soil and materials
engineers, inc.

BASELINE ENVIRONMENTAL ASSESSMENT CONDUCTED PURSUANT TO SECTION 20126(1)(C) OF 1994 PA 451, PART 201, AS AMENDED, AND THE RULES PROMULGATED THEREUNDER

423 WALBRIDGE STREET
KALAMAZOO, MICHIGAN

BASELINE ENVIRONMENTAL ASSESSMENT CONDUCTED PURSUANT TO SECTION 20126(1)(C) OF 1994 PA 451, PART 201, AS AMENDED, AND THE RULES PROMULGATED THEREUNDER 423 WALBRIDGE STREET KALAMAZOO, MICHIGAN

SME PROJECT NO. KE36281

PREPARED BY:

SOIL AND MATERIALS ENGINEERS, INC.
4460 COMMERCIAL AVENUE, SUITE B
KALAMAZOO, MICHIGAN 49002

AUGUST 2, 2000

Consultants in the geosciences, materials and the environment

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- Corrosion
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- Pavement Evaluation/Design
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- Air Quality
- Asbestos/Lead Based Paint
- Baseline Environmental Assessment
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- Regulatory Compliance
- Remediation
- Risk Assessment
- Storm Water Discharge
- Underground Storage Tanks

soil and materials engineers, inc.

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1964 36 2000 Years of Service

August 2, 2000

Ms. Carol Weaver
Michigan Department of Environmental Quality
Environmental Response Division
Plainwell District Office
1342 SR-89, Suite B
Plainwell, MI 48706

RE: Baseline Environmental Assessment
423 Walbridge Street
Kalamazoo, Michigan
SME Project KE36281

Dear Ms. Weaver:

Please find enclosed the Baseline Environmental Assessment (BEA) report for the referenced facility.

The enclosed BEA is being submitted to the Michigan Department of Environmental Quality (MDEQ) for a determination of adequacy under Section 20129a for Lawrence Industries, Inc., the prospective owner.

If you have questions regarding the BEA or enclosed forms, please call.

Very truly yours,

SOIL AND MATERIALS ENGINEERS, INC.

Nicholas B. Larabel
Senior Geologist

Michael S. Meddock, P.E.
Manager – Environmental Services

Enclosures: $750 Petition Fee
Petition Form (EQP4445)
Affidavit Signed by Petitioner (EQP4400)
Affidavit Signed by Environmental Professional who Prepared the BEA (EQP4439)
Qualifications of Environmental Professional
BEA Report (1 Original and 1 Copy)

Distribution: Ms. Ruth Murphy – Lawrence Industries, Inc. (one copy)
Mr. Ronald Baylor – Miller, Canfield, Paddock & Stone (one copy)
Mr. Ed Wilson – Old Kent Bank(one copy)
Ms. Jodi Milks – Midwest Realty (one copy)

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL RESPONSE DIVISION

FOR DEQ USE ONLY
Petition #:
Check #:
Amount $:
Payer:
Index: 45021 PCA: 31400 OBJ: 9135

PETITION FOR BASELINE ENVIRONMENTAL ASSESSMENT DETERMINATION and OPTIONAL DETERMINATION OF COMPLIANCE WITH SECTION 20107a (FORM EQP4445(REV.3/99))

(Under the authority of Part 201, 1994 Act 451, as amended, and the Rules promulgated thereunder)

All of the following questions must be answered. If any information is missing, the petition for Baseline Environmental Assessment (BEA) determination ("the petition") will be returned unreviewed.

Name and address of petitioner (individual or legal entity):*
Lawrence Industries, Inc.
P.O. Box 141
Plainwell, Michigan 49080

Status relative to the property:

	Former	Current	Prospective
Owner*	☐	☐	☒
Operator*	☐	☐	☐

Address/location of property where BEA was conducted:
423 Walbridge Street
Kalamazoo, Michigan 49001

County Kalamazoo

Provide the property tax identification number(s) or, if applicable, the ward and item numbers(s) for the property identified in the BEA. Required pursuant to Rule 907. 06-154-02-005

Contact person representing petitioner: Ruth Murphy Contact's Telephone #: 616-664-4614

If the address of the petitioner is different from the address that should be used to correspond with the petitioner's contact person, please provide the contact person's address:

Check the appropriate response to each of the following questions.

	YES	NO
1. **Is it known that the source of contamination at the property is primarily from any of the following?**	☐	☒
• **A leaking underground storage tank (UST) regulated under Part 213, 1994 PA 451, as amended.**	☐	☒
• **A licensed landfill or solid waste management facility.**	☐	☒
• **A licensed hazardous waste Treatment, Storage, or Disposal Facility.**	☐	☒
• **Oil and gas development related activities.**	☐	☒

The source of the release that resulted in this property becoming a "facility" will determine which DEQ division will review your petition.

2. **Based on the Part 201 Rules, this BEA is a:**

Category N	☐
Category D	☐
Category S	☒

	YES	NO
3. **Are USTs or discarded or abandoned containers identified in the BEA?** If yes, this information must be provided on Form EQP4476.	☒	☐

ELIGIBILITY FOR BEA DETERMINATION

	YES	NO
4. **Is the property for which the petition review is being requested a "facility" as defined in Section 20101?** If the answer to this question is no, the property is ineligible for consideration and your petition will be returned.	☒	☐
5. **Was the BEA conducted* prior to or within 45 days after the date of purchase*, occupancy, or foreclosure of the property, whichever is earliest and completed* not more than 15 days after the date required by Section 20126(1)(c) or Rule 299.5903(8)?** If the answer to either portion of this question is no, the BEA is invalid.	☒	☐
6. **Is this BEA petition being submitted to the DEQ within 6 months after the completion of the BEA?** If the answer to this question is no, pursuant to Section 20129a(1), the petition for a BEA determination is invalid and will be returned to the petitioner.	☒	☐

SECTION 20107a COMPLIANCE ANALYSIS

	YES	NO
7. **Is the petitioner seeking or does the petitioner intend to seek a determination of compliance with Section 20107a obligations?** This determination must be specifically requested in order for the DEQ to provide its conclusions. A Section 20107a Compliance Analysis may be submitted according to the schedule prescribed in Rule 299.5915 and the Instructions for Preparing and Disclosing BEAs.	☐	☒
8. **If you answered yes to number 7 above, have you enclosed a Section 20107a Compliance Analysis now?**	☐	☐

REQUIRED MATERIALS

This petition must include the following documents prepared according to DEQ Instructions for Preparing and Disclosing BEAs. The documents should be assembled in the order they are listed. If any of this information is missing, the petition will be returned to you unreviewed. Please indicate whether or not the documents are enclosed.

	YES	NO
• **The $750.00 petition fee.**	☒	☐
• **This form, completed.**	☒	☐
• **The affidavit signed by the petitioner and prepared according to DEQ procedures.**	☒	☐
• **The affidavit signed by the environmental professional who prepared the BEA, and if applicable, the affidavit of the environmental professional who completed the Section 20107a Compliance Analysis.**	☒	☐
• **The BEA prepared according to DEQ Instructions**	☒	☐
• **A Notice Regarding Discarded or Abandoned Containers, if applicable.**	☒	☐
• **A Section 20107a Compliance Analysis, if you answered yes to question 8.**	☐	☒

With my signature below, I certify that this petition and all related materials are complete and accurate to the best of my knowledge and belief. I have read and understand the caution related to curing deficiencies found in the Instructions for Preparing and Disclosing BEAs. I understand that intentionally submitting false information in a petition is a felony and may result in fines of up to $25,000 for each violation.

Signature of Submitter: Ruth Murphy (Person legally authorized to bind the petitioner*) 8-2-00 Date

Name (Typed or Printed) Ruth Murphy

Title President

*=Terms defined in Glossary (Appendix F)

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL RESPONSE DIVISION

AFFIDAVIT IN SUPPORT OF A PETITION FOR A BASELINE ENVIRONMENTAL ASSESSMENT DETERMINATION AND OPTIONAL DETERMINATION OF COMPLIANCE WITH SECTION 20107a(FORM EQP4400 (REV.3/99))

(Under the authority of Part 201, 1994 Act 451, as amended, and the Rules promulgated thereunder)

STATE OF Michigan

COUNTY OF Kalamazoo

The purpose of this Affidavit is to set forth certain information and documentation to enable the Michigan Department of Environmental Quality (hereinafter the "DEQ") to make the determinations pursuant to Section 20129a of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act (hereinafter the "NREPA"), 1994 PA 451, as amended, MCL 324.29a. All terms found in this document which are defined in the NREPA, Part 3, Part 201, and the Part 201 Rules, shall have the same meaning as in the statute and the Part 201 Rules.

The undersigned Petitioner, being first duly sworn, deposes and says as follows:

1. **THIS AFFIDAVIT** is executed by the undersigned Ruth Murphy whose title is, President on behalf of Lawrence Industries, Inc. (hereinafter "The Petitioner") located at P.O. Box 141, Plainwell, Michigan 49080.

2. The Petitioner intends to purchase a property located at 423 Walbridge Street, Kalamazoo, Michgian (hereinafter the "Property") on August 13, 2000.

3. The Property referred to in this petition is a "Facility."

4. The language in this Affidavit does not deviate from that in the model Affidavit, Form EQP4400 (Rev.3/99) [insert if appropriate: except as provided for in item #10].

5. The Baseline Environmental Assessment ("BEA") included in this petition was conducted on July 25, 2000 and completed on August 2, 2000. The BEA, to the best of the Petitioner's knowledge and belief, except as specified in Item #10 of this affidavit, reasonably defines the existing conditions and circumstances at the facility so that in the event of a release subsequent to the Petitioner's purchase of the Property, there is a means of distinguishing any new release from existing contamination.

6. The Petitioner agrees that the fee accompanying this petition will be deposited into the appropriate state fund, applies to this petition exclusively, and is not refundable, unless the Petition is found to be administratively incomplete and the Petition is not reviewed.

7. The Petitioner agrees that any affirmative determination on the Petition by the DEQ is based on:
   a. The truthfulness and accuracy of the information submitted by the Petitioner.
   b. The proposed use of the property set forth in the Petition.

c. The proposed hazardous substance(s)use set forth in the Petition.
d. The Petitioner completing in a timely and satisfactory manner any response activity described in this Petition.
e. The Petitioner having conducted the BEA prior to or within 45 days after the earlier of the date of purchase, occupancy, or foreclosure, and completing the BEA not more than 15 days after the date required by Section 20126(1)(c) or Rule 299.5903(8).

Section 7a determination not requested

8. The Petitioner's proposed use of the facility will, to the best of the Petitioner's knowledge and belief, satisfy the requirements of Section 20107a of the NREPA.

Not Proposed

9. The Petitioner agrees to undertake in a timely and satisfactory manner the response activities necessary to comply with Section 20107a of the NREPA.

10. The submitter acknowledges that if there is a failure of an engineering control or similar feature identified in the BEA, and if a release occurs as a result of the failure, the BEA does not provide an exemption to liability for response activity necessary to address contamination resulting from the failure. The burden of distinguishing the release attributable to the failure of the engineering control from existing contamination shall be borne by the submitter according to Section 29 of Part 201.

I affirm that the above representations are true and are based upon my personal knowledge and belief after all reasonable inquiry.

I certify that I am legally authorized to execute this Affidavit and to bind the Petitioner to the terms and conditions of this Affidavit.

I understand that intentionally submitting false information to the DEQ is a felony and may result in fines of up to $25,000 for each violation.

I acknowledge that this Affidavit has been provided pursuant to Section 20129a of the NREPA.

Ruth Murphy — 8-2-00

Signature of Petitioner or Person Legally Authorized to Bind Petitioner — Date

Ruth Murphy
Print or Type Legal Name

SUBSCRIBED AND SWORN to before me this 2 day of Aug, 2000, a Notary Public in and for Kalamazoo County, Michigan.

Elizabeth A Wheeler
Notary Public

My Commission Expires: 11-11-2002

ELIZABETH A. WHEELER
Notary Public, Barry County, MI
My Commission Expires 11/11/2002

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL RESPONSE DIVISION

AFFIDAVIT OF ENVIRONMENTAL PROFESSIONAL IN SUPPORT OF A PETITION FOR A BASELINE ENVIRONMENTAL ASSESSMENT DETERMINATION (FORM EQP4439 (REV.3/99))

(Under the authority of Part 201, 1994 Act 451, as amended, and the Rules promulgated thereunder)

STATE OF Michigan

COUNTY OF Kalamazoo

The purpose of this Affidavit is to set forth certain information and documentation to enable the Michigan Department of Environmental Quality (hereinafter the "DEQ") to make a determination on a petition for a Baseline Environmental Assessment ("BEA") Determination pursuant to Section 20129a of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act (hereinafter the "NREPA"), 1994 PA 451, as amended, MCL 324.20129a. All terms found in this document which are defined in the NREPA, Part 3, Part 201, and the Part 201 Rules, shall have the same meaning as in the statute and the Part 201 Rules.

The undersigned affiant, being first duly sworn, deposes and says as follows:

1. **THIS AFFIDAVIT** is executed by the undersigned Michael S. Meddock, P.E., whose title is Manager-Environmental Services working for Soil and Materials Engineers, Inc., located at 4460 Commercial Avenue, Suite B, Kalamazoo, Michigan 49002.

2. The affiant was retained by Lawrence Industries, Inc. (hereinafter the "Petitioner") to conduct a BEA on a property located at 423 Walbridge Street, Kalamazoo, Michigan (hereinafter the "Property").

3. I have 10 years of professional experience in the investigation and remediation of sites of environmental contamination. A copy of my qualifications, including education and work experience, is attached.

4. The BEA for the Property was prepared by the affiant. It was conducted on July 25, 2000 and completed on August 2, 2000. To the best of the knowledge and belief of the affiant, and based upon the future hazardous substance use associated with the Petitioner's intended use of the property, with the exception of the stipulation in item #10 of the Petitioner's affidavit which reads: The submitter acknowledges that if there is a failure of an engineering control or similar feature identified in the BEA, and if a release occurs as a result of the failure, the BEA does not provide an exemption to liability for response activity necessary to address contamination resulting from the failure. The burden of distinguishing the release attributable to the failure of the engineering control from existing contamination shall be borne by the submitter according to Section 29 of Part 201. The BEA reasonably defines the existing conditions and circumstances at the facility so that in the event of a release subsequent to the Petitioner's purchase of the Property, there is a means of distinguishing the new release from existing contamination.

5. The language in this Affidavit does not deviate from that in the model Affidavit, Form EQP4439(Rev.3/99).

I affirm to the best of my knowledge and belief that the information contained in the BEA prepared for this Property is true and accurate and that all sample test results and other relevant facility-related analytical data acquired, collected, and analyzed to prepare the BEA are included or referenced in the BEA.

I understand that intentionally submitting false information to the DEQ is a felony and may result in fines of up to $25,000 for each violation.

I certify that I am fully authorized by the Petitioner I represent to execute this Affidavit.

Signature of Environmental Professional

8/2/00
Date

Michael S. Meddock
Print or Type Legal Name

SUBSCRIBED AND SWORN to before me this 2nd day of August, 2000, a Notary Public in and for Kalamazoo County, Michigan.

Nicole Garneau
Notary Public

My Commission Expires: 10/11/02

NICOLE GARNEAU
Notary Public, Kalamazoo County, MI
My Commission Expires Oct. 11, 2002

RESUME

NICHOLAS B. LARABEL

Senior Geologist

Conducts hydrogeologic testing and collects soil and groundwater samples. Monitors drilling, geoprobe and well installation activities, and underground storage tank (UST) removals. Prepares proposals, letters and reports for Phase I and II Environmental Site Assessments (ESA), Baseline Environmental Assessments (BEA), Compliance Analyses, and UST investigations.

❖ Professional Qualifications:

- Skilled at collecting environmental soil and groundwater samples and report preparation.
- Experienced using nuclear soil density testing equipment, and a variety of geophysical and environmental monitoring and testing equipment.
- Skilled at collecting asbestos samples and performing asbestos surveys.
- Experienced at completing BEAs and Compliance Analyses.

❖ Project Experience:

- Performed 50 Phase I and II ESAs in Michigan, including asbestos surveys. Prepared over 35 category A, B and C, BEAs/CAs for various sites in Michigan.
- Performed groundwater characteristic studies at sites in Kalamazoo, Ann Arbor and Manchester, Michigan. In addition, performed hydrogeologic evaluations of the effects of sand/gravel removal at two gravel pits in southeastern Michigan.
- Performed a soil and groundwater evaluation for a former landfill in southeastern Michigan and at an active landfill in southwestern, Michigan.
- Monitored and collected soil samples during a thermal remediation project in Detroit, Michigan.
- Directed the removal of an UST and the excavation of soil in the basement for a site in Detroit, Michigan.
- Monitored UST removals and performed follow-up subsurface investigations for various sites in Michigan.
- Monitored drum and soil removal activities at a Level C site in southwestern Michigan.
- Performed pump tests along with soil and groundwater investigations for DNAPL site in Flint, Michigan.
- Performed field services for a former manufactured gas plant in southwest Michigan.
- Performed confined space entry services for sites in Michigan.

❖ **Career History:** SME since 1993

❖ **Education:** B.S., Hydrogeology, Western Michigan University

❖ **Certifications:** Certified Asbestos Building Inspector
Certified Nuclear Density Meter Operator - Troxler

❖ **Accreditations:** 40-Hour HAZWOP Course
Confined Space Entry

❖ **Affiliations:** Geological Society of America, NGWA

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RESUME

MICHAEL S. MEDDOCK, PE

Project Engineer

Responsible for coordinating SME's West Michigan environmental services, including project management and preparation of reports upon completion of environmental evaluations and assessments.

Professional Qualifications:

- Experienced in Phase I and II Environmental Site Assessments (ESA) and Baseline Environmental Assessments (BEA) for real estate transactions.
- Experienced in compliance audits, permitting projects and RCRA closures.
- Experienced in underground storage tank (UST) projects, including removals, hydrogeologic investigations, implementation of remedial systems, and operations and maintenance.
- Experienced in soil and groundwater sampling methods and analytical testing. Skilled in drilling methods, geoprobe sampling, monitor well installation and well material estimating.

Project Experience:

- Project manager for multiple BEA sites including Category A, B and C/other projects approved by MDEQ.
- Development and implementation of Phase II ESAs and hydrogeologic investigations.
- Project manager for design and implementation of remediation and free product removal systems for leaking UST and Michigan Act 307 sites.
- Project manager for RCRA facility closures.
- Designed and instituted storm water discharge sampling plans and permitting activities.
- Project manager for a 21-site Phase I and II ESA for proposed urban highway expansion.
- Project manager for a 25-site Phase I ESA for an urban redevelopment project.
- Project Manager for Class V injection well closure, contamination assessment, and site closure.
- Project manager for numerous sites that have been successfully closed in accordance with MDEQ Residential, Commercial and Industrial Closure requirements.
- Project Manager for geophysical surveying projects.
- Project manager for ESAs on former military bases.

Career History: SME since 1993 - Other firms from 1988

Education: B.S., Civil Engineering, University of Pittsburgh

Registration: Professional Engineer - Michigan, Illinois, Indiana, Ohio.

Affiliations: ASCE, Michigan Section, Southwestern Branch, Past President
Kalamazoo Math and Science Center-Student Mentor-1992-1995
Kalamazoo Academic Achievement Program Mentor-1995-1997

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BASELINE ENVIRONMENTAL ASSESSMENT CONDUCTED PURSUANT TO SECTION 20126(1)(C) OF 1994 PA 451, PART 201, AS AMENDED, AND THE RULES PROMULGATED THEREUNDER 423 WALBRIDGE STREET KALAMAZOO, MICHIGAN

SME PROJECT NO. KE36281

PREPARED BY:

SOIL AND MATERIALS ENGINEERS, INC.
4460 COMMERCIAL AVENUE, SUITE B
KALAMAZOO, MICHIGAN 49002

AUGUST 2, 2000

Consultants in the geosciences, materials and the environment

- Caissons/Piles
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- Geophysical Survey
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- Settlement Analysis
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- Facility Asset Management
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- Metals
- Nondestructive Testing
- Pavement Evaluation/Design
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- Structural Steel/Welding
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- Underground Storage Tanks

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1.0 IDENTIFICATION OF AUTHOR AND DATE BEA WAS CONDUCTED AND DATE BEA WAS COMPLETED

This Baseline Environmental Assessment (BEA) has been prepared pursuant to Section 20126 of Part 201 of the Natural Resources and Environmental Protection Act (NREPA), Public Act 451 of 1994, as amended. This report is intended to meet the requirements of a "Category S" BEA in general accordance with the Michigan Department of Environmental Quality's (MDEQ's) "New Administrative Rules for Baseline Environmental Assessments (BEAs) and Compliance with Section 20107a ("Due Care") and Related Materials," dated March 3, 1999. This BEA was prepared by Mr. Nicholas B. Larabel and reviewed by Mr. Michael S. Meddock, P.E. This BEA was conducted on July 25, 2000, (substantially complete) and completed on August 2, 2000.

2.0 INTRODUCTION

This report presents the results of SME's BEA for an industrial property located at 423 Walbridge Street, west of Walbridge Street and north of East Harrison Court in Kalamazoo, Kalamazoo County, Michigan (Property). The Property Location Diagram (Figure 1 in Appendix A) illustrates the Property location.

This BEA was authorized by Ms. Ruth Murphy of Lawrence Industries, Inc., the prospective owner of the Property, and has been prepared pursuant to Section 20126 of Part 201 of the National Resources and Environmental Protection Act (NREPA), Public Act 451, 1994, as amended.

This BEA has two purposes. One purpose is to provide liability protection for environmental impact at the Property in the soil or groundwater as a result of historic operations. The other purpose of this BEA is to provide a baseline for indicator parameters for those chemicals that the prospective owner will be using as part its' operations (overlapping chemicals). With respect to this second purpose, it has been determined it is not feasible to fully delineate the existing contamination. Therefore, pursuant to various discussions with MDEQ personnel, the Petitioner, in addition to providing the data contained in this BEA, will install extensive engineering controls and secondary containment measures to prevent a release into the environment of any of the overlapping chemicals.

2.1 Historical Uses and Property Evaluation

The historical uses of the property were evaluated as part of SME's Phase I Environmental Site Assessment (ESA) for the Property, dated April 19, 2000. A detailed description of historical property uses is included as Section 3.0 (pages 6 through 8) in the Phase I ESA, which can be found in Appendix B. A summary of the history of the Property as it pertains to the identified recognized environmental conditions are given below. Figure 2 in Appendix A illustrates the Property features encountered during our Phase I ESA.

The western portion of the Property was used in conjunction with the Michigan Buggy Company since at least 1887. Historical sources indicated that an oil house existed on the west portion of the Property in 1891 in connection with the Michigan Buggy Company. Between 1902 and 1965 portions of the Property were residential, and used for storage and industrial purposes. In 1965, the residences were razed and a new building was constructed for Food Processing Equipment, which manufactured equipment for the food processing industry. Food Processing Equipment operated on the Property between 1965 and 1995. At the time of the Phase I ESA, Norm's Electric Motor Repair utilized the Property. The historical use of the Property in connection with the Michigan Buggy Company represents a recognized environmental condition (REC) due to the former oil house located on the west portion of the Property.

During the Phase I ESA Property walkover, we observed thirty-six containers of miscellaneous engine fluids and cleaning solvents in household quantities of one gallon or less, and four unlabeled 55-gallon drums containing unknown contents in the garage areas. Mr. Don Thall, owner of the Property, informed us, Norm's Electric Motor repair owned the drums and used a portion of the building to store equipment. The concrete floor slab near the engine fluids, solvent containers, and drums appeared to be in good condition with no staining observed. Therefore, the engine fluids and cleaning solvent did not represent an REC to the Property.

