119	mg/kg	
Trans-1,2-Dichloroethene	< 0.0119	mg/kg	
1,1,1-Trichloroethane	< 0.0119	mg/kg	
1,1,2-Trichloroethane	< 0.0119	mg/kg	
Trichloroethene (TCE)	0.0226	mg/kg	
Trichlorofluoromethane	< 0.0119	mg/kg	
Vinyl Chloride	< 0.0119	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	84.2	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

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ORIGINAL (Red)

FINAL REPORT

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The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926127
Location : B-11-1.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM

ORIGINAL

APPENDIX F

BCM INTEROFFICE CORRESPONDENCE DOCUMENTING SOIL SAMPLE ANALYTICAL PROCEDURES FOR SAMPLES OBTAINED FROM BORINGS B-5 and B-6

BCM

INTEROFFICE

ORIGINAL (Red)

TO: (b) (4) [redacted]

cc: (b) (4) [redacted]
(b) (4) [redacted]

DATE: January 12, 1990

FROM: (b) (4) [redacted] BMR

SUBJECT: Christiana Metals
BCM Project No. 00-6471-01
BCM Lab Order No. 29200

The purpose of this memo is to provide additional explanation for the results reported in August for the above referenced order. Seven soil samples, a trip blank, and a field blank were analyzed for purgeable halocarbons by gas chromatograph in accordance with EPA Method No. 8010. In each of the samples where volatile organic compounds were detected, the concentrations are reported as greater than a specific value (e.g. 1,1-dichloroethene >10 mg/kg).

Normally, a specific concentration, not a greater than concentration, is reported. Each of the samples was collected on 8/1/89 and received and logged in at the laboratory that same day. Each of the samples were initially analyzed on 8/3 with a 1 to 10 (1/10) dilution. The concentrations detected were outside the linear range of the instrument calibration. This meant that the results for these analyses were qualitative only and that the concentrations detected were less than those actually present in the samples. Each of these samples was subsequently run 2-6 additional times at varying dilutions in order to obtain results within the range of instrument calibration. Attached is a table listing the dates and dilutions for the initial and subsequent tests for each sample. In each of these cases no concentrations above the level of detection were detected. As we know the samples initially contained several volatile organic compounds, our conclusion regarding the later runs was that disturbance of the samples by sample container opening and the volatile nature of the compounds resulted in the volatilization of the compounds from the samples.)

Review of the initial sample chromatograms indicates that the compound identifications are correct. These results are consistent with other data from the site. Consequently, the results reported can be used so long as it is understood that the concentrations are greater than reported.

Should you have any questions or require additional information, please contact either (b) (4) [redacted] or me.

BCM

INTEROFFICE

ORIGINAL (Red)

TO: (b) (4) [redacted]

DATE: 1/8/90

FROM (b) (4) [redacted]

SUBJECT: Chris Sinn Models
Order 29200

· Attached is a copy of a report from Organ which we had to qualify the data. The project manager needs a brief memo explaining why the samples could not be rerun (they were but the concentrations were semi-volatile). I need to see the file for this order w/ dates of data reduction and rerun attempt.

923863 – Date:	8/3	8/4	8/17									923864 –	8/3	8/4	8/10	8/11	8/17					
(MW-10A-1.5) dilution:	1/10	1/500	1/10									(B-5-1.5)	1/10	1/500	1/50	1/1	1/50					
923865 –	8/3	8/4	8/10	8/11	8/14	8/15	8/17	8/18				923871 –	8/3									
(B-5-3.5)	1/10	1/1000	1/5000	1/1	1/50	1/10	1/1000	1/10				(Field Blank)	1/1									
923866 –	8/3	8/4	8/10	8/11	8/17	8/18						923867 –	8/3	8/4	8/10	8/17	8/18					
(B-5-4.5)	1/10	1/500	1/50	1/5000	1/500	1/10						(B-5-6.5)	1/10	1/50	1/50	1/50	1/10					
923868 –	8/3	8/4	8/10	8/11	8/17	8/18						923869 –	8/3	8/4	8/17			923870 –	8/14			
(B6-1.5)	1/10	1/500	1/250	1/1000	1/100	1/10						(B6-5.5)	1/10	1/500	1/100			(Trip Blank)	1/1			

Samples ran on 8/3 on 1/10 dilution were overloaded, often that the corresponding dilutions shown samples were clean.
8/11 rerun from original soil again showed clean.