The storage areas of the building also contained automobiles, generators, and other miscellaneous automotive equipment. We observed staining in the building associated with motor oils for the automobile engines and stored equipment. One area of staining, encompassing approximately 300 square-feet, was observed near the northwest corner of the building. Mr. Thall indicated that this was a former drum storage location. Several engines were observed leaking oil onto the concrete floor and expansion joints in the garage areas of the building. The presence of oil staining near concrete expansion joints represented an REC to the Property.

We observed two drywells on the Property, one located within the northwest corner of the building and the other in the west portion of the Property. An overflow pipe extending toward the west was observed in the drywell located inside the building. Mr. Thall indicated the overflow pipe was connected to the second drywell, located outside in the west portion of the Property. Stained concrete was observed near each of the drywells. The presence of the drywells on the Property represented an REC to the Property.

We also observed a paint booth and floor drain near the central portion of the building. Paint residue was observed on the wall and floor surfaces. In addition, we also observed a floor drain, and concrete staining and oil absorbent material in the garage area located near the northeast corner of the building. Mr. Thall indicated the floor drains were most likely connected to the City of Kalamazoo's sanitary sewer system. Due to the staining observed in the building, and the unknown nature of the sewer connections, housekeeping practices represented an REC in connection with the Property.

Approximately fifteen automobiles, several engines, miscellaneous equipment, several oil stains, and one unlabeled drum were observed on the west portion of the Property, outside the building. The drum appeared to be in good condition with no evidence of leaks or spills. The automobile equipment storage and associated stained soil represent RECs to the Property.

Slag and cinder fill material were identified along the north side of the Property, and a miscellaneous debris pile and several small stains were observed within the fenced area to the west of the building. The slag and cinder fill material and stained areas represented an REC to the Property.

Two empty 250-gallon, steel aboveground storage tanks (ASTs) were identified on the Property, one near the southwest corner of the building, and the other in the fenced area of the Property along the west side of the building. Mr. Thall informed us that the AST located at the southwest corner of the building was used by Norm's Electric Motor repair for off-site fueling of a generator. The other AST was intended to be converted into a grill. The ASTs did not represent an REC to the Property.

SME performed a Limited Phase II ESA in order to evaluate if historical activities conducted at the Property and if chemicals from automobile maintenance activities used at the Property were present in the subsurface soil and groundwater. In addition, the Limited Phase II ESA was also performed to determine if regulated constituents were present in the soil beneath the building in areas designated to be the proposed chemical storage and plating process areas. Section 4.0 provides additional information of the Limited Phase II ESA.

2.2 Basis for BEA

Lawrence Industries, Inc., the prospective owner of the Property intends to use the site for coating miscellaneous metal parts for sale to commercial and industrial businesses. The building at the Property will consist primarily of office and warehouse areas as well as a main processing area for cleaning and plating metal parts. The office and warehouse space will generally occupy the southeastern and eastern portions of the building, and the processing area will occupy the central and western portions of the building.

Material storage will consist primarily of those items used for processing metal components for the plating industry (i.e. metal cleaning compounds and coating materials). Lawrence Industries, Inc., intends to utilize various regulated chemicals during daily operations. Sections 3.1 and 3.2 will further discuss the chemicals used and the plating processes that will occur on the Property. The storage and use of various chemicals for cleaning and plating steel components will be located solely within the process spill control area and secondary containment (discussed in the following section). Lead and chromium, which Lawrence Industries, Inc. intends to use at the Property, were discovered on the Property during the Limited Phase II ESA.

The storage and handling of the various plating chemicals at the Property will result in "significant hazardous substance use" as defined by the MDEQ document, "New Administrative Rules for BEAs and Compliance with Section 20107a ("Due Care") and Related Materials," dated March 3, 1999. This "Category S" BEA was prepared based upon the intended uses of the Property, as described by Lawrence Industries, Inc.

3.0 PROPERTY DESCRIPTION AND INTENDED HAZARDOUS SUBSTANCE USE

The Property encompasses approximately 1.2 acres of land located in the central portion of Section 15, Township 2 South, Range 11 West, Kalamazoo, Kalamazoo County, Michigan. The Property is located on the west side of Walbridge Street and north of East Harrison Court, and south of East Willard Street and the Conrail Railroad. Figures 1 and 2 in Appendix A illustrate the Property location and features. Photographs depicting Property features are included in the Phase I ESA in Appendix B of this BEA.

The Property was listed with an address of 423 Walbridge Street and parcel identification number of 06-154-02-005. The legal description is included in Appendix C. According to the City of Kalamazoo, the Property is zoned 'Industrial'. The current and planned future use of the Property will be for industrial purposes.

Lawrence Industries, Inc. has designed its parts-coating process to prevent environmental impact. Extensive engineered controls and secondary containment measures will be constructed throughout the building. The intended chemical use and a description of the parts-coating process, engineered controls and secondary containment measures are described below.

3.1 Intended Chemical Use

The chemicals, which are planned to be utilized on the Property for daily processing operations include:

Chromic Acid
Potassium Iodide
Activated Carbon
Sodium Carbonate
Barium Carbonate
Boric Acid
Potassium Hydroxide
Copper
Copper Sulfate
Bis(3-Sulfopropyl Disulfide)Disodium Salt
Polyethylene glycol
P-Dimethylamino Benzene Sulfonic Acid
4,4' Tetramethyldiamino Phenylmethane
Sodium Silicate
Nickel
Ammonium Chloride
Sodium m-Nitrobenzenesulfonate
Benzotriazole
1-Propanol
Diethylene Glycol Monoethyl
Sodium Chromate
Cellulose
Silver
Hydrogen Peroxide
Lead

Sodium Bisulfate
Sodium Fluoride
Sodium Nitrite
Formaldehyde
Saccharin
Calcium Chloride
Sulfuric Acid
Copper Cyanide
Fluoride
Sodium Hydroxide
Tetrasodium Pyrophosphate
Ammonium Nitrate
Sodium Fluoroborate
Methanol
Sodium Diethyldithiocarbamate
4-Phenyl-3-Butene-2-One
Sodium Bifluoride
Sodium Nitrate
Acetic Acid
Silver Nitrate
Terpene Hydrocarbon Blend
Potassium Choride

Hydrochloric Acid
Nickel Chloride
Nitric Acid
Potassium Silicate
Amphocarboxylates
Alkaline Silicate
Bleach
Acrylic Acid
Sulfamic Acid
Silica
Zinc Chloride
Nickel Carbonate
Nickel Sulfate
Tetrapotassium Pyrophosphate
Carboxylic Acid
Formic Acid
Baking Soda
Sodium Metabisulite
Tin Sulfate
Tin
Zinc

A detailed summary of the common product name, chemical form, chemical components, packaging material and average quantity stored within the building is included in Appendix D of this BEA.

Material Safety Data Sheets (MSDSs) for the referenced chemicals have been included in Appendix E of this BEA. The MSDSs include detailed information regarding chemical characteristics and provide Chemical Abstract Service (CAS) numbers for compounds in each of the referenced materials.

As stated in Section 2.2, of the chemicals listed above, lead and chromium were included in the Limited Phase II ESA testing program and discovered on the Property.

3.2 Manufacturing Process, Engineered Controls and Secondary Containment

Appendix F includes two diagrams showing the proposed parts-finishing processes. The following, which was provided by Mr. Steve Lovelace of Lawrence Industries, Inc., outlines the process description.

Process:

Miscellaneous metal parts will be washed, pickled, and given a copper, nickel, chrome, or zinc coating, rinsed, and dried. There will also be an option of brightening brass or copper parts through a process known as bright dipping.

Although the processes are independent of one-another, the processing for the plating procedures will generally be identical.

Stage 1: Cleaning

Metal substrate parts are processed through a high temperature immersion cleaning solution to remove dirt and oils. This is followed by three rinses to remove cleaner.

Cleaner will be received in bulk 55-gallon fiber drums in powder form and added to the cleaner tanks. Cleaners will be replaced every two weeks, and treated through on-site treatment for removal of metals and heavy solids. Water will be treated on site to comply with Kalamazoo discharge limitations, and all residuals will be stored in non-liquid form inside the building, in an area where the floor is sealed with an epoxy coating, until disposal. All rinses will be counter-flowed to reduce water consumption.

Stage 2: Pickling

The parts will be pickled (acid bath) to remove rust, oxidation, and to neutralize any residual cleaners. The parts will be cleaned through two additional rinses to remove acid.

Acids will be received in 15-gallon poly drums in liquid form and stored within the epoxy-coated area inside the building. After use, the acids will be neutralized on-site and metals will be removed before the liquid is discharged to the sanitary sewer.

Stage 3: Plating

The parts will be placed into a plating solution for either copper, nickel, or zinc, after which they are rinsed two additional times to remove plating solution (as an option on copper or brass parts, they may be placed into a brightening solution and given a three stage rinsing operation).

All necessary plating chemicals will be received in their various forms according to the chemical summary sheets provided in Appendix D of this BEA, and stored within the epoxy coated spill-control area. The chemicals used in this stage will be consumed during use. All residuals from any cleaning of process tanks or rinse tanks will be stored in non-liquid form inside the building, in the epoxy coated area, until disposal. Any contaminated material will be processed through wastewater treatment on-site to meet discharge requirements.

Stage 4: Final Processing

If the nickel-plated parts require a chrome finish, the parts will be placed into a chromic acid bath for plating, and given a three-stage rinse.

If the zinc-plated parts require a chromate or dichromate finish for color, they will be dipped into a chromating solution and give a three-stage rinse.

Stage 5: Drying

Parts will then be dried, inspected and packaged for return to customer.

According to Lawrence Industries, Inc. representatives, the vast majority of the mentioned chemicals will be consumed during use. Raw materials will be transported into the facility by trucks in sealed steel, plastic or fiber containers. A loading dock is currently located within the northeast portion of the building. The trucks used for transportation of the various hazardous materials will be permitted only in this area to unload chemicals. In the unlikely event of a catastrophic spill during unloading of chemicals, the interior portion of the building, loading dock area and truck will contain the materials. Lawrence Industries, Inc. has indicated that all raw chemicals used at the Property will be stored inside the building. The materials will be stored within a curbed area with enough volume to hold a catastrophic spill. The entire floor of the process area inside the building will be sealed with an epoxy coating, so that any spills would not be released into the environment. The hazardous components of the process are designed to either be consumed, and thus not part of the waste stream, or stored for disposal in a non-liquid state, easily handled and separated from existing contamination. The prospective owner will be installing a wastewater treatment system within the spill control area for the liquids that will be discharged to the City of Kalamazoo's wastewater treatment plant. Additionally, residual solids will be placed in a dumpster inside the building for offsite disposal.

The described engineered controls and secondary containment measures have been specifically developed to prevent releases to the subsurface should a spill occur. Lawrence Industries, Inc., personnel have stated that no other chemicals or hazardous substances are planned to be used at the Property. It is anticipated that within 45 days of ownership or prior to starting operations at the Property, Lawrence Industries, Inc., will employ the engineering controls and secondary containment previously discussed in this BEA. The engineering controls and secondary containment will be installed prior to initiating operations within the building.

Lawrence Industries, Inc. will be responsible for checking the integrity of the engineering controls and secondary containment. The sealed concrete floor inside the building and the outside asphalt paved parking area will be maintained in a good condition. If the integrity is visibly impaired, corrective actions will be taken to repair the concrete or pavement. Corrective actions may consist of re-sealing cracks in concreted and paved areas.

No floor drains will exist inside the building. The design of the secondary containment proposed for the Property will prohibit potential discharges to the storm sewer located outside the building. Lawrence Industries, Inc. has indicated that the sanitary sewer lines within the building, which will be used to discharge rinse water from plating

operations, will be evaluated to determine the pipe integrity (i.e., leaks, abandoned sections). If portions of the pipes leak or abandoned sections are present, Lawrence Industries, Inc. will repair/replace the lines prior to performing plating operations.

4.0 KNOWN CONTAMINATION

SME performed a Limited Phase II ESA in order to evaluate if historical activities have impacted the Property. In addition, the Limited Phase II ESA was performed to determine if regulated constituents were present in the soil beneath the building in the chemical storage and plating process areas.

4.1 Evaluation Activities

On June 13, 2000, SME performed a total of eight soil probes (SP1 through SP8) on the Property to provide information regarding potential contaminants that may be present due to the former operations conducted on the Property (Property Assessment of RECs, Section 4.4 infra). SP1 was advanced on the north portion of the Property in the area identified with slag and cinder fill material. SP2 and SP3 were advanced on the west portion of the Property in the area of the former oil house and oil surface staining. SP4 through SP7 were advanced adjacent to the drywells and floor drains. SP8 was advanced inside the building within an oil stained area (former drum storage area). Soil samples were collected continuously from the surface to the explored depth (4 to 15 feet below ground surface) of each probe. In addition, groundwater samples were also collected from soil probes SP1, SP2 and SP4 through SP6.

On July 13, 2000, two soil probes (SP9 and SP10) were advanced at the Property to further evaluate historical operations, and twelve soil probes (SP11 through SP22) were advanced inside the building to collect soil data sufficient to provide a means to distinguish potential future releases from existing contamination under in the proposed chemical storage and plating process areas (Future Chemical Use and Storage Areas Assessment, Section 4.5 infra).

Figure 3 in Appendix A shows the locations of the soil probes locations. Figure 4 in Appendix A shows the soil probe locations conducted within the building.

4.2 Subsurface Conditions

4.2.1 Soil

Concrete or asphalt was encountered at the surface of probe locations SP4 through SP8. Underlying the surface materials at SP4 and SP8, and at the surface of the remaining soil probe locations, fill consisting of fine to medium sand was encountered to depths ranging from 1.5 to 11 feet below ground surface (bgs). The sand fill contained varying amounts of one or more of the following materials: silt, gravel, brick, cinders, slag, coal, clay, organics and concrete. Soil probe SP8 terminated in the sand fill material.

At probe location SP5, sandy clay, extended from below the sand fill to 3.5 feet bgs. The native soil underlying the fill at SP1 through SP4 and SP6 through SP8, and underlying the clay at SP5 consisted of fine to medium sand. The native sand stratum contained varying amounts of silt and gravel, and extended to the explored depth of the probes except for SP1 and SP5. At probes SP1 and SP5, silty clay, extended from below the native sand stratum to 15 to 12 feet bgs, respectively.

Soil sample intervals varied at each soil probe location. Refer to the soil probe logs in Appendix G for specific sampling intervals.

4.2.2 Field Screening

A portion of each soil sample collected was utilized for field screening with a photoionization detector (PID) for volatile organic compounds (VOCs) using conventional headspace screening methodology.

Field screening activities were conducted by filling one half of a plastic bag with soil and sealing the bag. The sample was subsequently allowed to warm to ambient air temperature. The bag was then opened and the PID probe was inserted into the headspace within the bag.

Based on the results of the PID field screening activities, total VOC concentrations exceeding 1 part per million (ppm) were not identified during our evaluation activities.

The data for the organic vapor screening of soil samples during hand auger and soil probe activities as well as field observations regarding the presence of staining/odors are presented on the logs in Appendix G.

4.2.3 Groundwater Conditions

Groundwater was encountered in the probes at depths ranging from 8 to 13.5 feet during probing activities. Based on the proximity to the Kalamazoo River, topography of the area and review of files from the MDEQ during the Phase I ESA, groundwater at the Property is believed to flow to the east toward the river.

4.3 Analytical Testing Program

Laboratory analysis of 20 soil samples and 5 groundwater samples was performed in conjunction with SME's Limited Phase II ESA at the Property. Samples were selected for laboratory analysis based on soil type and field screening, as well as the current and/or historical use of the Property at the sampling location. The soil samples were submitted to KAR Laboratories, Inc. of Kalamazoo, Michigan for analysis. Laboratory Analytical Reports are included in Appendix H of this BEA. Tables 1 through 4 in Appendix I summarize the results of the Limited Phase II ESA. The following sections provide a summary of information regarding the results of the analytical testing.

Samples were selectively analyzed for VOCs, polynuclear aromatic hydrocarbons (PNAs), the 10 Michigan metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, zinc), or only chromium, copper, lead, nickel, silver, zinc; formaldehyde; and methanol.

A review of analytical laboratory data indicated that generally laboratory methods and method detection limits (MDLs) were in accordance with MDEQ Environmental Response Division (ERD), Operational Memorandum #6, Revision #5, dated November 16, 1998. The laboratory analytical reports for the sample locations referenced are included in Appendix H. The following sections describe the two sampling events conducted by SME and the respective results.

4.4 Results of Property Assessment of RECs

The eight soil probes, identified as SP1 through SP8 conducted on the Property provided information regarding potential contaminants that may be present due to the former operations conducted on the Property. Soil samples were analyzed for the 10 Michigan metals. Groundwater samples were analyzed for VOCs and PNAs. In addition, the groundwater samples from SP2, SP5 and SP6 were also analyzed for the 10 Michigan metals.

4.4.1 Soil Results

One or more of the following metals were detected at concentrations exceeding the Part 201 Residential Drinking Water Protection Criteria (DWPC) and/or Part 201 Direct Contact Criteria (DCC) at soil probe locations SP3 (2'), SP4 (3'), SP7 (2') and SP8 (1.5'): arsenic, barium, chromium, lead and selenium. The concentrations of the remaining metals for these samples were either less than the MDLs or Part 201 Residential Cleanup Criteria.

The lead concentrations ranged from 247 milligrams per kilogram (mg/kg) in the soil sample from soil probe SP-1 to 3,850 mg/kg in the soil sample from soil probe SP-3. Refer to Table 1 in Appendix I for a detailed summary of the results of the metals testing.

Metals concentrations for other soil samples analyzed were either less than the MDLs or Part 201 Residential Cleanup Criteria.

In July 2000, two additional soil probes, SP9 and SP10 were performed adjacent to SP3 to further evaluate a reported lead concentration of 3,850 mg/kg detected in the soil near the surface. The laboratory reported lead concentrations of 615 milligrams per kilogram (mg/kg) and 465 mg/kg were detected at SP9 and SP10, respectively. The concentrations exceeded the Part 201 Residential Drinking Water Protection Criterion (DWPC) of 400 mg/kg.

4.4.2 Groundwater Results

VOCs

A benzene concentration of 1.4 micrograms per liter (ug/L), a toluene concentration of 4.6 ug/L and a xylenes concentration of 3.4 ug/L were detected at SP4. The various concentrations were detected below the Part 201 Residential & Commercial I Drinking Water Criterion (DWC) of 5 ug/L for benzene, 790 ug/L for toluene and 280 ug/L for xylenes.

In addition, a 1,1,1-trichloroethane concentration of 3.4 ug/L was detected at SP4. The concentration was detected below the Part 201 Residential & Commercial I DWC of 200 ug/L. Since this compound is denser than groundwater, a potential exists that this chlorinated compound as well as other chlorinated compounds may be present at elevated levels at deeper depths in the groundwater. The remaining VOC constituents were not detected above the analytical laboratory MDLs in the groundwater samples analyzed. It should be noted that Lawrence Industries, Inc. does not intend to use chlorinated solvents during plating operations.

PNAs

PNA concentrations for the groundwater samples analyzed were less than the MDLs.

Metals

A barium concentration of 0.11 milligrams per liter (mg/L) and a selenium concentration of 0.006 mg/L were detected at SP5, and a selenium concentration of 0.015 mg/L was detected at SP2. The various concentrations were detected below the Part 201 Residential & Commercial I DWC of 2 mg/L for barium and 0.05 mg/L for selenium.

Metals concentrations for the other groundwater samples analyzed were less than the MDLs.

4.5 Results of Future Chemical Use and Storage Areas Assessment

SME performed additional evaluation of the Property in July 2000 to determine if regulated constituents were present in the soil beneath the proposed chemical storage and plating process areas.

The 12 additional soil probes, identified as SP11 through SP22 were conducted within the building to provide a baseline for indicator parameters for those chemicals that the prospective owner will be using as part of its' operations (overlapping chemicals). Soil samples were analyzed for chromium, copper, lead, nickel, silver, zinc, formaldehyde and methanol.

4.5.1 Soil Probes Within the Building

Formaldehyde and methanol were not detected exceeding the analytical laboratory MDLs in the soil samples analyzed.

Chromium was detected at a concentration of 36.3 mg/kg in the sample from SP17 (1') and at a concentration of 69.7 mg/kg in the sample from SP21 (1'). The chromium concentrations exceeded the Part 201 Residential DWPC of 30 mg/kg. The remaining chromium concentrations did not exceed the Part 201 Residential Cleanup Criteria.

Lead was detected at concentrations ranging from 452 mg/kg in the sample from SP20 (1') to 1,180 mg/kg in the sample from SP17 (1'), which exceeded the Part 201 Residential DCC of 400 mg/kg. The remaining lead concentrations did not exceed the Part 201 Residential Cleanup Criteria.

4.6 Summary of Contamination Identification and Distribution

Based on the laboratory analytical results for the metals testing, arsenic (CAS# 7440382), barium (CAS# 7440393), chromium (CAS# 18540299, 16065831), lead (CAS# 7439921) and selenium (CAS# 7782492) were detected in soil samples at concentrations, which exceeded the Part 201 Residential DWC and/or Part 201 Residential DCC.

The various metals that identified the Property as a "facility" appeared to be present within the fill stratum at various locations at the Property. As described above, the other constituents that were analyzed (VOCs, PNAs, formaldehyde, methanol and other various metals) as part of this BEA were not detected above Part 201 Residential DWPC or DCC, as appropriate.

It is anticipated that Lawrence Industries, Inc. will be using chromium in its' plating solutions and will be using lead anodes at the Property. For the overlapping metals in the soil samples, six of the eleven samples exceeded the Part 201 Residential DWPC. The sample locations that exhibited elevated levels of chromium were located beneath the central and south portions of the building. Although the chromium concentrations were random and did not exhibit any trends, the elevated levels only slightly exceeded the Part 201 Residential DWPC and appeared to be limited. Based on a review of the proposed layout for plating, it does not appear that chrome will be located in the area containing elevated levels of chromium. Areas where chrome plating is proposed will be in the western portion of the building where chromium concentrations did not exceed Part 201 Residential DWPC. Therefore, a means to distinguish existing impact from new releases will be available.

The reported lead concentrations beneath the building vary widely. This is likely attributable to the random placement of fill beneath the building and not from a single or multiple point source. Historically, foundry sand fill was widely used throughout the City of Kalamazoo, which accounts for the apparently random variation of the reported lead levels. Lead concentrations ranged from 5 mg/kg to 1,180 mg/kg in the soil beneath the building, with the average lead concentration beneath the building calculated to be 458 mg/kg. Although Lawrence Industries, Inc. will be using lead at the Property in its' operations, the material is contained in solid form within lead anode bars that will be submerged in plating solutions within an engineer-controlled area. In the event of a release, and a simultaneous failure of the engineering controls, the presence of other chemicals (plating fluid) would be present along with low-level lead concentrations. These other constituents in the plating fluid could be used as indicators to define the extent of a release. In addition, a comparison could be made to the average lead level discovered beneath the building. The occurrence of lead detected in the soil samples analyzed is shown on Figure 5.

5.0 LIKELIHOOD OF OTHER CONTAMINATION

Based on our April 19, 2000, Phase I ESA, and June and July, 2000 Limited Phase II ESA, areas of concern other than those addressed above were not noted.

Based on a review of the analytical results from the Limited Phase II ESA evaluation, levels of VOCs and metals exceeding the analytical laboratory MDLs, but below the MDEQ cleanup criteria were reported in the soil and groundwater samples collected at the Property.

Therefore, a potential exists that these constituents may be present at elevated levels elsewhere on the Property. Further, a potential exists that chlorinated compounds may be present at elevated levels at deeper depths in groundwater at the Property.

Several abandoned 1-gallon containers and 55-gallon drums containing automotive liquids and cleaning solvents were observed both inside and outside the building during the Property walkover. Additionally, two empty abandoned 250-gallon above ground storage tanks were observed outside the building during the Property walkover. Lawrence Industries, Inc., intends to have the storage containers removed by the current owner before Lawrence Industries, Inc. purchases the Property. Appendix I contains form EQP 4476 - Notice Regarding Discarded or Abandoned Containers.

SME cannot guarantee all potential contaminants have been identified, or that unknown contamination may exist at the Property resulting from historical activities or off site sources. In addition, the extent of identified constituents at elevated levels has not been fully determined. The location of the soil probes and the analytical testing program were selected based on known historical uses of the Property and the planned future use of chemicals. The analytical testing program was designed to incorporate those compounds, which would be likely indicators of a release, by the property owner, should a release occur.

6.0 CONCLUSIONS

SME has performed this Category S BEA for the Property, which consisted of approximately 1.2 acres of land situated at the northwest corner of Walbridge Street and East Harrison Court in Section 15, Township 2 South, Range 11 West, in Kalamazoo, Kalamazoo County, Michigan.

The results of the Limited Phase II ESA, which was conducted for this BEA, indicated the Property meets the criteria of a "facility" with respect to metals (arsenic, barium, chromium, lead and selenium). The Property is not indicated to be a "facility" with respect to the other constituents (VOCs, PNAs and other various metals) that were analyzed as part of the Limited Phase II ESA. SME's Limited Phase II ESA included analysis of the primary indicators of any future release from the various chemicals that will be stored on Property.

The lateral extent of contamination does not appear to be defined on the Property. However, if a release should occur in the area where chemicals are used, secondary containment in the process and material storage areas would contain the release. In addition, epoxy sealant will be applied to the floor in order to contain any future spills, which will any release into the environment or the subsurface soil.

Prior to installation of equipment and beginning operations at the Property, Lawrence Industries, Inc., will employ the engineering controls and secondary containment previously discussed in this BEA. If Lawrence Industries, Inc., is unable to construct the engineering controls and/or secondary containment within 45 days of ownership, Lawrence Industries, Inc. will prepare an affidavit which states that from the time of purchase and the date the engineering controls and/or secondary containment were employed, no hazardous substances were used, stored, handled or managed on the Property in quantities that constitute significant hazardous substance use.

Lawrence Industries, Inc. will be responsible for checking the integrity of the engineering controls and secondary containment. The epoxy sealed concrete floor inside the building and the outside asphalt paved parking area will be maintained in a good condition. If the integrity is visibly impaired, corrective actions will be taken to repair the concrete or pavement. Corrective actions may consist of re-sealing cracks in concreted and paved areas.

No floor drains will exist inside the building. The design of the secondary containment proposed for the Property will prevent potential discharges to the storm sewer located outside the building. Lawrence Industries, Inc. has indicated that the sanitary sewer lines within the building, which will be used to discharge rinse water from plating operations will be evaluated to determine the pipe integrity (i.e., leaks, abandoned sections). If portions of the pipes leak or abandoned sections are present, Lawrence Industries, Inc. will repair/cap the lines prior to performing plating operations.

The analysis and recommendations for the Limited Phase II ESA submitted in the attached Phase I ESA report were based upon the site walkover and historical environmental records search. In the Phase I ESA report, SME identified several areas of potential environmental concern, which were further evaluated by conducting the Limited Phase II ESA conducted for this BEA. Laboratory analyses of soil and groundwater samples obtained during the Limited Phase II ESA were based on the historical usage of the Property and field observations. In the process of obtaining information in preparation of this BEA, procedures were followed that represent current reasonable and accepted engineering and hydrogeological practices and principles, in a manner consistent with the level of care and skill ordinarily exercised by members of these professions.

SME has performed the Baseline Environmental Assessment based upon observed conditions, information discovered during the records search, projected future use of the subject property, and soil conditions encountered during the subsurface activities. Based on subsurface, analytical, and historical data which have been collected, the projected future use of the subject property, and the materials proposed to be used in significant quantities at the subject property, it is SME' opinion that this BEA is sufficient to provide a basis to distinguish potential future hazardous substance release from the existing facility conditions.

7.0 REFERENCES

1. Phase I Environmental Site Assessment, 423 Walbridge Street, Kalamazoo, Michigan, prepared by Soil and Materials Engineers, Inc., April 19, 2000.

2. DEQ Training Material for Part 201 Cleanup Criteria, Michigan Department of Environmental Quality, January 1998 and February 18, 1999 revised Tables.

3. The Michigan Department of Environmental Quality, Instructions for Preparing and Disclosing Baseline Environmental Assessments and Section 7a Compliance Analyses, dated March 3, 1999, effective March 11, 1999.

4. Enrolled House Bill 4596, Part 201 of 1994 PA 451, as amended, the Natural Resources and Environmental Protection Act, June 5, 1995.

5. Michigan Department of Environmental Quality, Environmental Response Division, Revised Part 201 Operational Memorandum #18 Cleanup Criteria Tables, dated June 7, 2000.

APPENDICES

APPENDIX A:	FIGURES
APPENDIX B:	PHASE I ESA
APPENDIC C:	LEGAL DESCRIPTION
APPENDIX D:	SUMMARY OF CHEMICAL STORAGE INFORMATION
APPENDIX E:	MATERIAL SAFETY DATA SHEETS
APPENDIX F:	DIAGRAM OF PROCESS AREA
APPENDIX G:	SOIL PROBE LOGS
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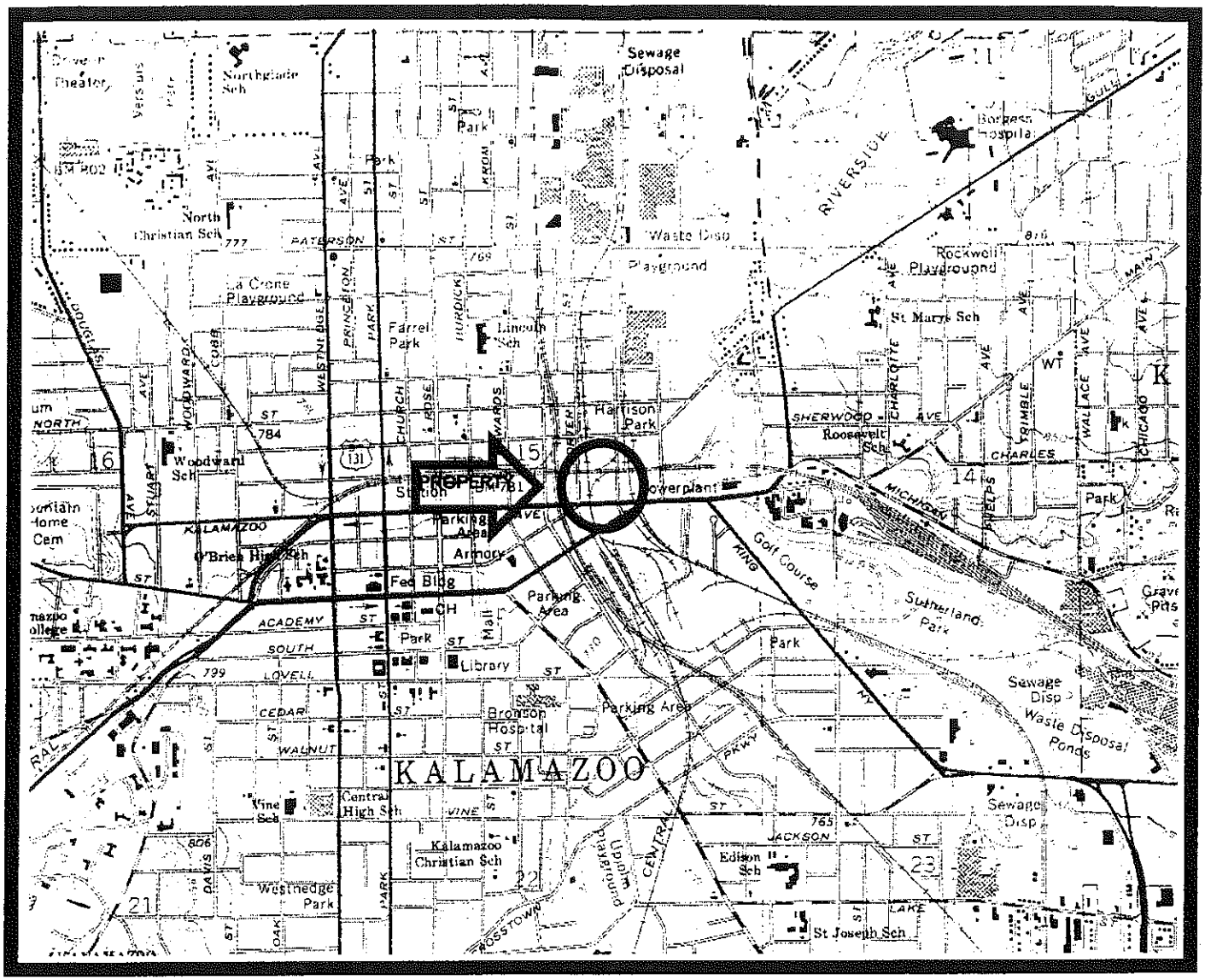
APPENDIX I:	TABLES
APPENDIX J:	EQP 4476 – NOTICE REGARDING DISCARDED OR ABANDONED CONTAINERS

APPENDIX A

FIGURES



SCALE 1:24 000

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1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

KALAMAZOO, MICH.

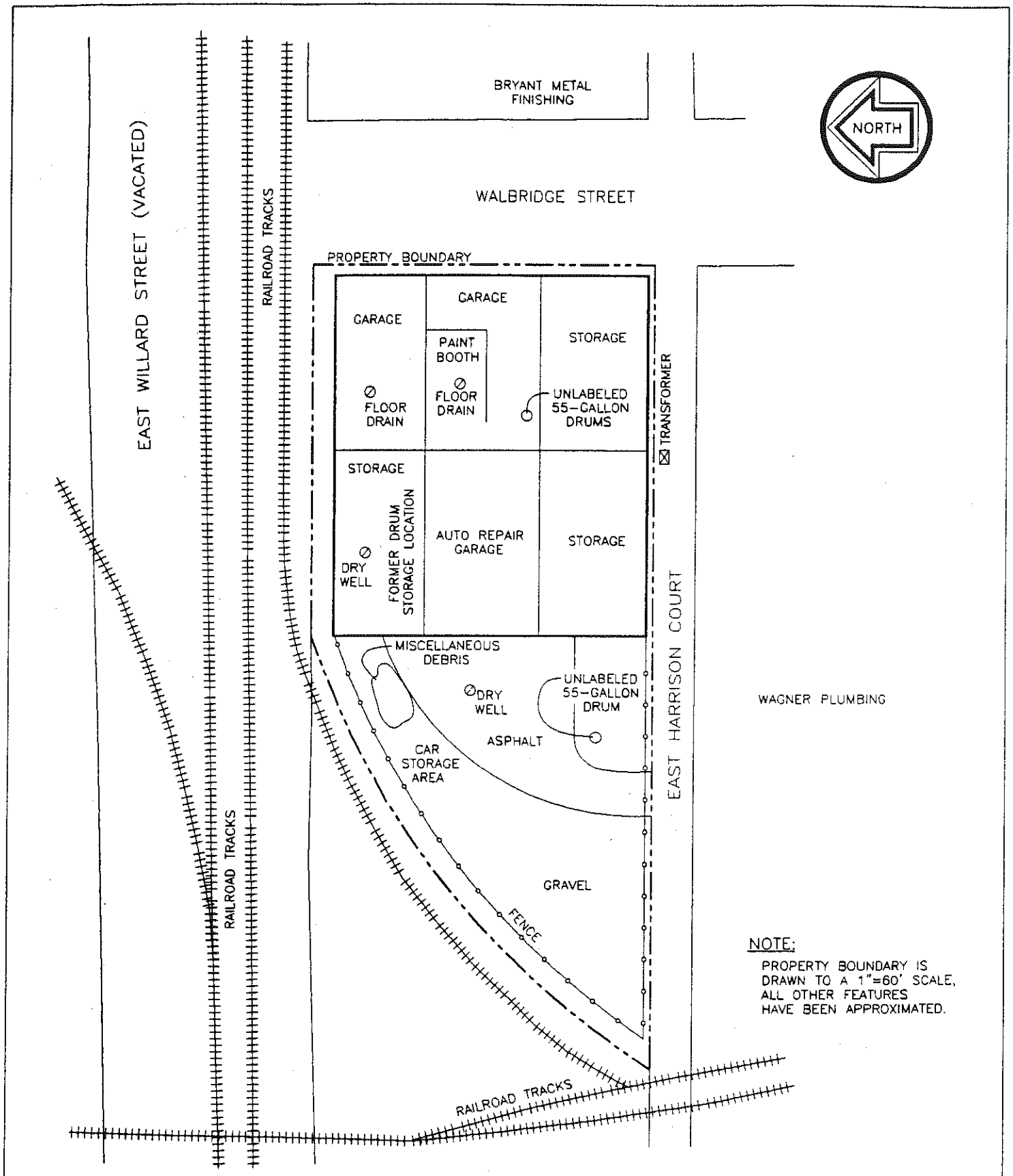
42085-C5-TF-024

1967
PHOTOREVISED 1973
DMA 3868 I SE—SERIES V862

N

Date 4-20-00 Drawn by NGG Scale AS SHOWN Job No. KE35803	BAY CITY KALAMAZOO LANSING PLYMOUTH TOLEDO	soil and materials engineers, inc.	Property Location Diagram 423 Walbridge Kalamazoo, Michigan

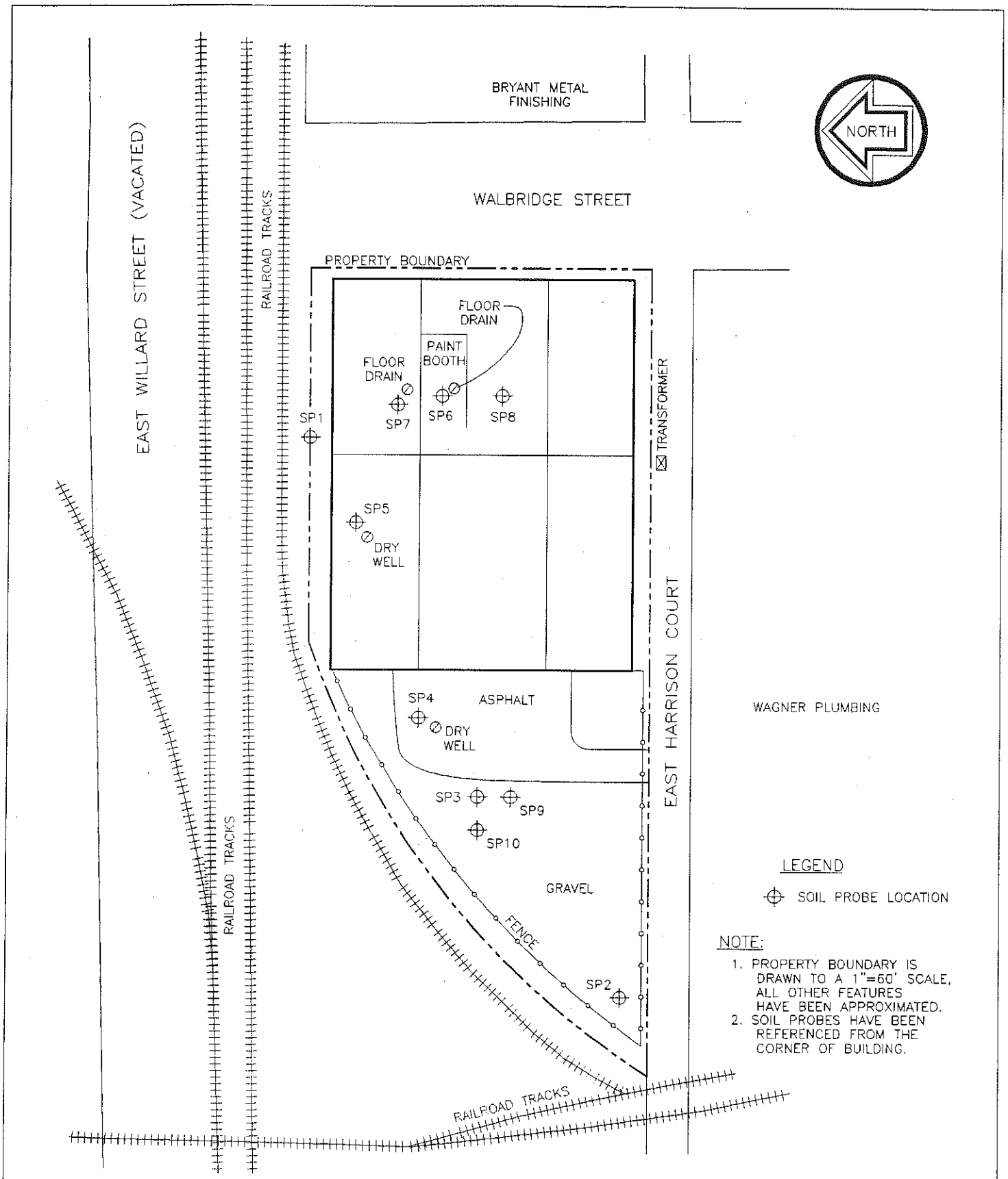
FIGURE 1



43880 PLYMOUTH OAKS BOULEVARD PLYMOUTH, MICHIGAN 48170 (313) 454-9900	BAY CITY KALAMAZOO LANSING PLYMOUTH TOLEDO	DATE 4-18-00 DRAWN BY AJW SCALE 1" = 60' JOB KE 35803	PROPERTY FEATURES DIAGRAM 423 WALBRIDGE STREET KALAMAZOO, MICHIGAN

FILE NAME H:\35000\35803-01.DWG

Figure No. 2



43980 PLYMOUTH OAKS BOULEVARD
PLYMOUTH, MICHIGAN 48170
(313) 454-9900

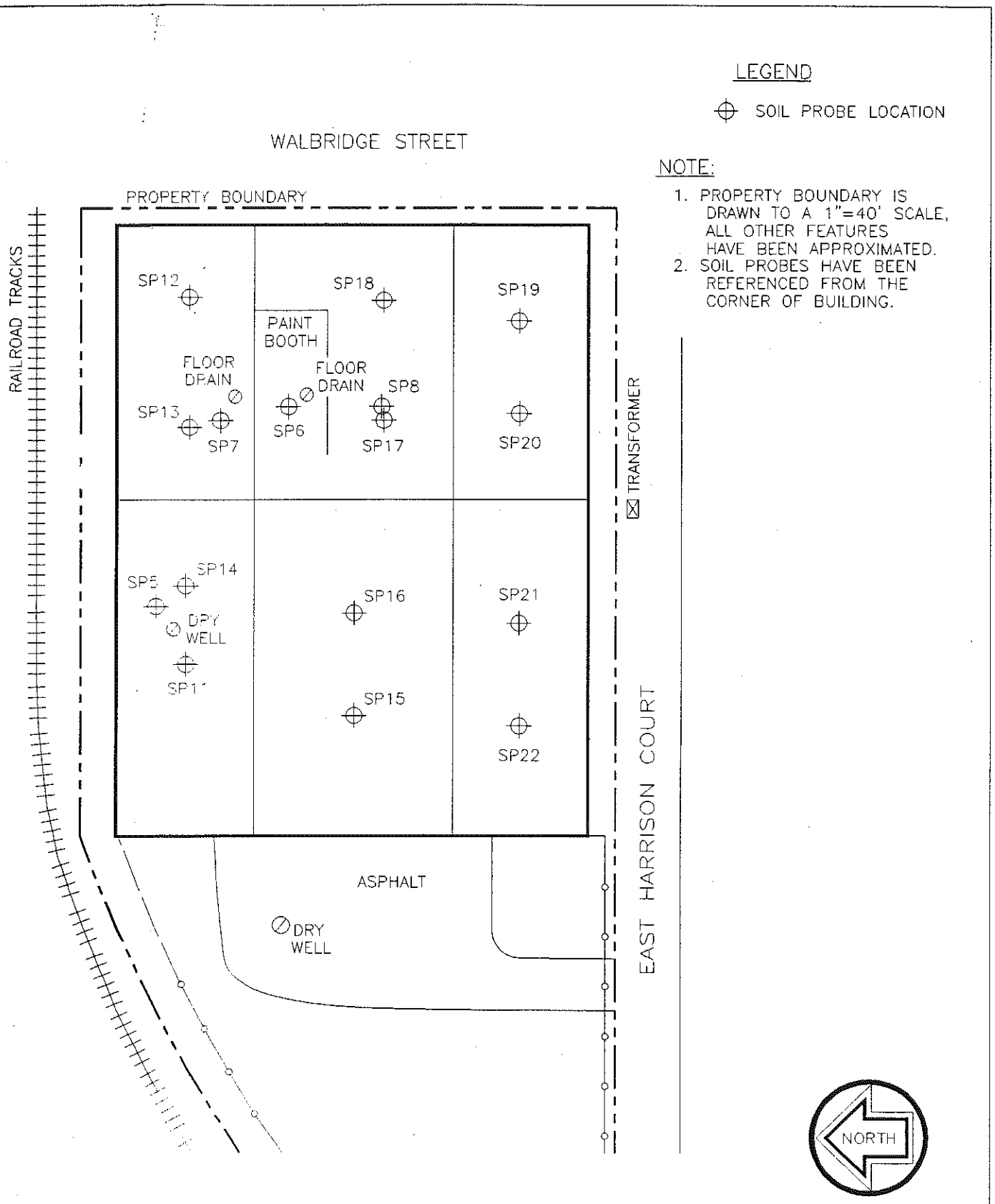
BAY CITY
KALAMAZOO
LANSING
PLYMOUTH
TOLEDO

DATE	6-16-00
DRAWN BY	AJW
SCALE	1"=appx.60'
JOB	KE 36281

SOIL PROBE LOCATION DIAGRAM
423 WALBRIDGE STREET
KALAMAZOO, MICHIGAN

FILE NAME H:\36000\36281-01.DWG

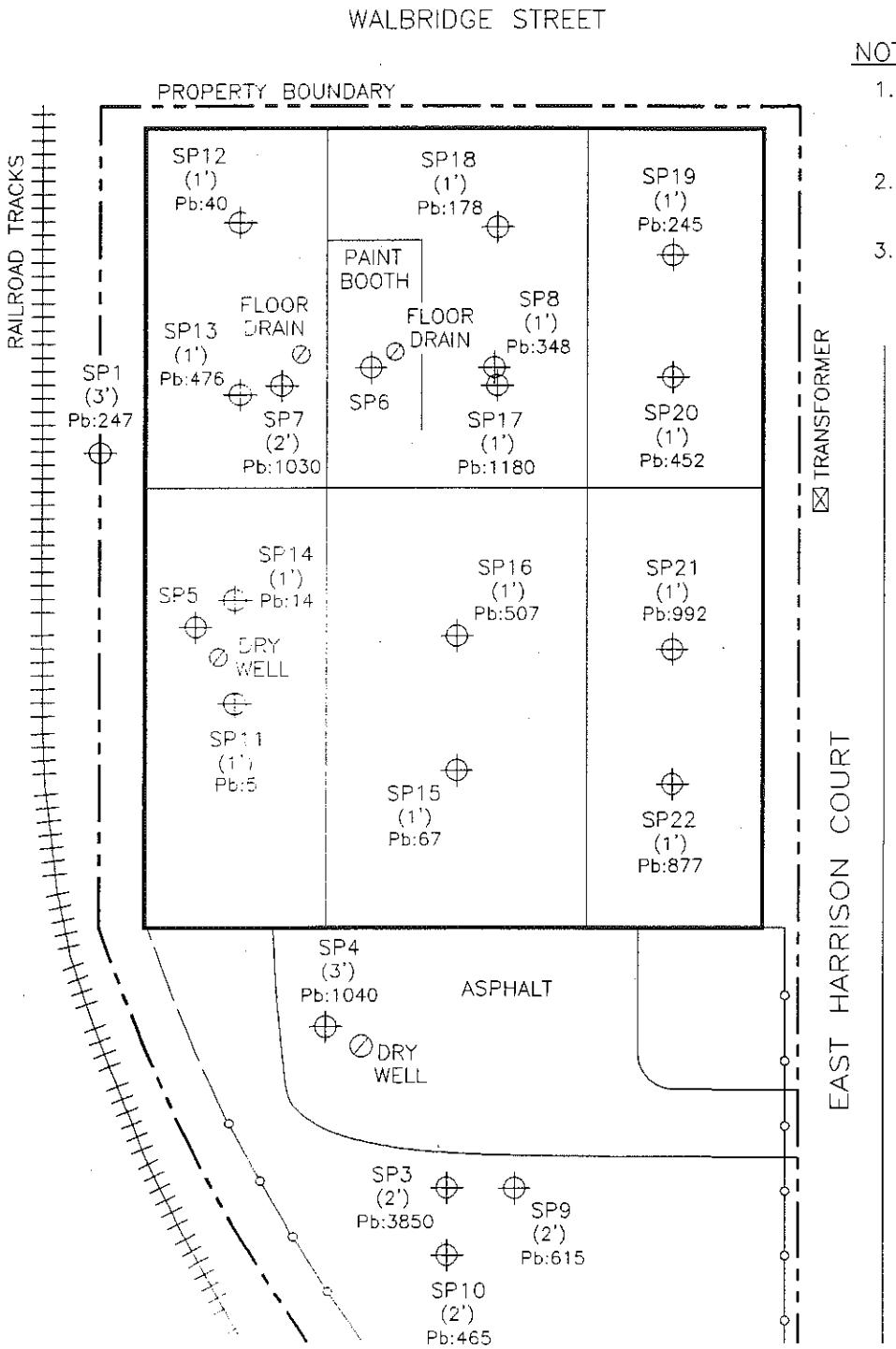
Figure No. 3



43980 PLYMOUTH OAKS BOULEVARD PLYMOUTH, MICHIGAN 48170 (313) 454-9900	BAY CITY KALAMAZOO LANSING PLYMOUTH TOLEDO	DATE 7-19-00 DRAWN BY AJW SCALE 1"=appx.40' JOB KE 36281	SOIL PROBE LOCATION DIAGRAM 423 WALBRIDGE STREET INSIDE BUILDING KALAMAZOO, MICHIGAN

FILE NAME H:\36000\36281-02.DWG

Figure No. 4



LEGEND

⊕ SOIL PROBE LOCATION

NOTE:

1. PROPERTY BOUNDARY IS DRAWN TO A 1"=40' SCALE, ALL OTHER FEATURES HAVE BEEN APPROXIMATED.
2. SOIL PROBES HAVE BEEN REFERENCED FROM THE CORNER OF BUILDING.
3. LEAD CONCENTRATIONS REPORTED IN MILLIGRAMS PER KILOGRAM.

43980 PLYMOUTH OAKS BOULEVARD PLYMOUTH, MICHIGAN 48170 (313) 454-9900	BAY CITY KALAMAZOO LANSING PLYMOUTH TOLEDO	DATE 7-19-00 DRAWN BY AJW SCALE 1"=appx.40' JOB KE 36281	LEAD CONCENTRATION DIAGRAM 423 WALBRIDGE STREET KALAMAZOO, MICHIGAN

FILE NAME H:\36000\36281-03.DWG

Figure No. 5

APPENDIX B

PHASE I ESA

PHASE I
ENVIRONMENTAL SITE ASSESSMENT
423 WALBRIDGE
KALAMAZOO, MICHIGAN

SME Project Number KE35803
April 19, 2000

Consultants in the geosciences, materials and the environment

- *Caissons/Piles*
- *Corrosion*
- *Dewatering*
- *Drilling*
- *Earth Retention Systems*
- *Foundation Engineering*
- *Geodynamics/Vibrations*
- *Geophysical Survey*
- *Geosynthetics*
- *Ground Modification*
- *Instrumentation*
- *Settlement Analysis*
- *Site Condition Assessment*
- *Slope Stability*
- *Building Restoration*
- *Coatings*
- *Concrete*
- *Condition Survey*
- *Construction Materials Services*
- *Facility Asset Management*
- *Forensic Engineering*
- *Masonry/Stone*
- *Metals*
- *Nondestructive Testing*
- *Pavement Evaluation/Design*
- *Roof System Management*
- *Sealants/Waterproofing*
- *Structural Steel/Welding*
- *Air Quality*
- *Asbestos/Lead Based Paint*
- *Baseline Environmental Assessment*
- *Due Care Analysis*
- *Environmental Site Assessment*
- *Hydrogeologic Evaluation*
- *Industrial Hygiene*
- *Landfill Services*
- *Pollution Prevention*
- *Regulatory Compliance*
- *Remediation*
- *Risk Assessment*
- *Storm Water Discharge*
- *Underground Storage Tanks*

soil and materials engineers, inc.

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Herbert A. Hoskins, CHMM
Davie J. Hurlburt, PE
Truman F. Maxwell, CPA
Michael S. Meddock, PE
Mark A. Michener
Timothy J. Mitchell, PE
Thomas M. Peet, PE
Thomas M. Powell
Larry W. Shook, PE

35 Years of Service

April 19, 2000

Ms. Ruth E. Murphy
P.O. Box 141
Plainwell, Michigan 49080

Re: Phase I Environmental Site Assessment
423 Walbridge
Kalamazoo, Michigan
SME Project Number KE35803

Dear Ms. Murphy:

SME has completed the Phase I Environmental Site Assessment (ESA) of the above referenced property. Enclosed are three copies of SME's completed report. This report presents SME's interpretation of the observed conditions based on field observations, a review of readily available historical and regulatory records, and interviews.

The Phase I ESA was requested to identify recorded and readily observable recognized environmental conditions associated with the property. SME understands Ms. Ruth Murphy, and Miller, Canfield, Paddock, and Stone, P.C., will rely upon the professional opinions and representations contained in the report. This reliance is not to be construed as a warranty or guarantee on the part of SME.

Thank you for the opportunity to provide these services. If you have any questions concerning this report, or if additional services are required, please call.

Very truly yours,

SOIL AND MATERIALS ENGINEERS, INC.

Davin K. Ojala
Environmental Specialist

Michael S. Meddock, PE
Manager - Environmental Services

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Appendix A: Property Location Map
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Appendix F: Owner/Occupant Disclosure Statement

EXECUTIVE SUMMARY

The findings of the Phase I Environmental Site Assessment (ESA) conducted on 423 Walbridge located in the City of Kalamazoo, Kalamazoo County, Michigan (Property), are summarized as follows:

Findings and Conclusions

One building was located on the Property at the time of SME's walkover on April 13, 2000. The building was used as an auto repair garage and for the storage of generators and equipment from Norm's Electric Motor Repair.

SME observed five unlabeled 55-gallon drums and several boxes of fluorescent light ballasts on the Property. No staining or evidence of spills was observed on the ground surface surrounding the drums or light ballasts.

Historical sources indicated that an oil house existed on the west portion of the Property in 1891 in connection with an industrial company located on the west-adjoining site. Portions of the Property were used for residential, industrial and storage of city equipment between 1891 and 1965. Between 1965 and 1995 the Property was used by Food Processing Equipment Company to manufacture equipment for the food processing industry. The former oil house represents an REC to the Property.

SME observed surficial staining from oil on the Property. Staining was observed in the building from oil spills in the auto repair garage and equipment storage areas. Oil staining was observed on the ground surface located in the fenced area on the west portion of the Property. The staining represents an REC to the Property.

Two drywells and two floor drains were observed on the Property. Oil staining was observed around the edge and inside the drywell located in the fenced area. The oil staining observed inside the drywell represents an REC to the Property. The other drywell and floor drains have unknown discharge locations. Based on this information, the drywells and floor drains represent an REC to the Property.

Slag and cinder fill material was observed in the fenced area and along the north side of the Property. The presence of slag and cinder fill material on the Property represents an REC.

The known sites of environmental contamination identified within the appropriate ASTM-defined radii did not represent an REC to the Property.

The regulatory agencies interviewed for this Phase I ESA were not aware of any environmental concerns associated with the Property.

Recommendations

In SME's professional opinion, based on the information gathered for this Phase I Environmental Site Assessment, additional assessment of the Property is warranted. SME recommends the collection of soil and/or groundwater samples at the Property to assess the potential for subsurface contamination resulting from the slag and cinder fill material, oils associated with the auto repair garage and electrical equipment, unknown discharge locations

of the drywells and floor drains, and the oil house formerly located on the Property. Additionally, the unlabeled 55-gallon drums should be properly removed and disposed. Also, the fluorescent light ballasts should be sampled for Polychlorinated Biphenyls content and properly disposed.

The summary presented above is general in nature and should not be considered apart from the entire text of the report with all the qualifications and considerations mentioned herein. Details of our findings and conclusions are included in this report.

REPORT PREPARED BY:

Davin K. Ojala
Environmental Specialist

REPORT REVIEWED BY:

Michael S. Meddock, PE
Manager - Environmental Services

1.0 INTRODUCTION

SME has performed a Phase I Environmental Site Assessment (ESA) on 423 Walbridge located in Kalamazoo, Michigan (Property). The general location of the Property is shown on the Property Location Diagram, presented in Appendix A.

Ms. Ruth Murphy authorized this Phase I ESA. This report is intended to be used solely and exclusively by Ms. Murphy, and Miller, Canfield, Paddock, and Stone, P.C. No other party may rely upon SME's opinions, conclusions, or reports unless SME has agreed to such reliance in writing.

1.1 Purpose

The purpose of this Phase I ESA was to identify **recognized environmental conditions (RECs)** on the Property and assess the relative significance of the identified REC(s). An REC is defined by ASTM as;

...the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. Recognized environmental conditions are not intended to include de minimus conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.*

*For the purposes of this Phase I ESA, a hazardous substance is a substance as defined in the ASTM Standard E 1527-97.

1.2 Scope of Services

The Phase I ESA is in general accordance with the ASTM Standard on Environmental Site Assessments for Commercial Real Estate designation E 1527-97, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process." The specific scope of services is included in Appendix B.

2.0 PROPERTY DESCRIPTION

The following is a description of the Property and observed uses and conditions. Additionally, potential RECs identified during the Property walkover and interviews are described.

2.1 Property Location

The Property was located west of Walbridge Street, north of East Harrison Court in the City of Kalamazoo, Section 15, Township 2 South, Range 11 West, Kalamazoo County, Michigan. A legal description for the Property is presented in Appendix C.

2.2 Physical Setting

SME reviewed a topographic map to evaluate the physical setting of the Property. According to the United States Geological Survey (USGS) Kalamazoo dated 1967, and photorevised in 1973, 7.5 Minute Series quadrangle topographic map, the Property elevation was approximately 770 feet above mean sea level (MSL). Regional topography appeared to slope toward the Kalamazoo River located approximately ¼ mile east of the Property.

2.3 Property Walkover

On April 13, 2000, Thomas N. Stolz and Davin K. Ojala of SME conducted an observational walkover and recorded Property conditions, features, and RECs observed. Photographs taken during the walkover which illustrate observed Property conditions and surrounding areas are presented in Appendix D. A Property Features Diagram, developed from observations, field notes, and photographs, is presented in Appendix E.

The Property encompassed approximately 1.15 acres, approximately one-half of which was occupied by a building on the east portion of the Property. The building, constructed with brick walls and a concrete floor slab, was approximately 25,450 square feet in size and consisted of three garage areas, three storage areas, a paint booth, and an office area. Mr. Don Thall, owner of the Property, was available to answer questions and to provide access to the building.

SME observed several cars, engines, repair equipment, 36 containers of miscellaneous engine fluids and cleaning solvents in household quantities of one gallon or less, and four unlabeled 55-gallon drums containing unknown contents in the garage areas. Mr. Thall indicated that Norm's Electric Motor Repair owned the drums and used a portion of the building to store equipment. The concrete floor slab near the miscellaneous engine fluids, cleaning solvent containers, and drums appeared to be in good condition with no staining observed. Therefore, the engine fluids, cleaning solvent, and drums did not represent an REC to the Property.

The storage areas contained cars, generators, and other miscellaneous equipment. SME observed staining in the building associated with motor oils from the automobile engines and stored equipment. One area of staining, encompassing approximately 300 square feet, was observed near the northwest corner of the building. Mr. Thall indicated that this

was a former drum storage location. Several engines were observed leaking oil onto the concrete floor in the garage areas of the building. SME observed expansion joints in the concrete floor near several of the stained areas and engines.

SME observed two drywells on the Property. One was located in the northwest corner of the building. An overflow pipe was observed in this drywell extending toward the west. Mr. Thall indicated the overflow pipe was connected to the second drywell observed in the fenced area on the west portion of the Property. Stained concrete was observed near the drywells. The presence of drywells on the Property represents an REC to the Property.

SME observed a paint booth near the central portion of the building. Paint residue was observed on the wall and floor surfaces. SME observed a floor drain in the paint booth. Mr. Thall indicated the floor drain was most likely connected to the sanitary sewer. SME observed a floor drain in the garage area located near the northeast corner of the building. Mr. Thall indicated the floor drain is most likely connected to the sanitary sewer system. The concrete in this portion of the building was stained and oil absorbent material was observed in several areas. Due to the staining observed in the building, and the unknown nature of the sewer connections, housekeeping practices represented an REC in connection with the Property.

The remainder of the Property included a fenced area encompassing the west half of the Property. The fenced area consisted of grassy areas and an asphalt drive extending from the building toward East Harrison Court. Approximately 15 cars, several engines, miscellaneous equipment, several oil stains, and one unlabeled drum were observed in the fenced area. The drum appeared to be in good condition with no evidence of leaks or spills.

SME observed slag and cinder fill material along the north side of the Property and a miscellaneous debris pile inside the fenced area near the northwest corner of the building. Additionally, several small stains were observed within the fenced area. This slag and cinder fill material and stained areas represent an REC to the Property.

2.4 Operations, Activities, and Processes

The Property was used as an auto repair garage and for storage of vehicles, various automobile parts, and electrical equipment. Automobile painting also reportedly occurred at the Property. No other operations, activities, or processes on the Property were observed at the time of SME's walkover.

2.5 Utilities and Drainage

According to the Kalamazoo Assessing Department, municipal water, sanitary sewer, natural gas, and electric are available to the Property. Drywells, described in section 2.3, were observed on the north and west portions of the Property. Sanitary sewer was reportedly connected to the Property in various stages, as the different sections of the building were constructed. The integrity of the sewer connections is unknown. City of Kalamazoo Engineering Department records indicate that several sewer connections were available to the residences previously located on the Property. However, no records were available detailing connections to the building observed on the Property.

Natural gas has reportedly serviced the building since at least 1953. SME researched the heating source for the Property prior to 1953. Building department records and Sanborn Fire Insurance Maps indicate no heating oil underground storage tanks (USTs) or aboveground storage tanks (ASTs) were located on the Property. Based on this information, heating oil does not appear to represent an REC in connection with the Property.

2.6 Adjoining Properties

SME observed adjoining sites from the Property boundaries and public rights-of-way for evidence of potential RECs. The Property walkover did not include accessing the adjoining properties. Railroad tracks adjoined the Property to the north with vacated East Willard Street north of the railroad tracks. Walbridge Street adjoined the Property to the east with Bryant Metal Finishing east of Walbridge Street. East Harrison Court adjoined the Property to the south with Wagner Plumbing south of East Harrison Court. Railroad tracks adjoined the Property to the west with a rail yard west of the railroad tracks.

Based on visual observations, the adjoining sites did not appear to represent RECs in connection with the Property

2.7 Potential Recognized Environmental Conditions Observed

During the Property walkover, SME searched for potential RECs. Identified RECs are described in the following sections.

2.7.1 Chemical Use and Storage

Chemical use and storage on the Property consisted of miscellaneous engine fluids, solvents used to clean engine parts, and used oil drained from the engines.

Approximately 24 containers of miscellaneous engine fluids and 12 containers of cleaning solvent in quantities of 1 gallon or less were observed in the garage area located near the east central portion of the building. The floor area near the engine fluid and cleaning solvent containers appeared to be in good condition with no staining observed. Therefore, the engine fluids and cleaning solvent do not represent an REC to the Property.

Five unlabeled 55-gallon drums were observed on the Property. The drums appeared to be in good condition and no staining was observed on the ground surface surrounding the drums.

2.7.2 Underground/Aboveground Storage Tanks

SME did not observe evidence of USTs, such as fill ports, vent pipes, dispensers, and excavated areas at the time of the observational walkover.

Two empty, steel ASTs were observed on the Property. One tank, approximately 250 gallons in size, was observed near the southwest corner of the building. Mr. Thall indicated the AST was stored onsite by Norm's Electric Motor Repair and was used off-site to fuel a generator. A second AST, approximately 250 gallons in size, was observed in the fenced area of the Property along the west side of the building. The AST was empty and intended to be converted into a grill. The ASTs do not represent an REC to the Property.

2.7.3 Polychlorinated Biphenyl-Containing Electrical Transformers

SME observed two pole mounted electrical transformers along the south side of the Property. No staining was observed near the transformers and labels regarding Polychlorinated Biphenyls (PCBs) content were not observed on the transformers at the time of the observational walkover.

Several boxes of fluorescent light ballasts were observed in the southwest storage area. Minor staining was observed on the boxes. However, no staining of the concrete floor was observed in the vicinity of the light ballasts. PCB-containing equipment did not appear to represent an REC in connection with the Property.

2.7.4 Waste Generation, Treatment, Storage, and Disposal

Waste generated on the Property consisted of dry-absorption material used to soak up spilled oil, and general refuse. Mr. Thall indicated that the dry-absorption material is containerized in cardboard boxes inside the building and removed by a licensed waste disposal company every few months. General refuse was stored in containers inside the building and reportedly disposed of off-site.

Several containers of used motor oil were observed in the garage areas of the building. Mr. Thall indicated that oil change operations are not performed in the building and the used oil is returned to the engine after repairs are completed or disposed of off-site. SME did not observe other waste generation, treatment, storage, or disposal on the Property.

3.0 HISTORICAL REVIEW

SME reviewed the history of use of the Property at intervals defined by ASTM from the present back to the obvious first developed use of the Property, or back to 1940, whichever was earlier. SME reviewed this information from reasonably available standard sources such as information that was publicly available, information that was obtainable from its source within reasonable time and cost constraints, and information that was practically reviewable. Data failures encountered, as defined by ASTM, are described under each appropriate standard historical source.

3.1 Historical Sources Reviewed

SME reviewed the following reasonably ascertainable historical sources to identify the ownership/use of the Property. The historical usage summary is identified at the end of this section followed by a description of potential RECs identified during the historical review.

1. **Aerial Photographs:** SME reviewed aerial photographs dated 1938, 1950, 1960, and 1974 at the Kalamazoo County USDA Service Center located in Portage, Michigan. Aerial photographs dated 1968, 1978, 1986, and 1997 were reviewed at the City of Kalamazoo Engineering Department. The 1938, 1950, and 1960 aerial photographs depicted a building along the north side of the Property and an area of equipment storage on the central portion of the Property. Tree canopy did not permit viewing of the east portion of the Property along Walbridge Street. A building was observed on the west adjoining site and the parking area for this building extends onto the west portion of the Property. The railroad tracks along the north and west Property boundary were not present. The 1968 and 1974 aerial photographs depict the current building, as observed at the time of the walkover. However, the northwest corner of the building had not been fully constructed. SME observed a gravel drive extending from the west side of the building toward East Harrison Court, an area of exposed soil along the north side of the building, and railroad tracks along the north and west Property boundary. The 1978, 1986, and 1997 aerial photographs depict the building and adjoining sites as observed at the time of the observational walkover.

2. **Sanborn Fire Insurance Maps:** Sanborn fire insurance maps for the Property dated 1887, 1891, 1902, 1908, and 1932 were reviewed at the Kalamazoo Public Library. The 1887, 1891, and 1902 depicted portions of the Property used for the Michigan Buggy Company. SME observed an oil house on the west portion of

the Property in the 1891 map. The 1891, 1902, 1908, and 1932 depict three residences along Walbridge Street and four different warehouse buildings near the center of the Property used as a city supply yard.

3. **Local City Directories:** Polk City Directories for the area of the Property were available at the Kalamazoo Public Library for the years 1902 to 1999. Directories, reviewed in five-year increments, listed residences at 423 and 425 Walbridge Street between 1902 and 1965. 421 Walbridge Street was also listed as a residence between 1926 and 1965. Food Processing Equipment was listed at 425 Walbridge Street from 1967 to 1995. The 1997 directory listed 425 Walbridge as vacant. Since 1998 there was no listing for 425 Walbridge.

4. **Property Tax Files and Building Permits:** SME contacted the City of Kalamazoo Assessing Department regarding information for the Property. Assessment records listed the size of the Property, construction dates, and the utilities available to the Property. SME reviewed historical building permits at the City of Kalamazoo Records Management Department. Building permits provided dates for several additions made to the building currently on the Property, as well as the dates the residences were razed. City records did not indicate the presence or historical presence of RECs at the Property.

5. **Zoning/Land Use Records:** SME contacted the City of Kalamazoo regarding zoning for the Property. Records indicated the Property was zoned "Industrial".

6. **Land Title Records and Other Historical Sources:** SME did not review Land Title Records for the Property because they were not likely to be useful in determining the historic use of the Property. SME reviewed a topographic map dated 1967. The map depicted one building was located on the Property. Additionally, Mr. Thall indicated that the northwest portion of the building was present when his family purchased the Property in 1953. Five additions were made to the building during the 1960s.

3.2 Historical Usage Summary

The following table presents a summary of historical usage of the Property based on the information collected from the sources outlined above.

HISTORICAL USAGE SUMMARY

Year	Use/Comment	Source
1887-1902	Residences, Michigan Buggy Company	Sanborn fire insurance maps
1902-1965	Residential, city storage yard	Aerial photographs, Sanborn fire insurance maps, city directories, city records, interviews.
1965-1995	Food Processing Equipment, commercial use	Aerial photographs, city directories, city records, interviews
1995-2000	Auto repair garage, storage	Aerial photographs, city directories, interviews

The western portion of the Property was used in conjunction with the Michigan Buggy Company since at least 1887. Between 1902 and 1965 portions of the Property were used for residential, storage and industrial purposes. In 1965, the residences were razed and a new building was constructed for Food Processing Equipment to operate. Food Processing Equipment operated on the Property between 1965 and 1995. The historical use of the Property in connection with the Michigan Buggy Corporation represents an REC due to the former oil house located on the west portion of the Property.

4.0 REGULATORY REVIEW

4.1 Standard Environmental Record Sources

SME reviewed the following state and federal regulatory agency lists to identify regulated and/or environmentally impacted sites within the specified search radii of the Property. Sites found on these lists are identified at the end of this section.

1. **Michigan Sites of Environmental Contamination, currently regulated under Part 201 of Act 451 September 1999; 1-mile radius.**

   This list identifies sites of environmental contamination in the State of Michigan and provides information pertaining to the risk assessment, evaluation, and cleanup of these sites.

2. **Michigan Department of Environmental Quality (MDEQ) Leaking Underground Storage Tank (LUST) Sites, January 2000; 1/2-mile radius.**

   LUST sites are regulated under Part 213 of Michigan Public Act 451 of 1994, as amended (Part 213). This list is comprised of sites where the source of release is a regulated UST.

3. **MDEQ Storage Tank Division (STD) Registered USTs, April 1999; 1/8-mile radius.**

   The MDEQ UST database provides information about current or previously registered UST systems in the State of Michigan. This list identifies sites which have or have had registered, regulated UST systems as defined by Part 211 of Michigan Public Act 451 of 1994, as amended (Part 211).

4. **MDEQ Waste Management Division Lists of Active and Inactive Solid Waste Facilities, March and April 1998; 1/2-mile radius.**

   These lists identify known active and inactive landfills and transfer stations in the State of Michigan.

5. **United States Environmental Protection Agency (USEPA) CERCLIS Sites, September 1999; 1/2-mile radius.**

The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list is a compilation by the USEPA of sites under investigation for potential contamination under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), also known as Superfund.

6. **USEPA National Priorities List (NPL), September 1999; 1-mile radius.**

   The NPL is a list of Superfund sites that qualify for federal funds for remedial action and also appear on the federal CERCLIS list.

7. **Federal Resource Conservation and Recovery Act (RCRA) Treatment Storage and Disposal (TSD) CORRACTS Facilities List, August 1999; 1-mile radius.**

   The RCRA TSD facilities list for Michigan includes sites which treat, store, or dispose of hazardous waste in the State of Michigan as regulated by the Resource Conservation Recovery Act of 1976 (RCRA) and have had corrective actions.

8. **Federal Resource Conservation and Recovery Act (RCRA) Treatment Storage and Disposal (TSD) NONCORRACTS Facilities List, July 1999; 1/2-mile radius.**

   The RCRA TSD facilities list for Michigan includes sites which treat, store, or dispose of hazardous waste in the State of Michigan as regulated by the Resource Conservation Recovery Act of 1976 (RCRA) and have not had any corrective actions.

9. **USEPA RCRA Generators List for Michigan, July 1999; Property and adjoining properties.**

   The RCRA Generators list includes sites and facilities in Michigan which generate hazardous waste as defined by RCRA. Since these sites are known and regulated they are generally not considered an environmental concern unless known to have a history of RCRA violations.

10. **USEPA Emergency Response Notification System (ERNS) List, May 1999; Property only.**

    The USEPA maintains a list of reported CERCLA hazardous substance releases or spills in quantities greater than the reportable quantity, as maintained at the National Response Center. The database contains information from spill reports made within the referenced time frame to the USEPA, US Coast Guard, and the Michigan Department of Transportation.

LISTED SITES

Site Name and Address	Distance and Direction	Name of List
Bryant Metal Finishing at 511 Harrison Court	0.1 miles east	RCRA
East Willard at 501 & 521 East Willard and 500 E. Ransom St	0.125 miles north	MSPL
First of America at 513-517 East Kalamazoo	0.125 miles south	LUST
Portage Creek – Kalamazoo River	0.25 miles east	MSPL
Spearflex at 241 East Kalamazoo	0.25 miles southwest	MSPL
701 East Michigan Avenue	0.25 miles south	MSPL
Lyons Machine Builders at 904-910 Hotop	0.25 miles northeast	MSPL
Former Fisher-Graff Property at 721 Porter Street	0.25 miles north	MSPL
E.M.Sergeant at 542 East Michigan Avenue	0.25 miles east	MSPL
Total #4279 at 605 East Michigan	0.25 miles east	LUST
BFI at 100 East North Street	0.25 miles north	LUST
Bahr Oil Company at 535 East Ransom Street	0.25 miles north	LUST
Vacant Land at 539 East Michigan	0.25 miles east	LUST
J & K Furniture at 427 East Michigan	0.25 miles east	LUST
521 East Michigan Avenue	0.25 miles east	LUST
Jack Laird at 202 East Kalamazoo	0.25 miles southwest	LUST
Allied Paper at 511 East Patterson	0.50 miles north	MSPL
Auto Ion Chemical at 74 Mill Street	0.5 miles east	NPL
Spring Street	0.5 miles south	MSPL
Conrail Mill Street at Botsford Yard Mill Street	0.5 miles east	MSPL
Gull Road Site at Riverview Drive	0.5 miles northeast	MSPL
Allen Test Products at Pitcher Street	0.5 miles north	MSPL

Production Plating at 1002 O'Neil Street	0.5 miles east	MSPL
Arcadia Creek Corridor at Rose and Eleanor Street area	0.5 miles southwest	MSPL
Pitcher and Patterson Street at 243 East Patterson Street	0.5 miles north	MSPL
APEC at Ampersee Street	0.5 miles east	MSPL
McNamara Trucking at 424 Richardson Street	0.5 miles north	LUST
Richard Standish at 501 South Pitcher	0.5 miles south	LUST
The Upjohn Co. at 300 Portage Road	0.5 miles south	LUST
Pitcher and Prouty Street	0.75 miles north	MSPL
Portage and Second Street at 631 Second Street	0.75 miles southeast	MSPL
Kalamazoo Community Education Center at 600 Vine St.	0.75 miles southwest	MSPL
Sinclair Bulk Storage at 1000 Fourth Street	1 mile southeast	MSPL

4.2 File Reviews and Interviews

Information regarding the listed sites located within the specified search radius of the Property was reviewed from the Michigan Department of Environmental Quality Plainwell District Office on January 6, 2000. Below is a summary of the information regarding these sites.

The following sites were located to the north, northwest, northeast, east, south, or southeast of the Property: Allied Paper, Auto Ion Chemical, Bryant Metal Finishing, Portage Creek – Kalamazoo River, Spring Street, Portage and Second Street, Conrail Mill Street, 701 East Michigan Avenue, Gull Road Site, Lyons Machine Builders, East Willard, Former Fisher-Graff Property, Allen Test Products, Production Plating, Sinclair Bulk Storage, Pitcher and Prouty Street, E. M. Sergeant, Pitcher and Patterson Street, APEC, Total #4279, BFI, Bahr Oil Company, Vacant Land at 539 East Michigan, J & K Furniture, 521 East Michigan Avenue, McNamara Trucking, First of America, Richard Standish, and the Upjohn Company. Reportedly, groundwater flow direction in the vicinity of these sites is northerly or easterly, towards the Kalamazoo River, away from, or cross gradient to the Property. Based on this information, these sites do not represent RECs to the Property.

Kalamazoo Community Education Center at 600 Vine Street
The Kalamazoo Community Education Center was located approximately 0.75 miles to the southwest and was listed as a MSPL site. Fuel oil constituents were identified in the groundwater at the site. Groundwater flow direction is towards the east-southeast, cross gradient to the Property. Based on this information, the site does not represent an REC to the Property.

Arcadia Creek Corridor at Rose and Eleanor Street Area
The Arcadia Creek Corridor site was located approximately 0.5 miles to the southwest and was listed as a MSPL site. Contamination of metals was identified in the soil at the site, however impact was not detected in the groundwater. The contaminated soils were removed from the site, therefore this site does not represent an REC to the Property.

Jack Laird Site at 202 East Kalamazoo
The Jack Laird site was located approximately 0.25 miles to the southwest and was listed as a LUST site. Contamination of gasoline constituents was identified in the soil at the site, however impact was not detected in the groundwater. The extent of contamination has been defined to the site. Based on this information, the site does not represent an REC to the Property.

SME contacted the Michigan Department of Environmental Quality Cost Recovery Division regarding liens involving the Property. No federal, state, or local environmental cleanup liens were revealed for the Property.

SME contacted the City of Kalamazoo Fire Department regarding the Property. No records of environmentally related incidents were available for the Property.

An Owner/Occupant Disclosure Statement was completed by Mr. Don Thall and is included in Appendix F. Mr. Thall was unaware of any environmental concerns associated with the Property.

4.2.1 County Environmental Health Department

SME contacted the Kalamazoo County Health Department regarding environmental conditions at the Property. Records were not available for the Property.

5.0 FINDINGS AND CONCLUSIONS

SME has performed the Phase I ESA on 423 Walbridge located in the City of Kalamazoo, Kalamazoo County, Michigan. The report is in general conformance with the scope and limitations of SME's Scope of Services, and the ASTM Practice E 1527-97. The findings of this assessment are as follows:

One building was located on the Property at the time of SME's walkover on April 13, 2000. The building was used as an auto repair garage and for the storage of generators and equipment from Norm's Electric Motor Repair.

Historical sources indicated that an oil house existed on the west portion of the Property in 1891 in connection with an industrial company located on the west-adjoining site. Portions of the Property were used as residential and industrial, and for storage of city equipment between 1891 and 1965. Between 1965 and 1995, the Property was used by Food Processing Equipment Company to manufacture equipment for the food processing industry. The former oil house represents an REC to the Property.

SME observed surficial staining from oil on the Property. Staining was observed in the building from oil spills in the auto repair garage and equipment storage areas. Oil staining was observed on the ground surface located in the fenced area on the west portion of the Property. The staining represents an REC to the Property.

Two drywells and two floor drains were observed on the Property. Oil staining was observed around the edge and inside the drywell located in the fenced area. The oil staining observed inside the drywell represents an REC to the Property. The other drywell and floor drains have unknown discharge locations. Based on this information, the drywells and floor drains represent an REC to the Property.

Slag and cinder fill material was observed in the fenced area and along the north side of the Property. The presence of the slag and cinder fill material on the Property represents an REC.

The known sites of environmental contamination identified within the appropriate ASTM-defined radii did not represent an REC to the Property.

The regulatory agencies interviewed for this Phase I ESA were not aware of any environmental concerns associated with the Property.

6.0 RECOMMENDATIONS

In SME's professional opinion, based on the information gathered for this Phase I Environmental Site Assessment, additional assessment of the Property is warranted. SME recommends the collection of soil and/or groundwater samples at the Property to assess the potential for subsurface contamination resulting from the slag and cinder fill material, oils associated with the auto body repair shop and electrical equipment, unknown discharge locations of the drywells and floor drains, and the oil house formerly located on the Property. Additionally, the unlabeled 55-gallon drums should be properly removed and disposed. Also, the fluorescent light ballasts should be sampled for Polychlorinated Biphenyls content and properly disposed.

7.0 GENERAL COMMENTS

This Phase I ESA was conducted to identify recorded and readily observable recognized environmental conditions in connection with the Property and to assess the relative significance of the identified RECs. The findings, opinions, conclusions and recommendations presented in this report are based upon observations noted during our site visit, and information obtained during the performance of the scope of services on the dates indicated. In the process of obtaining the field and historical information in preparation of this report, procedures were followed that represent reasonable and accepted environmental practices and principles, in a manner consistent with that level of care and skill ordinarily exercised by members of these professions currently practicing under similar conditions. Appropriate inquiry was made into the previous ownership and uses of the property consistent with good commercial or customary practice.

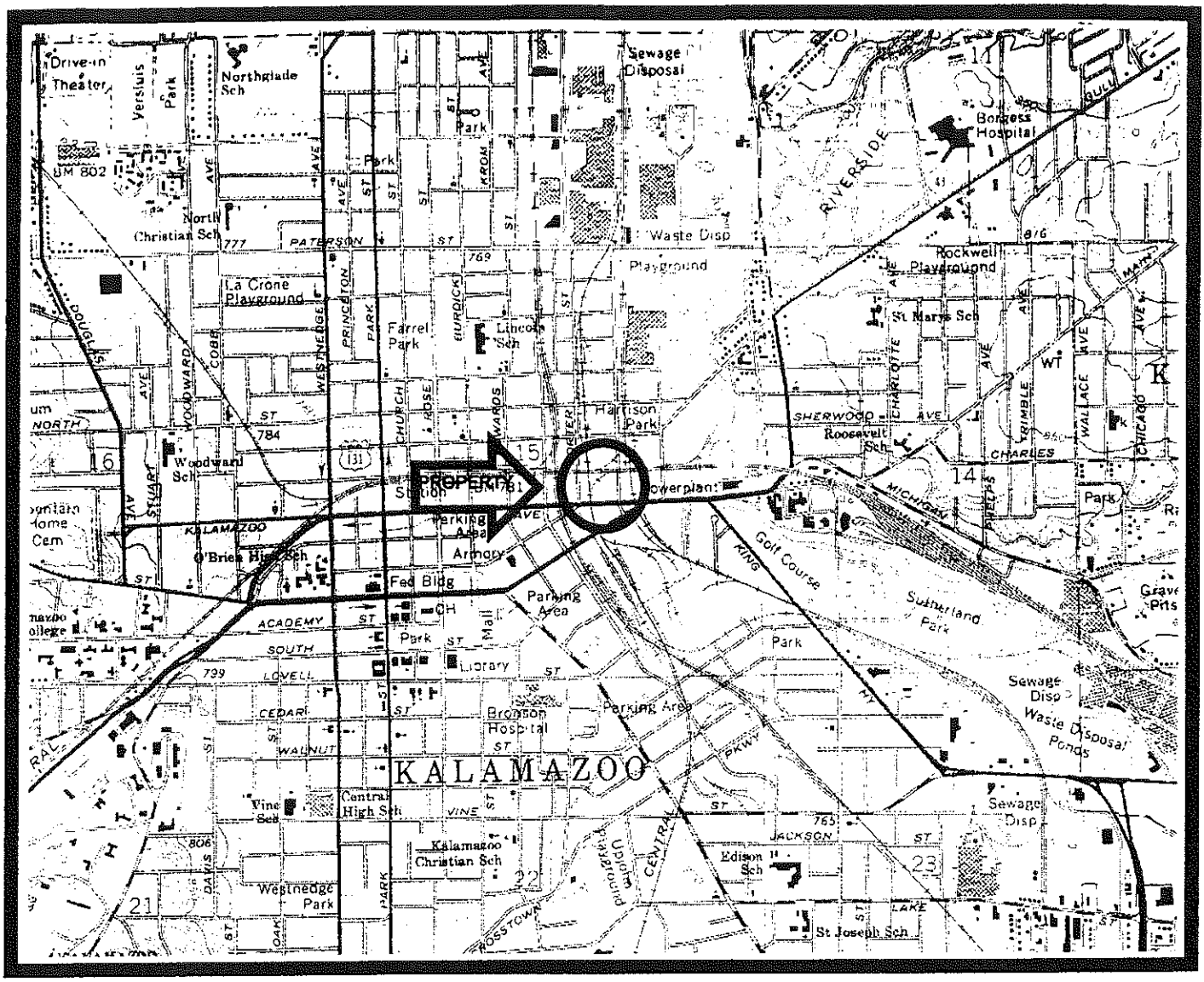
As is typical with Phase I ESAs, no testing or subsurface investigation was conducted by SME for this assessment.

Due to unknown or latent conditions on the subject property, or on adjacent or nearby properties, which may become evident in the future, SME does not guarantee the subject property is free of contamination or hazardous waste material. It should also be noted Property conditions may change over time. Should additional surface, subsurface, chemical, or other data become available after the date of issue of this report, the findings, conclusions and recommendations contained in this report may have to be modified. Review by SME of such additional information would be conducted upon receipt of a written request from our client.

All reports, field data, field notes, laboratory test data, calculations, estimates and other documents prepared by SME as instruments of service are the property of SME. No parties other than those specifically identified in this report may rely upon SME's opinions, conclusions or reports unless SME has agreed to such reliance in writing.

APPENDIX A

PROPERTY LOCATION MAP



KALAMAZOO, MICH.

42085-C5-TF-024

1967

PHOTOREVISED 1973

DMA 3868 I SE—SERIES V862

Date 4-20-00 Drawn by NGG Scale AS SHOWN Job No. KE35803	BAY CITY KALAMAZOO LANSING PLYMOUTH TOLEDO	soil and materials engineers. inc.	Property Location Diagram 423 Walbridge Kalamazoo, Michigan

APPENDIX B

SCOPE OF SERVICES

SCOPE OF SERVICES
PHASE I ESA

The following scope of work is proposed for completion of the Phase I ESA

- Obtain preliminary information (if available) regarding the Property from:
  - Legal property description
  - USGS map
  - Property plan or boundary survey, if available
- Conduct a Property walkover to identify evidence of recognized environmental conditions, including:
  - Aboveground and underground storage tanks, and abandoned drums
  - Waste storage, treatment, and/or disposal areas
  - Chemical use and storage
  - Stained soil, odors, distressed vegetation, debris, or fill materials
  - Surface water, pits, ponds, lagoons or drywells
  - Immediately adjoining properties from Property for recognized environmental conditions which may impact the Property
  - Current and/or former operations, activities, or processes conducted on the Property
  - Ownership and general condition of electrical equipment that may contain PCBs, if present
  - Potential wetland areas
- If regulated underground storage tanks (USTs) are observed on the property, an interview with the owner/operator of the property will be conducted to assess the status of the UST with regard to the current UST leak detection and spill protection requirements, and to assess the status of the USTs with regard to the December 22, 1998 UST Overfill & Corrosion Protection Upgrade Requirements. It should be noted that this interview process is not intended to be a detailed UST compliance audit.
- Obtain photographs and revise Property diagram previously completed for the Property, which illustrate Property conditions.
- Conduct a review of the history from 1940 or the first reasonable ascertainable developed use to the present and summarize historical information. This information shall be reviewed from reasonably available standard sources such as; 1) information that is publicly available; 2) information that is obtainable from its source within reasonable time and cost constraints; and 3) information that is practically reviewable.
  - Historical ownership and use information sources may include:
    a. Aerial Photographs
    b. Fire Insurance Maps

c. Local Street Directories
d. Building Department Records
e. Property Tax Files
f. Zoning/Land Use Records
g. Land Title Records (if provided by the client)

- Conduct interviews with owners and other individuals with knowledge of current and past conditions of the Property. The interviews may be conducted in person, in writing, or by telephone.

- Review the following lists of regulated and/or environmentally impacted sites:

• Federal NPL site list	1.0 Mile Radius
• Federal CERCLIS list	0.5 Mile Radius
• Federal RCRA TSD Non-CORRACTS list	0.5 Mile Radius
• Federal RCRA TSD CORRACTS list	1.0 Mile Radius
• Federal RCRA generators list	Property & adjoining properties
• Federal ERNS list	Property only
• State list of hazardous waste sites	1.0 Mile Radius
• State landfill and/or solid waste disposal sites	0.5 Mile Radius
• State leaking UST	0.5 Mile Radius
• State registered UST lists	0.125 Mile Radius

- Review up to five Michigan Department of Environmental Quality (MDEQ) files of listed sites located within 0.5 miles of the subject property to obtain information regarding current status, depending on appointment availability. If additional sites are present, these files should be reviewed, and additional fees may be required.

- Review of governmental agency records and discussion with agency staff, if practical, regarding recognized environmental conditions at or within specified search distances. Sources may include the following:

  - Michigan Department of Environmental Quality (MDEQ)
  - U.S. Environmental Protection Agency
  - County Health Department
  - Local Governmental Agencies

- Conduct a review of relevant documents concerning the subject property, which are provided by the client, including:

  - Environmental Site Assessment Reports
  - Environmental Audit Reports
  - Environmental Permits
  - Registration for underground storage tanks

SCOPE OF SERVICES
PHASE I ESA

- Hydrogeologic Reports
- Geotechnical Reports
- Notices to or from governmental agencies regarding environmental conditions and/or violations.
- Record of any pending, threatened, or past litigation regarding environmental conditions.

■ Prepare a Phase I ESA Report including the following:

- Summary of the scope of work
- Summary of the observed Property conditions
- Summary of record search results
- Summary of the interviews with public agencies
- Summary of Previous Phase I ESA Report
- Conclusions and Recommendations regarding recognized environmental conditions at the subject property, based on the results of the assessment

The Phase I ESA scope of work does not include: air, soil or water sampling, chemical testing, building materials sampling, wetlands delineation, or mineral rights investigation. If unanticipated conditions are encountered requiring a change in scope, you will be contacted.

APPENDIX C

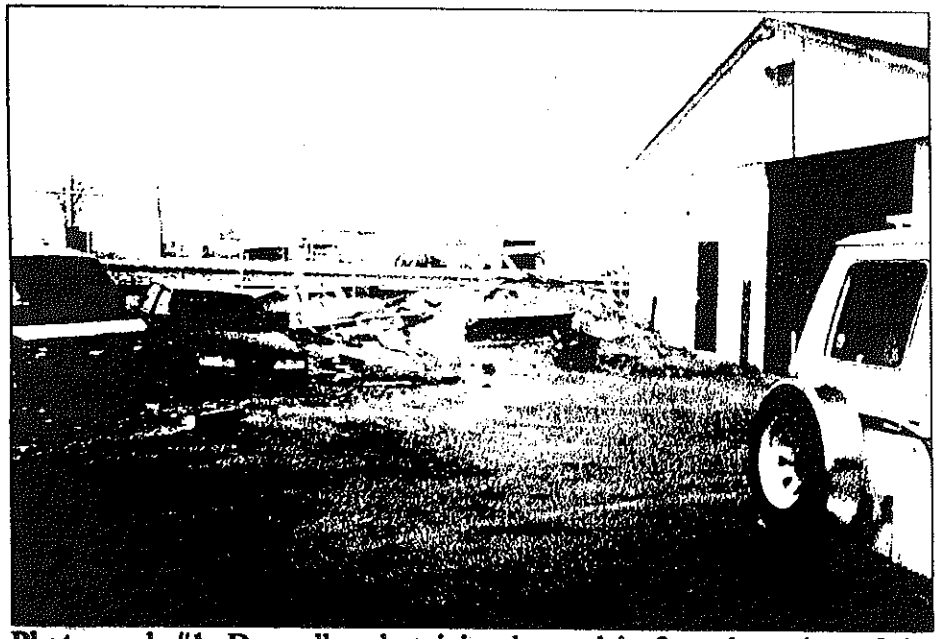
LEGAL DESCRIPTION

Legal Description

1230 original plat lots2, 3, 4, 5, 6, Block 19, except all that part of lots 2, 3, 4, Block 19 of said plat, described as beginning at the northwest corner of lot 2, then easterly along north line of lots 2, 3, 4, 196 feet, then southwesterly on curve concave to the southeast, having a radius of 395.28 feet, to southwest corner of lot 2, then north along west line of said lot 2 to the place of beginning. Also south ½ vacated Willard Street lying northerly of and adjacent to described property, except that part lying in railroad right-of-way.

APPENDIX D

PHOTOGRAPHS

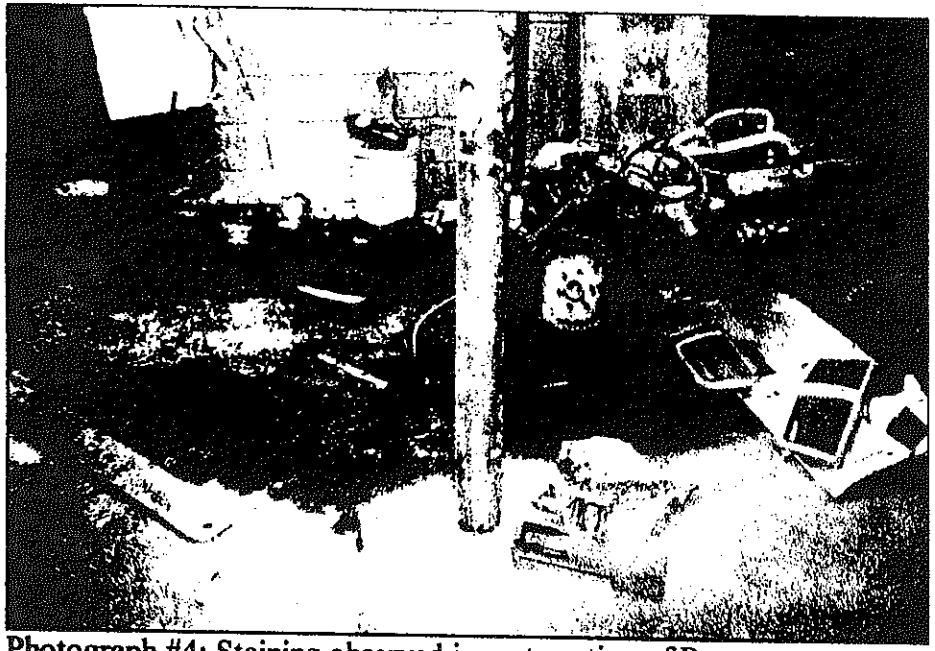


Photograph #1: Drywell and staining located in fenced portion of the Property.

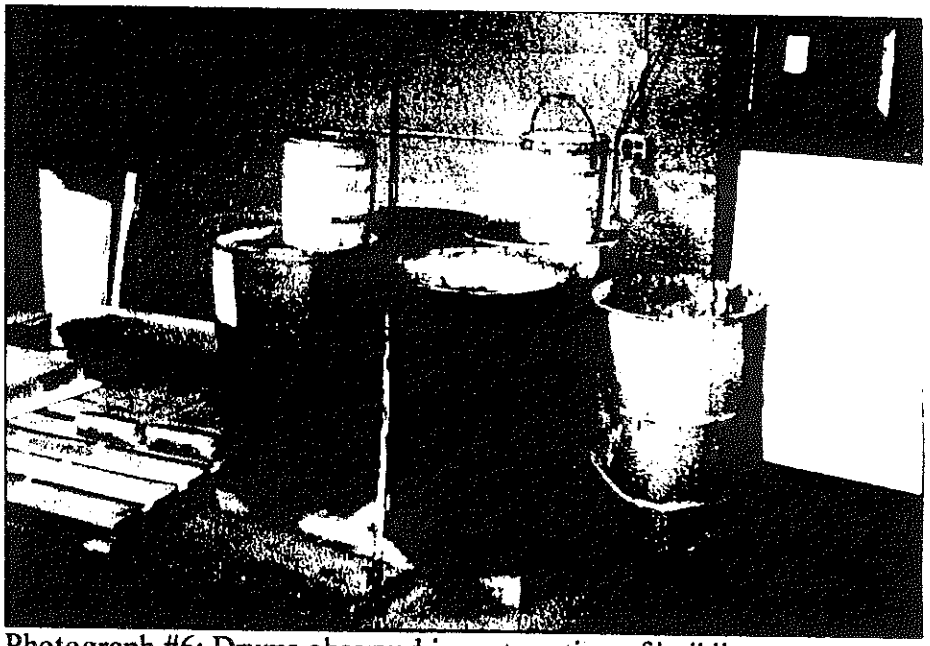
Photograph #2: Staining observed in fenced portion of Property.

Photograph #3: Staining observed in northeast portion of Property.

423 Walbridge
Kalamazoo, Michigan
SME Project No. KE35803



Photograph #4: Staining observed in east portion of Property.



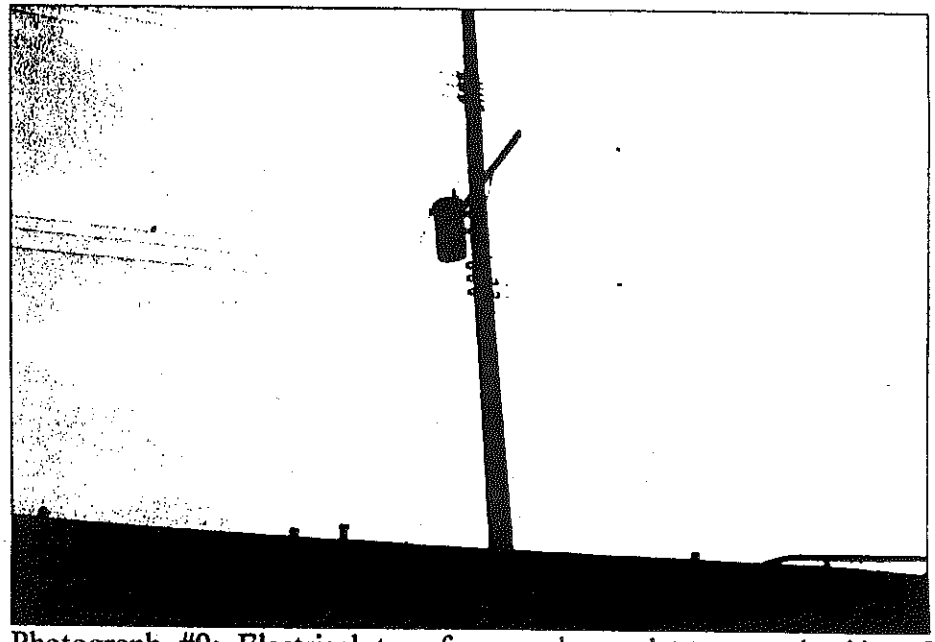
Photograph #6: Drums observed in east portion of building.

Photograph #5: Floor drain observed in paint booth located in east portion of the building.

423 Walbridge
Kalamazoo, Michigan
SME Project No. KE35803

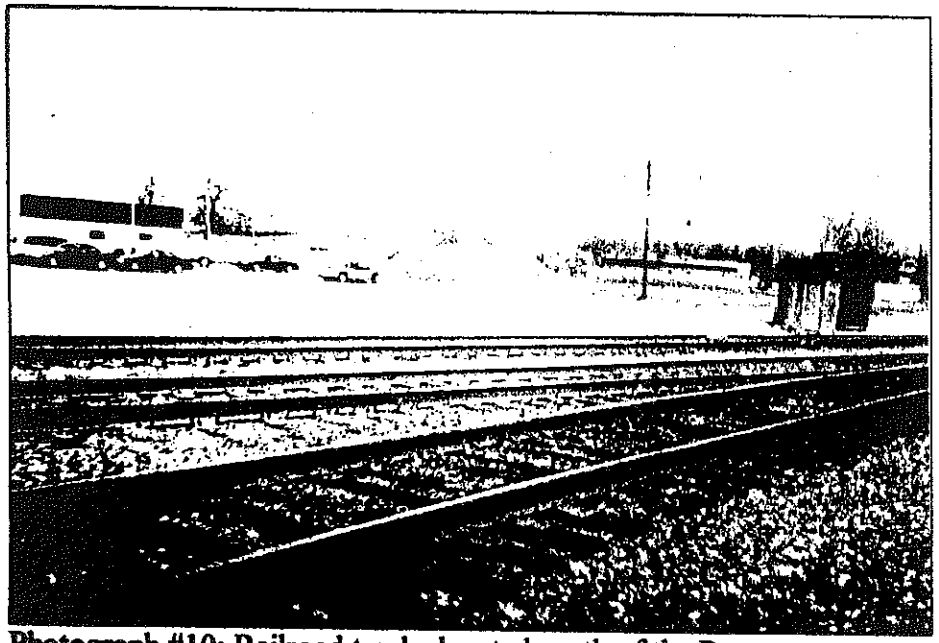
Photograph #7: Drum observed in fenced portion of Property.

Photograph #8: Suspected fill material observed along north side of Property.



Photograph #9: Electrical transformer observed near south side of Property.

423 Walbridge
Kalamazoo, Michigan
SME Project No. KE35803



Photograph #10: Railroad tracks located north of the Property.

Photograph #11: Walbridge Street and Bryant Metal Finishing located east of the Property.

Photograph #12: Norm's Electric Motor Repair located southeast of the Property.

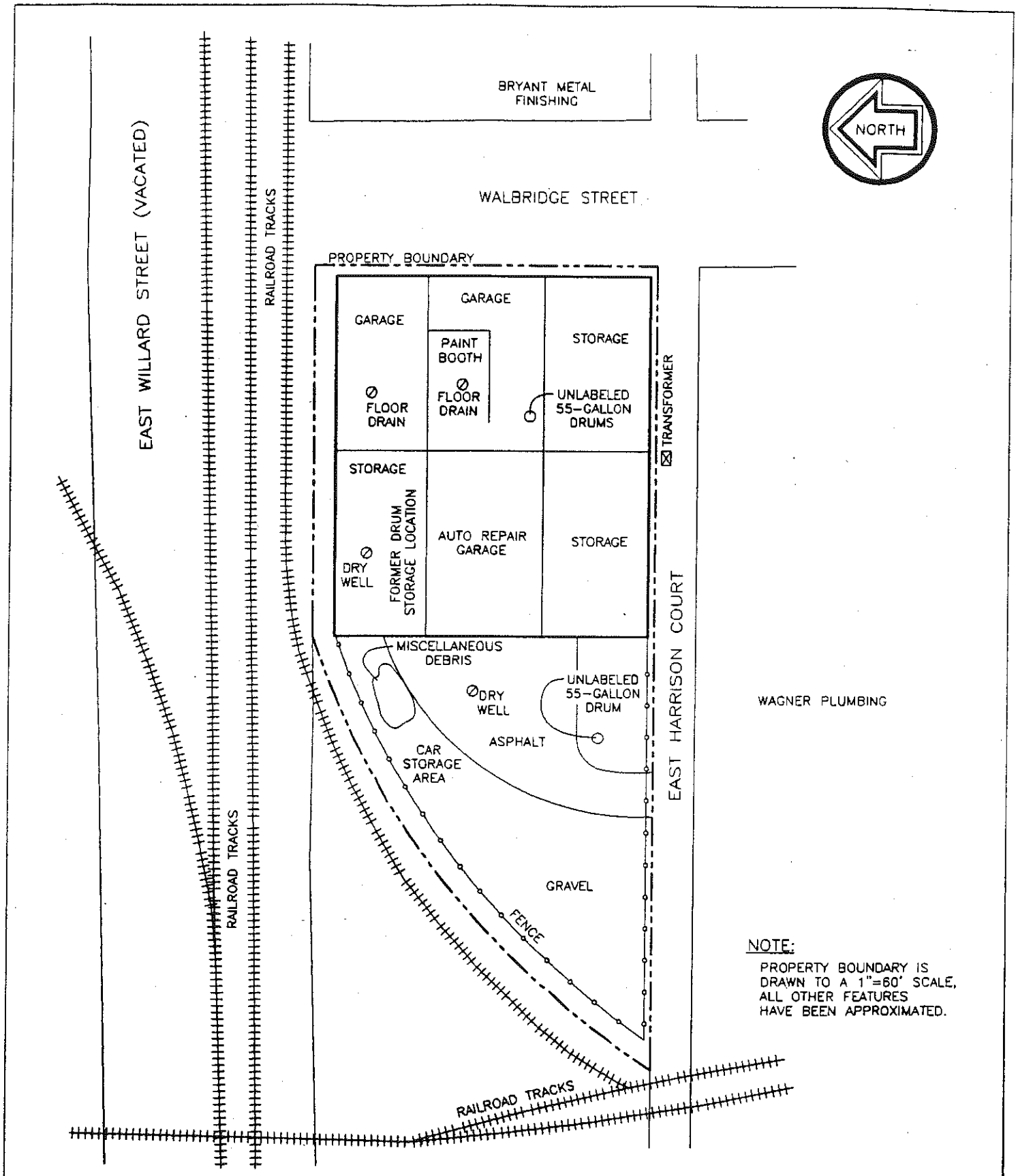
423 Walbridge
Kalamazoo, Michigan
SME Project No. KE35803

Photograph #13: Wagner Plumbing located south of the Property.

423 Walbridge
Kalamazoo, Michigan
SME Project No. KE35803

APPENDIX E

PROPERTY FEATURES DIAGRAM



NOTE:
PROPERTY BOUNDARY IS DRAWN TO A 1"=60' SCALE, ALL OTHER FEATURES HAVE BEEN APPROXIMATED.

43560 PLYMOUTH OAKS BOULEVARD PLYMOUTH, MICHIGAN 48170 (313) 454-9600	BAY CITY KALAMAZOO LANSING PLYMOUTH TOLEDO	DATE 4-18-00 DRAWN BY AJW SCALE 1" = 60' JOB KE 35803	PROPERTY FEATURES DIAGRAM 423 WALBRIDGE STREET KALAMAZOO, MICHIGAN

FILE NAME H:\35000\35803-01.DWG

Figure No.

APPENDIX F

OWNER/OCCUPANT DISCLOSURE STATEMENT

OWNER/OCCUPANT DISCLOSURE STATEMENT

Property Address: 423 WALBRIDGE
KALAMAZOO, MICHIGAN

Property Occupant/Tenant: _____

Purpose of Statement:

This statement is a disclosure of the condition and information concerning the property, known by the owner/occupant. This disclosure statement is based on reasonable knowledge of the history and commercial/residential activities (if any) and any improvements on the subject property and is not based on the environmental or engineering expertise of the owner/occupant. It is acknowledged that this statement is not a warranty of any kind by the owner/occupant.

Instructions:

1. Fill in all blanks.
2. Report known conditions related to or affecting the property.
3. Attach additional pages with your signature if additional space is required.
4. If some items do not apply, write N/A (not applicable). If you don't know the facts, write "unknown".

Owner/Occupant Disclosure:

The owner/occupant discloses the following information with the knowledge that even though this is not a warranty, the owner/occupant hereby specifically makes the following representations based on the owner/occupant's knowledge at the time of the signing of the document:

To the best of my knowledge, the following are formerly or currently NOT present.

NO Drinking water wells
NO Septic fields, drain fields or dry wells
NO Lagoons, settling ponds or similar impoundments
NO Monitor wells
NO Underground sumps, lines, basins or tanks (excludes utilities)
NO Aboveground tanks
NO Transformers or capacitors of pre-1975 construction
NO Other PCB equipment
NO Asbestos
NO Mines or pits
NO Hidden chemical materials or wastes
NO Dumps or landfills
NO Oil or gas wells or test holes
NO Unusual fill materials such as cinders, foundry sands, etc.
NO Barrel or drum storage areas

Devin K. Ojala
Environmental Specialist

soil and materials engineers, inc.
4460 Commercial Ave., Ste. B, Kalamazoo, MI 49002
(616) 323-3555 FAX (616) 323-3553
E-mail: Ojala@kalamazoo.soilmat.com

OWNER/OCCUPANT DISCLOSURE STATEMENT

If any of the preceding items are believed formerly or currently present, specifically identify:

Has remediation or abatement ever been performed at the subject property?

NO

If yes, specifically identify:

Identify known commercial or industrial activities or occupants on the subject property:

Select Motor Storage, Auto Body Shop, Vehical Storage

Identify any significant improvements and the year of improvement related to site construction (excluding pavement resurfacing):

Buildings constructed between 1960- 1967

Are any of the following documents known to exist for the subject site?

NO Environmental Site Assessment Reports
NO Environmental Audit Reports
NO Environmental permits (for example, solid waste disposal, wastewater permits, NPDES permits)
NO Registrations for underground storage tanks
NO Material Safety Data Sheets (except for house-hold type substances)
NO Community Right-to-Know Plan
NO Spill Prevention Plans
NO Geotechnical or Hydrogeologic Reports
NO Notices from any government agency relating to past or current violations of environmental laws or relating to environmental liens

OWNER/OCCUPANT DISCLOSURE STATEMENT

NO Hazardous Waste Generator notices or reports
NO Property appraisals

If so, please specify and provide, if possible:

Are there or have there been any pending, threatened or past litigation or administrative proceedings relevant to hazardous substances or petroleum or other chemical products in, on, or from the subject property?

NONE

(Optional) Is the purchase price of the subject property significantly less than the price of comparable properties?

Not Known

If so, it is suggested in accordance with ASTM standards that an explanation for the discrepancy be documented.

The owner/occupant has owned/occupied (circle one or both) the property since 1953 and makes representations only since that date. The owner/occupant has indicated above the history and condition of all items based on that information known to the owner/occupant.

Family owned

Donald Thall
(Name)

Donald Thall
(Signed)

Owner
(Title)

(Company)

4-13-2000
(Date)

APPENDIX C

LEGAL DESCRIPTION

Legal Description

1230 original plat lots2, 3, 4, 5, 6, Block 19, except all that part of lots 2, 3, 4, Block 19 of said plat, described as beginning at the northwest corner of lot 2, then easterly along north line of lots 2, 3, 4, 196 feet, then southwesterly on curve concave to the southeast, having a radius of 395.28 feet, to southwest corner of lot 2, then north along west line of said lot 2 to the place of beginning. Also south ½ vacated Willard Street lying northerly of and adjacent to described property, except that part lying in railroad right-of-way.

APPENDIX D

SUMMARY OF CHEMICAL STORAGE INFORMATION

Product Name	Chemical Form	Chemical	Packaging	Average Stored
Actane 36	Dry	Chromic Acid <90%	100 lb Steel Drum	100 lbs
		Sodium Bisulfite >10%		
Actane 380	Dry	Sodium Bisulfite >70%	25 lb Fiber Drum	25 lbs
		Potassium Iodide >20%		
Actisalt #6	Dry	Sodium Bisulfate 90%	400 lb Fiber Drum	400 lbs
		Sodium Fluoride 10%		
Activated Carbon	Dry	Activated Carbon	50 lb bag	100 lbs
Antirust RP6	Dry	Sodium Nitrate <40%	50 lb Fiber Drum	100 lbs
		Sodium Carbonate <50%		
AP-A Nickel Wetter	Liquid	Formaldehyde <2%	5 gal Poly Pail	10 gal
Barium Carbonate	Dry	Barium Carbonate	50 lb Bag	50 lbs
Besniflec 811	Liquid	Misc. Blend	5 gal Poly Pail	5 gal
Besniflec 812	Liquid	Saccharin <10%	5 gal Poly Pail	5 gal
Besniflec 815	Liquid	Misc. Blend	5 gal Poly Pail	5 gal
Besplate 241	Liquid	Misc. Blend	5 gal Poly Pail	5 gal
Besplate 242	Liquid	Saccharin <7%	5 gal Poly Pail	5 gal
Boric Acid	Dry	Boric Acid 100%	50 lb bag	150 lbs
Calcium Chloride	Dry	Calcium Chloride 100%	50 lb bag	250 lbs
Caustic Potash	Dry	Potassium Hydroxide <90%	200 lb Steel Drum	200 lbs
Chromator 50	Liquid	Chromic acid <30%	5 gal Poly Pail	5 gal
		Sulfuric acid <10%		
Chromic Acid	Dry	Chromic Acid 100%	100 lb Steel Drum	100 lbs
Copper	Solid Bars	Copper Bars	400 lb Boxed	400 lbs
Copper Cyanide	Dry	Copper Cyanide 100%	100 lb Steel Drum	100 lbs
Copper Sulfate	Dry	Copper sulfate 100%	50 lb bag	50 lbs
Cromylite 107A	Liquid	Fluoride <5%	5 gal Poly Pail	5 gal
Decalume D1R	Liquid	Sulfuric Acid <10%	5 gal Poly Pail	5 gal
		BIS (3-Sulfopropyl Disulfide) Disodium Salt <20%		
		Polyethylene Glycol <10%		
Decalume D2R	Liquid	Sulfuric Acid <15%	5 gal Poly Pail	5 gal
Decalume D3R	Liquid	P-Dimethylamino Benzene Sulfonic Acid 9%	5 gal Poly Pail	5 gal

Product Name	Chemical Form	Chemical	Packaging	Average Stored
		4,4 Tetramethyldiamino phenylmethane 1%		
Econochrome Antispray	Liquid	Misc. Blend	5 gal Poly Pail	5 gal
Electrocleaner 59 special	Dry	Sodium Hydroxide <50%	400 lb Fiber Drum	400 lbs
		Sodium silicate <20%		
		Tetrasodium Pyrophosphate <15%		
Electrolytic Nickel	Solid Chips	Nickel Chips	500 lb Steel Drum	500 lbs
Enstrip 110C	Liquid	Ammonium Nitrate 10%	55 Gal Poly Drum	55 gal
		Ammonium Chloride 1%		
Enstrip 110S	Liquid	Sodium Fluoroborate <5%	5 gal Poly Pail	5 gal
Enstrip S	Dry	Sodium m-Nitrobenzenesulfonate 100%	200 lb Fiber Drum	200 lbs
Entek CU-56	Liquid	Methanol >40%	5 gal Poly Pail	5 gal
		Benzotriazole <5%		
		Sodium m-Nitrobenzenesulfonate <5%		
Enthobrite 940A	Liquid	misc Blend	55 Gal Poly Drum	55 gal
Enthobrite 940B	Liquid	1-Propanol <10%	55 Gal Poly Drum	55 gal
		4-Phenyl-3-Butene-2-one <5%		
Enthox Z994	Dry	Sodium Bifluoride <30%	100 lb Steel Drum	100 lbs
		Sodium Chromate <20%		
Enthox 995	Dry	Chromic Acid <40%	100 lb Steel Drum	100 lbs
		Sodium Nitrate <10%		
		Sodium Bisulfate <5%		
Fumetrol 208	Liquid	Misc. Blend	1 gal Poly Jug	1 gal
Havablack 50	Liquid	Acetic Acid <50%	5 gal Poly Pail	5 gal
		Silver 1%		
Havablack 140	Liquid	Silver Nitrate 1.4%	5 gal Poly Pail	5 gal
Havablack Catalyst	Liquid	Acetic Acid <50%	5 gal Poly Pail	5 gal
Havafloc AN	Dry	Misc. Blend	50 lb Fiber Drum	50 lbs
Hydrogen Peroxide 50%	Liquid	Hydrogen Peroxide 50%	15 gal Poly Drum	45 gal
Lead	Solid Bars	Lead Anode Bars	100 lb bars	Use only- not Stored
Metal Cleaner 373	Dry	Sodium Hydroxide <25%	400 lb Fiber Drum	400 lbs
		Sodium Silicate <25		
Muriate of Potash	Dry	Potassium Chloride 100%	50 lb bag	150 lbs
Muriatic Acid 20 deg.	Liquid	Hydrochloric Acid 20 Degree	15 gal Drum	60 Gal

Product Name	Chemical Form	Chemical	Packaging	Average Stored
Nickel Carbonate	Dry	Nickel Carbonate 100%	50 lb bag	100 lbs
Nickel Chloride	Dry	Nickel Chloride 100%	50 lb bag	150 lbs
Nickel Purifier	Liquid	Misc. Blend	5 gal Poly Pail	5 gal
Nickel Sulfate	Dry	Nickel Sulfate 100%	50 lb bag	150 lbs
Nitric Acid 42 deg.	Liquid	Nitric Acid 42 Degree	15 Gal SS Drum	15 gal
Reflecta Maintenance	Liquid	Saccharin 4%	5 gal Poly Pail	5 gal
Rodip OD Part A	Liquid	Chromic Acid <10%	5 gal Poly Pail	5 gal
		Sodium Chromate <25%		
		Nitric Acid 5%		
Rodip OD Part B	Liquid	Formic Acid 55%	5 gal Poly Pail	5 gal
Rogard Supreme Seal 500	Liquid	Alkaline Silicate <40%	5 gal Poly Pail	5 gal
Sodium Bicarbonate	Dry	Baking Soda 100%	50 lb bag	50 lbs
Sodium Chromate	Dry	Sodium Chromate 100%	50 lb bag	50 lbs
Sodium Cyanide	Dry	Sodium Cyanide 100%	200 lb Steel Drum	200 lbs
Sodium Hydroxide	Liquid	Sodium Hydroxide <51%	55 Gal Poly Drum	165 gal
		Sodium Chloride <1.3%		
Sodium Hypochlorite	Liquid	Bleach	55 Gal Poly Drum	55 gal
Sodium Metabisulfite	Dry	Sodium Metabisulfite 100%	50 lb bag	250 lbs
Solderex TB-A	Liquid	Sulfuric Acid <2%	5 gal Poly Pail	5 gal
Solderex TB-HS	Liquid	Acrylic Acid <5%	5 gal Poly Pail	5 gal
		1-Propanol <10%		
Stanous Sulfate	Dry	Tin Sulfate 100%	50 lb Fiber Drum	50 lbs
Sulfamic Acid	Dry	Sulfamic Acid 100%	50 lb bag	100 lbs
Sulfuric Acid 66 Deg.	Liquid	Sulfuric Acid 66 Degree	15 gal Poly Drum	45 gal
Tin	Solid Bars	Tin Anode Bars	75 lb Bars Boxed	300 lbs
Ultrasorb	Dry	Silica Amorphous >96%	25 lb Bag	100 lbs
		Silica Crystalline (Cristobalite) <1%		
		Silica Crystalline <1%		
Zinc	Solid Balls	Zinc Anode Balls 100%	275 lb Fiber Drum	275 lb
Zinc Chloride Solution	Liquid	Zinc Chloride Solution 50%	30 gal Poly Drum	30 gal

APPENDIX E

MATERIAL SAFETY DATA SHEETS

Enthone-OMI, Inc.

a subsidiary of ASARCO

MATERIAL SAFETY DATA SHEET

ENTHONE

ACTANE® 36

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS
ENTHONE 203-934-8611
UDYLITE 313-497-9100
SEL-REX 313-497-9100

PRODUCT CODE#: 2720
DATE ISSUED: 3/30/89
SUPERCEDES: 8/19/88
PREPARER: F.R. Hirtler

FRH/88K

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Chromic acid *Ceiling value based on Cr03	Chromium trioxide +Based on Cr (VI)	1333-82-0	0.1mg/m3*	.05mg/m3+	<90
Sodium bisulfate		7681-38-1	NI	NI	>10

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	NI	BOILING POINT, °F	NA
EVAP.RATE (BUTYL ACETATE=1)	NA	MELTING POINT, °F	NI
VAPOR PRESSURE, mmHg	NA	SOLUBILITY IN WATER	essentially soluble
VAPOR DENSITY (AIR=1)	NA	APPEARANCE	reddish-brown powder
pH (AS IS)	NA	ODOR	pungent

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	NA	FLAMMABLE LIMITS (AIR)	NA	LEL	NA	UEL

EXTINGUISHING MEDIA

[X] Not Combustible [X] Water fog or spray [ ] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear self-contained breathing apparatus (SCBA) and complete personal protective equipment when potential for exposure to vapors or products of combustion exists.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Strong oxidizer. May react violently with organic materials and reducing agents.

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Dust may cause ulceration and perforation of respiratory system with possible risk of lung cancer.

INGESTION: Can cause severe burns to mouth, throat, esophagus, and stomach. Material is a systemic poison to kidneys, liver and gastrointestinal tract; toxic effect may not appear immediately. May be fatal.

SKIN: May cause burns and "chrome sores". Skin absorption may lead to kidney failure.

EYES: Causes severe burns with damage to eyes and possible blindness.

EFFECTS OF CHRONIC EXPOSURE:

May cause sensitization of skin, ulceration of respiratory tract and possibly lung cancer.

CARCINOGEN: Chromic acid : human positive

REFERENCE: IARC 23,205,80

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed give large amounts of water and INDUCE VOMITING.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water for 15 minutes. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated.
Seek immediate medical attention.

EYES: Immediately flush eyes with plenty of water for at least 15 minutes holding lids apart to ensure flushing of entire surface. Washing eyes within several seconds of exposure is essential to minimize damage.
Seek immediate medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Avoid contact with skin, eyes and clothing. Wear protective equipment (see Section VII). Sweep or shovel spilled material into clean steel drum and cover. Flush spill area with water, treat with reducing agent and neutralize. Keep resultant slurry or solution out of sewer. Dispose of in accordance with Federal , State and Local Regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in a cool, dry place. Avoid wooden flooring. Keep away from combustibles, organic materials and reducing agents.

ADDITIONAL INFORMATION:

Wash thoroughly after handling.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL. Use cartridge filter for acidic dust.

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [X] Face shield

PROTECTIVE GLOVES: [X] Neoprene [ ] Natural rubber Other: PVC

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Chemically resistant coveralls, hat, and shoes or boots. CAUTION: If clothing becomes contaminated, wash off immediately; spontaneous ignition may occur on contact with cloth or paper.

WORK/HYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of spilled or contaminated product follow Enthone Waste Disposal Procedures. If necessary, consult Enthone for disposal assistance. Dispose of in accordance with Local, State and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See Incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Combustibles, organic materials, reducing agents, alkaline materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic oxides of sulfur.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

WARNING: This product contains a chemical known to the State of California to cause cancer. (This statement is necessary to comply with California Statute [Section 25249.6]). This product contains one or more chemicals which are subject to the reporting requirements of SARA, TITLE III, Section 313 (40 CFR 372). The chemical(s) are listed in Section II, HAZARDOUS INGREDIENTS, along with the CAS (Chemical Abstract Service) # and the ingredient concentration which will be within 5% of the figure stated. This notice must be included in any subsequent copying of this MSDS.

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI, Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone-OMI, Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI, Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI's control, user assumes all responsibility and risk.

Enthone-OMI Inc.

a subsidiary of ASARCO

MATERIAL SAFETY DATA SHEET

ENTHONE

ACTANE® 380

P. O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBER
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBER
(203) 934-8611
8 0 a.m. - 5 p.m. (EST)

PRODUCT CODE#: RG08
DATE ISSUED: 1/5/95
SUPERCEDES: 5/15/86 (Udyprep 380)
PREPARER: L.T. Horbal

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
S dium bisulfate		7681-38-1	NI	NI	>70
F assium iodide		7681-11-0	NI	NI	>20

Balance of ingredients
n considered hazardous

III. PHYSICAL PROPERTIES

SI ECIFIC GRAVITY (WATER =1)	NA	BOILING POINT, °F	NA
E. AP.RATE (BUTYL ACETATE=1)	NI	MELTING POINT, °F	NI
VAPOR PRESSURE, mmHg	NI	SOLUBILITY IN WATER	appreciable
7 POR DENSITY (AIR=1)	NI	APPEARANCE	off-white powder
pH (AS IS)	NA	ODOR	none

IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	>200	FLAMMABLE LIMITS (AIR)	NI	LEL	NI	UEL

EXTINGUISHING MEDIA

[X] Not Combustible [X] Water fog or spray [X] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

V ar self-contained breathing apparatus (SCBA) and complete personal protective equipment when potential for exposure to vapors or products of combustion exists.

U JSUAL FIRE AND EXPLOSION HAZARDS

Thermal decomposition may yield toxic sulfur oxides.

Printed on recycled paper

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Dust may damage upper respiratory tract and lung tissue which may cause chemical pneumonia depending upon severity of exposure.

INGESTION: Can cause severe irritation to mouth, throat, esophagus, and stomach.

SKIN: Can cause burns.

EYES: Can cause severe irritation, damage to eyes.

EFFECTS OF CHRONIC EXPOSURE:

Repeated ingestion may damage the central nervous system.

CARCINOGEN: Not listed by NTP, IARC, OSHA.

REFERENCE:

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed DO NOT INDUCE VOMITING, give large amounts of water.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated. If irritation continues, seek medical attention.

EYES: Immediately flush eyes with plenty of water for at least 15 minutes holding lids apart to ensure flushing of entire surface. Washing eyes within several seconds of exposure is essential to minimize damage.
Seek immediate medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Avoid contact with skin, eyes and clothing. Wear protective equipment (see Section VII). Sweep or shovel spilled material into clean steel drum and cover. Carefully flush spill area with water and neutralize dilute residue with alkali such as soda ash, lime or limestone and recover resultant solution or slurry for disposal. Keep out of sewer. Dispose of in accordance with Local, State and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in a cool, dry place. Keep away from alkalis. Loosen cover cautiously when opening.

ADDITIONAL INFORMATION:

Wash thoroughly after handling.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL. Use cartridge filter for dusts.

EYE PROTECTION: [X] Safety glasses [X] Chemical safety goggles [ ] Face shield

PROTECTIVE GLOVES: [X] Neoprene [X] Natural rubber Other:

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Chemically resistant coveralls, hat, and shoes or boots.

WORK/HYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of spilled or contaminated product follow Enthone-OMI Waste Disposal Procedures. If necessary, consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See Incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Alkalis.

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic oxides of sulfur, iodides, iodine.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

This product does not contain any chemicals subject to the reporting requirements of SARA, TITLE III, Section 313 (40CFR372) or known to the State of California to cause cancer or birth defects (to comply with California Statute [Section 25249.6]).

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone-OMI Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI's control, user assumes all responsibility and risk.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ACTISALT 6

MSDS No.: 13203
REVISION: 7

PREPARED BY: TSCA COORDINATOR ISSUE DATE:07/02/80 EFFECTIVE DATE: 05/01/97

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

38521 SCHOOLCRAFT AVE.
LIVONIA MI 48150
TELEPHONE: 313-464-2330

CHEMTREC:
TELEPHONE #: 800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: SODIUM BISULFATE

80.0 - 90.0%
CAS NUMBER: 7681-38-1
EXPOSURE LIMIT: TWA: 10mg/CU METER AS NUISANCE DUST
SUSPECT CARCINOGEN: NO

INGREDIENT: SODIUM FLUORIDE

5.0 - 10.0%
CAS NUMBER: 7681-49-4
EXPOSURE LIMIT: TWA: 2.5mg/CU METER AS FLUORIDE
SUSPECT CARCINOGEN: NO

SECTION C. PHYSICAL DATA.

APPEARANCE: WHITE POWDER
ODOR: MILD
SPECIFIC GRAVITY: NA
pH: NA
EVAPORATION RATE: NA

BOILING POINT: NA
FREEZING POINT: NA
VAPOR PRESSURE: NA
VAPOR DENSITY: NA
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: COMPLETE

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NA
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	2	2
FLAMMABILITY:	0	0
REACTIVITY:	0	0
SPECIAL:		

PRODUCT NAME: ACTISALT 6 MSDS No.: 13203
REVISION: 7
PREPARED BY: TSCA COORDINATOR ISSUE DATE:07/02/80 EFFECTIVE DATE: 05/01/97

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: IF INVOLVED IN A FIRE, SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR SHOULD BE WORN.

UNUSUAL FIRE OR EXPLOSION HAZARDS: NONE

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID: NA

CHEMICAL INCOMPATIBILITIES: STRONG MINERAL ACIDS

HAZARDOUS DECOMPOSITION PRODUCTS: HYDROGEN FLUORIDE AND OXIDES OF SULFUR.

SECTION F. HEALTH HAZARD DATA.

SUMMARY OF RISKS: SARA-ACUTE, CHRONIC.

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: EXISTING DERMATITIS.

TARGET ORGANS: SKIN, EYES, RESPIRATORY SYSTEM, TEETH.

PRIMARY ENTRY ROUTES: THROUGH CONTACT OR INHALATION OF DUST.

ACUTE EFFECTS: IRRITATING TO SKIN. STRONGLY IRRITATING OR CORROSIVE TO EYES.

CHRONIC EFFECTS: SODIUM FLUORIDE IS AN MAMMALIAN REPRODUCTIVE TOXIN. MOTTLING OF TEETH.

SIGNS & SYMPTOMS OF OVEREXPOSURE:

EYE CONTACT: BURNING OR STINGING SENSATION.

SKIN CONTACT: IRRITATION OR BURNING SENSATION.

INHALATION: IRRITATION OF RESPIRATORY TRACT.

INGESTION: BURNING OF THROAT. NAUSEA. VOMITING.

PRODUCT NAME: ACTISALT 6 MSDS No.: 13203
REVISION: 7
PREPARED BY: TSCA COORDINATOR ISSUE DATE:07/02/80 EFFECTIVE DATE: 05/01/97

EMERGENCY & FIRST AID PROCEDURES:

EYE CONTACT: FLUSH EYES WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN CONTACT: FLUSH WITH WATER WHILE REMOVING CONTAMINATED CLOTHING. SOAK AREA WITH 0.13% ZEPHIRAN (R) SOLUTION THEN MASSAGE IN 2.5% CALCIUM GLUCONATE GEL INTO THE BURN SITE.

INHALATION: REMOVE TO FRESH AIR.

INGESTION: IF CONSCIOUS, GIVE SEVERAL GLASSES OF MILK OR WATER. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: SCOOP, SWEEP, OR VACUUM UP. PLACE IN SUITABLE CONTAINER FOR TREATING, RECLAMATION, OR DISPOSAL. FLUSH TRACE RESIDUE AWAY WITH WATER.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: THE PRODUCT AS RECIEVED CAN BE SENT TO A LANDFILL. IF DESIRED, DISSOLVE IN WATER AND TREAT WITH LIME TO A pH OF 7-8.5. THE PRECIPITATE CAN GO TO A LANDFILL. THE MOTHER LIQUOR CAN BE SEWERED.
FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:

GOGGLES: SAFETY GLASSES.
GLOVES: RUBBER.
RESPIRATOR: IF TWA IS EXCEEDED, MUST BE NIOSH OR MSHA APPROVED.

OTHER: SUFFICIENT TO PREVENT SKIN CONTACT.

PRODUCT NAME: ACTISALT 6

MSDS No.: 13203
REVISION: 7

PREPARED BY: TSCA COORDINATOR ISSUE DATE:07/02/80 EFFECTIVE DATE: 05/01/97

WORKPLACE CONSIDERATIONS:
VENTILATION: SUFFICIENT TO KEEP BELOW TWA LIMITS.
SAFETY STATIONS: EYE WASH.
OTHER: SAFETY SHOWER.

SECTION I. SPECIAL PRECAUTIONS.

SPECIAL HANDLING & STORAGE PROCEDURES: STORE IN A COOL, DRY AREA TO PREVENT CAKING.

D.O.T. CLASS: NONE UN REGISTER: NONE
IMCO CLASS: NONE UN REGISTER: NONE

EXPLANATION OF SYMBOLS
NA = NOT APPLICABLE UK = UNKNOWN

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION, AND INVESTIGATION. WHILE THE INFORMATION AND RECOMMENDATION SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, McGEAN-ROHCO, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

THIS MATERIAL SAFETY DATA SHEET HAS BEEN PREPARED TO COMPLY WITH TITLE 29 CODE OF FEDERAL REGULATIONS, PART 1910.1200, OSHA HAZARD COMMUNICATION STANDARD, AND TO FULFILL THE ANNUAL CHEMICAL NOTIFICATION REQUIREMENTS OF SARA TITLE III, SECTION 313.

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FLAMMABILITY 1
HEALTH 0 REACTIVITY 0

MATERIAL SAFETY DATA SHEET

American Norit Company, Inc.
420 Agmac Avenue
Jacksonville, Florida 32205
(904) 783-6406

Bulletin No. - MSDS - 101
Revised August 1, 1987

SECTION 1 NAME

ALL DARCO® Lignite Based Carbons to include:

- DARCO® S-51
- DARCO® S-51 A (B,C,CE,H,FF,RL,RW,T)
- Premium DARCO®
- DARCO® TRS
- DARCO® GFP
- GRO-SAFE®
- All HYDRODARCO® Grades
- All Granular DARCO®

SECTION 2 INGREDIENTS

	%	TLV (ACGIH)
Activated carbon (CAS 7440-44-0) (U.N. 1362)	100.	Not listed *

* Product normally contains greater than 1% quartz: see Section 8

SECTION 3 PHYSICAL DATA

Boiling point: Not applicable
Vapor pressure (mmHg at 20°C): zero
Vapor density (air = 1): Not applicable
Solubility: Insoluble in water and organic solvents
pH: Not applicable
Specific gravity: 250 - 600 g/l
% Volatile by volume: Not applicable
Appearance and odor: Black granules or powder without taste or odor

RECEIVED
DATE 10-17-88
INITIALS tp

SECTION 4 FIRE AND EXPLOSION HAZARD DATA

Flash point (and method): Not applicable
Autoignition temp.: Powdered - No generally accepted test method available
Granular - About 450°C (ANSI/ASTM D3466)

All carbonaceous materials will burn under certain conditions and activated carbons are no exception. Activated carbons, however, are not highly flammable and burn slowly without producing smoke or flame.

Extinguishing media:
Water (fog or fine spray), carbon dioxide
Avoid methods which may stir up dust clouds.

Special fire fighting protective equipment:
Self-contained breathing apparatus.

Unusual fire and explosion hazards:
Airborne dust is a weak explosion hazard.

SECTION 5 REACTIVITY DATA

Stability:
Stable under normal conditions.

Incompatibility (materials to avoid):
Strong oxidizing agents.

Hazardous decomposition products:
Carbon dioxide, carbon monoxide.

Hazardous polymerization:
Will not occur.

SECTION 6 HEALTH HAZARD ASSESSMENT

General:
No toxicity data are available. Physical and chemical properties of activated carbon are used for the health hazard assessment.
Carcinogenicity: Activated carbon is not listed in the National Toxicology Program (NTP) Annual report on carcinogens nor has it been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) monographs or by OSHA.

Ingestion:
The acute oral LD values are not available. Relative to other materials, a single dose of this product is relatively harmless by ingestion. Hodge, H.C. and Sterner, J.H., American Industrial Hygiene Association Quarterly, 10:4, 93, Dec. 1949.

Eye Contact:
This material will probably cause some mild physical irritation if contact is made with human eyes.

Skin Contact:
This material is not likely to be a primary irritant on human skin; it has a low potential for sensitization after skin contact.

Skin absorption:
This product is not known to be absorbed through the human skin.

Inhalation:
Acute toxic effects are not likely to develop after inhalation from this material.

ECTION 6 HEALTH HAZARD ASSESSMENT (continued)

Effect of overexposure:

No adverse clinical effects have been associated with exposures to this material

First aid procedures:

Skin: Wash material off the skin with soap and water. If redness, itching or a burning sensation develops, get medical attention.

Eyes: Immediately flush with copious amounts of water. If redness, itching or a burning sensation develops, have eyes examined and treated by medical personnel.

Ingestion: Give one or two glasses of water to drink. If gastrointestinal symptoms develop, consult medical personnel. (Never give anything by mouth to an unconscious person.)

Inhalation: Remove victim to fresh air. If cough or other respiratory symptoms develop, consult medical personnel.

ECTION 7 SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled:

Wear respiratory protection during cleanup. Sweep up and recover or mix material with moist absorbent and shovel into waste container. Wash down spill area with water containing detergent and flush away with plenty of water.

Disposal method:

Dispose of virgin (unused) carbon (waste or spillage) in a facility for non-hazardous wastes.

Container disposal:

Do not reuse empty bags. Dispose of in facility permitted for non-hazardous waste.

SECTION 8 SPECIAL PROTECTION INFORMATION

TLV or suggested control value:

The current OSHA and ACGIH limit for dusts which contain more than 1% quartz are as follows for Darco lignite carbons:

Respirable Dust Limit (OSHA and ACGIH)	=	0.7 mg/m^3
Total Dust Limit (OSHA)	=	2.1 mg/m^3
Total Dust Limit (ACGIH)	=	2.0 mg/m^3

Ventilation:

Provide adequate general and local exhaust ventilation to meet suggested control value requirements.

SECTION 8 SPECIAL PROTECTION INFORMATION (continued)

Respiratory protection:
If needed, use MSHA-NIOSH approved respirator for dusts, mists and fumes whose TLV is greater than 0.05 mg/m3 or (European) filter 2b.

Protective Clothing:
For personal hygiene purposes use adequate clothing to prevent skin contact.

Eye protection:
Safety glasses with side shields.
Contact lenses should not be worn when working with activated carbon.

Other protective equipment:
Eyewash station in work area.

SECTION 9 SPECIAL PRECAUTIONS OR OTHER COMMENTS

Precautions to be taken in handling or storing:
Activated carbon can be safely stored in any normal storage area, but away from sources of direct heat.

An oxygen deficiency may be created when activated carbon is stored in an enclosed space/silo. Ventilate or wear self-contained breathing apparatus.

The information herein is given in good faith but no warranty, expressed or implied, is made.

Robert W. Edwards
Marketing Manager

MATERIAL SAFETY DATA SHEET

ANTI-FOAM NS

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME..... Haviland Products Company
ADDRESS (STREET,CITY,STATE,ZIP) 421 Ann St., N.W., Grand Rapids, MI 49504
PHONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER..... CHEMTREC (800) 424-9300
EFFECTIVE DATE..... 1/11/88
TRADE NAME..... ANTI-FOAM NS
CHEMICAL FAMILY..... Miscellaneous Blend

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #

No hazardous components
(in accordance with OSHA
29 CFR 1910.1200).

SECTION III - PHYSICAL DATA

BOILING POINT..... >212°F (100°C)
FREEZING POINT ..... Approximately 32°F (0°C)
VAPOR PRESSURE (mm Hg)..... 20 @ 20°C
VAPOR DENSITY (Air=1)..... 1.0
SOLUBILITY IN H20..... Dispersable
APPEARANCE/ODOR..... Milky White, Opaque Liquid; Mild Odor
SPECIFIC GRAVITY (H20=1)..... 1.008
PH..... Not Established

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT..... Not Flammable
LOWER EXPLOSIVE LIMIT (% by Volume) Not Applicable
UPPER EXPLOSIVE LIMIT (% by Volume) Not Applicable
EXTINGUISH MEDIA..... As for Surrounding Fires
SPECIAL FIRE FIGHTING PROCEDURES... After water evaporates, residue can burn.
UNUSUAL FIRE HAZARD..... None Currently Known

SECTION V - HEALTH HAZARD DATA

CARCINOGENICITY..... None
NTP..... No
IARC..... No
OVER EXPOSURE EFFECTS..... Swallowing may cause nausea.
PRIMARY ROUTE(S) OF ENTRY..... Skin Contact

MATERIAL SAFETY DATA SHEET

ANTI-FOAM NS

FIRST AID PROCEDURES..... In case of contact: Flush with water. If irritation persists, call a physician.

Ingestion: Do not induce vomiting. Contact physician.

EXPOSURE AGGRAVATED MEDICAL CONDITIONS None Currently Known

SECTION VI - REACTIVITY DATA

CHEMICAL STABILITY..... Stable
CONDITIONS TO AVOID..... Not Applicable
INCOMPATIBLE MATERIALS..... None Currently Known
DECOMPOSITION PRODUCTS..... After evaporation of water, residue can burn to produce carbon monoxide, carbon dioxide, and oxides of silicon.
HAZARDOUS POLYMERIZATION..... Will Not Occur
POLYMERIZATION AVOID..... Not Applicable

SECTION VII - SPILL OR LEAK PROCEDURE

FOR SPILL ..... Soak up with absorbent and place in a covered container for disposal.
WASTE DISPOSAL METHOD..... Bury in landfill where permitted under appropriate federal, state and local regulations.

SECTION VIII - SPECIAL PROTECTION

RESPIRATORY PROTECTION..... None required for normal use.
VENTILATION..... Not required for normal use.
PROTECTIVE GLOVES..... Rubber or other impervious materials.
EYE PROTECTION..... Chemical splash proof goggles.
OTHER PROTECTIVE EQUIPMENT.... A safety shower and eye bath should be available.
HANDLING AND STORAGE..... Store in tightly closed containers.

SECTION IX - SPECIAL PRECAUTIONS

HAZARD CLASS..... None
DOT SHIPPING NAME..... NON-REGULATED
UN NUMBER..... NR
REPORTABLE QUANTITY (RQ)..... Not Listed

MATERIAL SAFETY DATA SHEET

ANTI RUST RP#6

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME..... Haviland Products Company
ADDRESS (STREET,CITY,STATE,ZIP) 421 Ann St., N.W., Grand Rapids, MI 49504
PHONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER..... CHEMTREC (800) 424-9300
EFFECTIVE DATE..... 1/11/89
TRADE NAME..... ANTI RUST RP#6
CHEMICAL FAMILY..... Miscellaneous Blend

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #
Sodium Nitrite	Not Established	Not Established	7632-00-0
Sodium Carbonate (Soda Ash)	Not Established	Not Established	497-19-8

SECTION III - PHYSICAL DATA

BOILING POINT..... Decomposes
FREEZING POINT ..... >1000°F
VAPOR PRESSURE (mm Hg)..... Not Applicable
VAPOR DENSITY (Air=1)..... Not Applicable
SOLUBILITY IN H2O..... Moderately Soluble
APPEARANCE/ODOR..... White to Pale Yellow Powder; Odorless
SPECIFIC GRAVITY (H2O=1)..... 2.35
PH..... Not Established

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT..... Will Not Burn
LOWER EXPLOSIVE LIMIT (% by Volume) Not Applicable
UPPER EXPLOSIVE LIMIT (% by Volume) Not Applicable
EXTINGUISH MEDIA..... As for Surrounding Fires
SPECIAL FIRE FIGHTING PROCEDURES... None Currently Known
UNUSUAL FIRE HAZARD..... Oxidizer; ignition temperatures of paper and wood are lowered when impregnated with substance; contact with combustible matter may cause fire. Releases toxic nitrogen oxide gases at 914°F.

SECTION V - HEALTH HAZARD DATA

CARCINOGENICITY..... None
NTP..... No
IARC..... No
OVER EXPOSURE EFFECTS..... May irritate skin, eyes, nose, throat, lungs; headaches; reduction of the blood's oxygen carrying capacity with cyanosis (bluish discoloration); low blood pressure.

PRIMARY ROUTE(S) OF ENTRY..... Inhalation, Eye and Skin Contact
FIRST AID PROCEDURES..... In case of eye contact: Flush immediately with plenty of water for at least 15 minutes and get medical attention; for skin, wash thoroughly with soap and water.
If inhaled: Remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Get medical attention.
If swallowed: Induce vomiting immediately by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person.

EXPOSURE AGGRAVATED MEDICAL CONDITIONS . Respiratory conditions; cardiovascular and bone marrow diseases.

SECTION VI - REACTIVITY DATA

CHEMICAL STABILITY..... Stable
CONDITIONS TO AVOID..... Unstable if heated to 914°F
INCOMPATIBLE MATERIALS..... Acids, ammonium salts, amines, activated carbon, cyanides, reducing agents.
DECOMPOSITION PRODUCTS..... Nitrogen oxide gases; may react with amines to form nitrosamines. (Suspect cancer agents.)
HAZARDOUS POLYMERIZATION..... Will Not Occur
POLYMERIZATION AVOID..... Not Applicable

SECTION VII - SPILL OR LEAK PROCEDURE

FOR SPILL ..... Sweep up spilled material; do not re-package. Flush area with water.
WASTE DISPOSAL METHOD..... Comply with federal, state and local regulations.

SECTION VIII - SPECIAL PROTECTION

MATERIAL SAFETY DATA SHEET

ANTI RUST RP#6

RESPIRATORY PROTECTION.....	NIOSH approved respirator when required for dusts.
VENTILATION.....	When needed for dusty conditions.
PROTECTIVE GLOVES.....	Rubber or other impervious material.
EYE PROTECTION.....	Chemical safety goggles.
OTHER PROTECTIVE EQUIPMENT....	Apron, long sleeve shirt and trousers to prevent skin contact.
HANDLING AND STORAGE.....	Store in cool, dry place. Keep tightly closed and protect from damage. Do not mix or store with acids, ammonium salts, cyanides, amines, or reducing agents. Empty containers retain product residue.

SECTION IX - SPECIAL PRECAUTIONS

HAZARD CLASS.....	Oxidizer
DOT SHIPPING NAME.....	SODIUM NITRITE MIXTURE
UN NUMBER.....	UN1500
REPORTABLE QUANTITY (RQ).....	200 lbs.

REFERENCES ANTRURP6

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ROHCO AP-A NICKEL WETTER

MSDS No.: 11527
REVISION: 3

PREPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/90 EFFECTIVE DATE: 01/01/96

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

2910 HARVARD AVE.
CLEVELAND OH 44105
TELEPHONE: 216-441-4900

CHEMTREC:
TELEPHONE #: 800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: FORMALDEHYDE---SARA 313 CHEMICAL

1.0 - 2.0%
CAS NUMBER: 50-00-0
EXPOSURE LIMIT: TWA: 0.75ppm
SUSPECT CARCINOGEN: YES

SECTION C. PHYSICAL DATA.

APPEARANCE: COLORLESS LIQUID
ODOR: PUNGENT
SPECIFIC GRAVITY: 1.05
pH: 5-6
EVAPORATION RATE: AS WATER

BOILING POINT: 100C
FREEZING POINT: UNKNOWN
VAPOR PRESSURE: AS WATER
VAPOR DENSITY: AS WATER
% VOLATILE BY VOLUME: 90
SOLUBILITY IN WATER: 100%

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	1	1
FLAMMABILITY:	0	0
REACTIVITY:	0	0
SPECIAL:	0	0

EXTINGUISHING MEDIA: NA

SPECIAL FIRE FIGHTING PROCEDURES: NONE

UNUSUAL FIRE OR EXPLOSION HAZARDS: NONE

PRODUCT NAME: ROHCO AP-A NICKEL WETTER MSDS No.: 11527
REVISION: 3
PREPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/90 EFFECTIVE DATE: 01/01/96

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID: NA

CHEMICAL INCOMPATIBILITIES: NONE KNOWN

HAZARDOUS DECOMPOSITION PRODUCTS: NONE KNOWN

SECTION F. HEALTH HAZARD DATA.

MMARY OF RISKS: SARA HAZARD -- CHRONIC

DICAL CONDITIONS ICH MAY BE GRAVATED BY CONTACT: RESPIRATORY

RGET ORGANS: SKIN, EYES, MUCOUS MEMBRANES

IMARY ENTRY ROUTES: CONTACT AND INHALATION

UTE EFFECTS: MAY IRRITATE SKIN OR EYES

RONIC EFFECTS: FORMALDEHYDE IS A SUSPECT CARCINOGEN

GNS & SYMPTOMS OF OVEREXPOSURE:
EYE CONTACT: IRRITATION, WATERING

SKIN CONTACT: IRRITATION

INHALATION: IRRITATION

INGESTION: IRRITATION OF MOUTH AND THROAT

PRODUCT NAME: ROHCO AP-A NICKEL WETTER

MSDS No.: 11527
REVISION: 3

PREPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/90 EFFECTIVE DATE: 01/01/96

EMERGENCY & FIRST AID PROCEDURES:
EYE CONTACTFLUSH WITH WATER FOR AT LEAST 15 MINUTES. IF ANY IRRITATION SEE A PHYSICIAN.

SKIN CONTACWASH WITH SOAP AND WATER.

INHALATION:REMOVE TO FRESH AIR.

INGESTION: IF CONSCIOUS,GIVE WATER TO DRINK AND INDUCE VOMITING. GET MEDICAL ATTENTION.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: FLUSH WITH WATER

WASTE MANAGEMENT & DISPOSAL PROCEDURES: FORMALDEHYDE CAN BE OXIDIZED WITH HYDROGEN PEROXIDE. AFTER DESTRUCTION OF FORMALDEHYDE,SEWER. FOLLOW ALL LOCAL,STATE, AND FEDERAL REGULATIOS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:
GOGGLES: CHEMICAL GOGGLES.
GLOVES: RUBBER.
RESPIRATOR: IF TWA IS EXCEEDED, MUST BE NIOSH OR MSHA APPROVED. SUFFICIENT TO PREVENT SKIN CONTACT.
OTHER:

RODUCT NAME: ROHCO AP-A NICKEL WETTER MSDS No.: 11527
REVISION: 3
REPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/90 EFFECTIVE DATE: 01/01/96

WORKPLACE CONSIDERATIONS:
VENTILATION: SUFFICIENT TO KEEP BELOW TWA LIMITS.
SAFETY STATIONS: EYE WASH.
OTHER: NA

SECTION I. SPECIAL PRECAUTIONS.

SPECIAL HANDLING & STORAGE PROCEDURES: NORMAL HANDLING AND STORAGE.

D.O.T. CLASS: NONE UN REGISTER: NONE
IMCO CLASS: NONE UN REGISTER: NONE

XPLANATION OF SYMBOLS
NA = NOT APPLICABLE UK = UNKNOWN

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HIS MATERIAL SAFETY DATA SHEET HAS BEEN PREPARED TO COMPLY WITH ITLE 29 CODE OF FEDERAL REGULATIONS, PART 1910.1200, OSHA HAZARD OMMUNICATION STANDARD, AND TO FULFILL THE ANNUAL CHEMICAL NOTIFICATION EQUIREMENTS OF SARA TITLE III, SECTION 313.

MATERIAL SAFETY DATA SHEET

BARIUM CARBONATE

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME..... Haviland Products Company
ADDRESS (STREET,CITY,STATE,ZIP) 421 Ann St., N.W., Grand Rapids, MI 49504
PHONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER..... CHEMTREC (800) 424-9300
EFFECTIVE DATE..... 09/29/1993
TRADE NAME..... BARIUM CARBONATE
CHEMICAL FAMILY..... Miscellaneous Blend

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #
No hazardous components (in accordance with29 CFR 1910.1200).			

SECTION III - PHYSICAL DATA

BOILING POINT..... Not Applicable
FREEZING POINT ..... No Information Available
VAPOR PRESSURE (mm Hg)..... Not Applicable
VAPOR DENSITY (Air=1)..... Not Applicable
SOLUBILITY IN H20..... Completely, Very Viscous @ > 1%
APPEARANCE/ODOR..... White Powder; Odorless
SPECIFIC GRAVITY (H20=1)..... 0.78 (Solid)
PH..... Not Established

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT..... Not Flammable
LOWER EXPLOSIVE LIMIT (% by Volume) Not Applicable
UPPER EXPLOSIVE LIMIT (% by Volume) Not Applicable
EXTINGUISH MEDIA..... As for Surrounding Fires
SPECIAL FIRE FIGHTING PROCEDURES... Use self contained breathing apparatus in confined areas.
UNUSUAL FIRE HAZARD..... Under certain conditions can form explosive mixtures when suspended in air.

SECTION V - HEALTH HAZARD DATA

CARCINOGENICITY..... None
NTP..... No
IARC..... No

OVER EXPOSURE EFFECTS..... Possible Irritation of Skin and Eyes
PRIMARY ROUTE(S) OF ENTRY..... Eye and Skin Contact
FIRST AID PROCEDURES..... In case of contact: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
Ingestion: Immediately give two tablespoons of Epsom Salt or Glauber's Salt in a glass of water. Follow with copious amounts of milk or water and induce vomiting. Never give anything by mouth to an unconscious person. Call physician immediately.
For Skin: Thoroughly flush skin with plenty of water and wash contaminated clothes before reuse.
EXPOSURE AGGRAVATED MEDICAL CONDITIONS None Currently Known

SECTION VI - REACTIVITY DATA

CHEMICAL STABILITY..... Stable
CONDITIONS TO AVOID..... Avoid creating explosive concentrations of dust.
INCOMPATIBLE MATERIALS..... Strong oxidizing agents.
DECOMPOSITION PRODUCTS..... Carbon dioxide, carbon monoxide, nitrogen oxides.
HAZARDOUS POLYMERIZATION..... Will Not Occur
POLYMERIZATION AVOID..... Not Applicable

SECTION VII - SPILL OR LEAK PROCEDURE

FOR SPILL ..... Clean up in normal manner, preferably while dry. Avoid conditions which produce dust. Keep away from acids. Avoid possibility of spilled material being flushed by rain into streams or waterways. Dispose of where no possibility of contamination of food or water.
WASTE DISPOSAL METHOD..... Dispose in an approved chemical waste landfill in accordance with applicable federal, state and local regulations.

SECTION VIII - SPECIAL PROTECTION

RESPIRATORY PROTECTION..... None required under normal use.
VENTILATION..... To maintain low dust concentration.
PROTECTIVE GLOVES..... Rubber or Plastic
EYE PROTECTION..... Chemical splash goggles or face shield.
OTHER PROTECTIVE EQUIPMENT.... A safety shower and eye bath should be available.

HANDLING AND STORAGE..... Store in cool, dry place. Emptied containers retain product residues.

SECTION IX - SPECIAL PRECAUTIONS

HAZARD CLASS..... None
DOT SHIPPING NAME..... NON-REGULATED
UN NUMBER..... NR
REPORTABLE QUANTITY (RQ)..... Not Listed

REFERENCES BARMCARB

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: BESNIFLEC 811

MSDS No.: 11334
REVISION: 3

PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 05/26/92

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

2910 HARVARD AVE.
CLEVELAND OH 44105
TELEPHONE: 216-441-4900

CHEMTREC:
TELEPHONE #:800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: CONTAINS NOTHING CONSIDERED HAZARDOUS BY STATE OR FEDERAL REGULATIONS.
CAS NUMBER:NA
EXPOSURE LIMIT: TWA:NA
SUSPECT CARCINOGEN: NO

SECTION C. PHYSICAL DATA.

APPEARANCE: SLIGHTLY YELLOW LIQUID
ODOR: SLIGHT

BOILING POINT: 100C
FREEZING POINT: UK

SPECIFIC GRAVITY: 1.11
pH: 4-6

VAPOR PRESSURE: AS WATER
VAPOR DENSITY: AS WATER
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: 100%

EVAPORATION RATE: AS WATER

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	0	0
FLAMMABILITY:	0	0
REACTIVITY:	0	0
SPECIAL:		

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: NONE

UNUSUAL FIRE OR EXPLOSION HAZARDS: NONE

PRODUCT NAME: BESNIFLEC 811 MSDS No.: 11334
REVISION: 3
REPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 05/26/92

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID:

CHEMICAL INCOMPATIBILITIES: NONE KNOWN

HAZARDOUS DECOMPOSITION PRODUCTS: NONE KNOWN

SECTION F. HEALTH HAZARD DATA.

SUMMARY OF RISKS: SARA-NA

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: NONE KNOWN

TARGET ORGANS: SKIN, EYES

IMARY ENTRY ROUTES: THROUGH CONTACT

ACUTE EFFECTS: WHILE THERE IS NO OATA TO SHOW ANY HARMFUL EFFECTS IT IS POSSIBLE THAT IRRITATION OF SKIN OR EYES OF OF PARTICULARY SENSITIVE INDIVIDUALS COULD OCCUR.

CHRONIC EFFECTS: NONE KNOWN

SIGNS & SYMPTOMS OF OVEREXPOSURE:
EYE CONTACT: POSSIBLE IRRITATION.

SKIN CONTACT: POSSIBLE SLIGHT IRRITATION ON EXTENDED CONTACT.

INHALATION: NONE KNOWN.

INGESTION: NONE KNOWN.

PRODUCT NAME: BESNIFLEC 811

MSDS No.: 11334
REVISION: 3

PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 05/26/92

EMERGENCY & FIRST AID PROCEDURES:

EYE CONTACT: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. IF ANY IRRITATION PERSISTS, SEE A PHYSCIAN.

SKIN CONTACT: WASH WITH SOAP AND WATER.

INHALATION: NA

INGESTION: INDUCE VOMITING

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: FLUSH SPILL AREA WITH WATER.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: FLUSH WITH WATER TO SEWER. FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:

GOGGLES: CHEMICAL GOGGLES.
GLOVES: RUBBER.
RESPIRATOR: NOT REQUIRED.

OTHER: SUFFICIENT TO PREVENT SKIN CONTACT.

PRODUCT NAME: BESNIFLEC 811 MSDS No.: 11334
REVISION: 3
REPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 05/26/92

WORKPLACE CONSIDERATIONS:
VENTILATION: NORMAL.
SAFETY STATIONS: EYE WASH.
OTHER:

SECTION I. SPECIAL PRECAUTIONS.

SPECIAL HANDLING & STORAGE PROCEDURES: NORMAL HANDLING AND STORAGE.

D.O.T. CLASS: NONE UN REGISTER: NONE
IMCO CLASS: NONE UN REGISTER: NONE

EXPLANATION OF SYMBOLS
NA = NOT APPLICABLE UK = UNKNOWN

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MATERIAL SAFETY DATA SHEET

PRODUCT NAME: BESNIFLEC 812

MSDS No.: 11335
REVISION: 4

PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 12/11/92

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

2910 HARVARD AVE.
CLEVELAND OH 44105
TELEPHONE: 216-441-4900

CHEMTREC:
TELEPHONE #:800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: SACCHARIN

CAS NUMBER:81-07-2 5.0 - 10.0%
EXPOSURE LIMIT: TWA:NONE ESTABLISHED
SUSPECT CARCINOGEN: YES

SECTION C. PHYSICAL DATA.

APPEARANCE: COLORLESS LIQUID
ODOR: NONE

SPECIFIC GRAVITY: 1.04
pH: 4-6

EVAPORATION RATE: <BUTYL ACETATE

BOILING POINT: 100C
FREEZING POINT: UK

VAPOR PRESSURE: AS WATER
VAPOR DENSITY: AS WATER
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: 100%

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	0	0
FLAMMABILITY:	0	0
REACTIVITY:	0	0
SPECIAL:		

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: NONE

UNUSUAL FIRE OR EXPLOSION HAZARDS: NONE

PRODUCT NAME: BESNIFLEC 812 MSDS No.: 11335
REVISION: 4
PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 12/11/92

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID: NA

CHEMICAL INCOMPATIBILITIES: NONE KNOWN

HAZARDOUS DECOMPOSITION PRODUCTS: NONE KNOWN

SECTION F. HEALTH HAZARD DATA.

SUMMARY OF RISKS: SARA CHRONIC

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: NONE KNOWN

TARGET ORGANS: BLADDER

PRIMARY ENTRY ROUTES: THROUGH CONTACT.

ACUTE EFFECTS: POSSIBLE SLIGHT IRRITATION OF SKIN OR EYES.

CHRONIC EFFECTS: SACCHARIN SUSPECT CANCER AGENT.

SIGNS & SYMPTOMS OF OVEREXPOSURE:
EYE CONTACT: POSSIBLE IRRITATION.

SKIN CONTACT: NONE TO POSSIBLE SLIGHT IRRITATION.

INHALATION: NONE KNOWN

INGESTION: ANOREXIA, NAUSEA, VOMITING, DIARRHEA.

PRODUCT NAME: BESNIFLEC 812 MSDS No.: 11335
REVISION: 4
EPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 12/11/92

M RGENCY & FIRST AID PROCEDURES:

EYE CONTACT: FLUSH WITH WATER FOR 15 MINUTES. IF ANY IRRITATION PERSISTS, SEE A PHYSCIAN.

SKIN CONTACT: WASH WITH SOAP AND WATER.

NHALATION: NOT EXPECTED TO BE A PROBLEM.

NGESTION: IF CONSCIOUS, GIVE SEVERAL GLASSES OF WATER AND INDUCE VOMITING. GET MEDICAL ATTENTION.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: FLUSH WITH WATER.

WASTE MANAGEMENT DISPOSAL ROCEDURES: FLUSH WITH WATER TO SEWER.
FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:

GOGGLES: CHEMICAL GOGGLES.
GLOVES: RUBBER.
RESPIRATOR: NOT NORMALLY REQUIRED.

OTHER: SUFFICIENT TO PREVENT SKIN CONTACT.

PRODUCT NAME: BESNIFLEC 812

MSDS No.: 11335
REVISION: 4

PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 12/11/92

WORKPLACE CONSIDERATIONS:
VENTILATION: NORMAL.
SAFETY STATIONS: EYE WASH
OTHER: SAFETY SHOWER.

SECTION I. SPECIAL PRECAUTIONS.

SPECIAL HANDLING & STORAGE PROCEDURES: NORMAL HANDLING AND STORAGE.

D.O.T. CLASS: NONE UN REGISTER: NONE
IMCO CLASS: NONE UN REGISTER: NONE

EXPLANATION OF SYMBOLS
NA = NOT APPLICABLE UK = UNKNOWN

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MATERIAL SAFETY DATA SHEET

PRODUCT NAME: BESNIFLEC 815

MSDS No.: 11336
REVISION: 2

PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 EFFECTIVE DATE: 05/01/

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

2910 HARVARD AVE.
CLEVELAND OH 44105
TELEPHONE: 216-441-4900

CHEMTREC:
TELEPHONE #: 800-424-930

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: CONTAINS NOTHING CONSIDERED HAZARDOUS BY STATE OR FEDERAL REGULATIONS.
CAS NUMBER: NA
EXPOSURE LIMIT: TWA: NA
SUSPECT CARCINOGEN: NO

SECTION C. PHYSICAL DATA.

APPEARANCE: COLORLESS LIQUID
ODOR: NONE
SPECIFIC GRAVITY: 1.12
pH: 4-6

EVAPORATION RATE: AS WATER

BOILING POINT: 100C
FREEZING POINT: UK
VAPOR PRESSURE: AS WATER
VAPOR DENSITY: AS WATER
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: 100%

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	0	0
FLAMMABILITY:	0	0
REACTIVITY:	0	0
SPECIAL:		

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: NONE

UNUSUAL FIRE OR EXPLOSION HAZARDS: NONE

PRODUCT NAME: BESNIFLEC 815 MSDS No.: 11336
REVISION: 2
PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 EFFECTIVE DATE: 05/01/97

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID: NA

CHEMICAL INCOMPATIBILITIES: NONE KNOWN

HAZARDOUS DECOMPOSITION PRODUCTS: NONE KNOWN

SECTION F. HEALTH HAZARD DATA.

SUMMARY OF RISKS: SARA-NA

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: NONE KNOWN

TARGET ORGANS: SKIN, EYES

PRIMARY ENTRY ROUTES: THROUGH CONTACT

ACUTE EFFECTS: WHILE THERE IS NO DATA TO SHOW ANY HARMFUL EFFECTS IT IS POSSIBLE THAT IRRITATION OF SKIN OR EYES OF OF PARTICULARY SENSITIVE INDIVIDUALS COULD OCCUR.

CHRONIC EFFECTS: NONE KNOWN

SIGNS & SYMPTOMS OF OVEREXPOSURE:

EYE CONTACT: POSSIBLE IRRITATION.

SKIN CONTACT: POSSIBLE SLIGHT IRRITATION ON EXTENDED CONTACT.

INHALATION: NONE EXPECTED.

INGESTION: EFFECTS UNKNOWN.
NOT CONSIDERED TOXIC.

PRODUCT NAME: BESNIFLEC 815 MSDS No.: 11336
REVISION: 2
PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 EFFECTIVE DATE: 05/01/97

EMERGENCY & FIRST AID PROCEDURES:

EYE CONTACT: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. IF ANY IRRITATION PERSISTS, SEE A PHYSCIAN.

SKIN CONTACT: WASH WITH SOAP AND WATER.

INHALATION: NA

INGESTION: IF CONSCIOUS, GIVE SEVERAL GLASSES OF WATER AND INDUCE VOMITING. GET MEDICAL ATTENTION.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: FLUSH SPILL AREA WITH WATER.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: FLUSH WITH WATER TO SEWER. FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:

GOGGLES: CHEMICAL GOGGLES.
GLOVES: RUBBER.
RESPIRATOR: NOT REQUIRED.

OTHER: SUFFICIENT TO PREVENT SKIN CONTACT.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: BESPLATE 241

MSDS No.: 11316
REVISION: 3

PREPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/77 EFFECTIVE DATE: 05/01/97

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

2910 HARVARD AVE.
CLEVELAND OH 44105
TELEPHONE: 216-441-4900

CHEMTREC:
TELEPHONE #: 800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: ~~CONTAINS NOTHING CONSIDERED HAZARDOUS~~ BY STATE OR FEDERAL REGULATIONS.
CAS NUMBER: NA
EXPOSURE LIMIT: TWA: NA
SUSPECT CARCINOGEN: NO

SECTION C. PHYSICAL DATA.

APPEARANCE: YELLOW LIQUID
ODOR: SLIGHT
SPECIFIC GRAVITY: 1.13
pH: 4-5
EVAPORATION RATE: <BUTYL ACETATE

BOILING POINT: 100C
FREEZING POINT: 0C
VAPOR PRESSURE: AS WATER
VAPOR DENSITY: AS WATER
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: 100%

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	0	0
FLAMMABILITY:	0	0
REACTIVITY:	0	0
SPECIAL:		

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: NONE

UNUSUAL FIRE OR EXPLOSION HAZARDS: NONE

PRODUCT NAME: BESPLATE 241 MSDS No.: 11316
REVISION: 3
PREPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/77 EFFECTIVE DATE: 05/01/97

EMERGENCY & FIRST AID PROCEDURES:

EYE CONTACT: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. IF ANY IRRITATION PERSISTS, SEE A PHYSCIAN.

SKIN CONTACT: WASH WITH SOAP AND WATER.

INHALATION: NA

INGESTION: IF CONSCIOUS, GIVE SEVERAL GLASSES OF WATER AND INDUCE VOMITING. GET MEDICAL ATTENTION.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: FLUSH SPILL AREA WITH WATER.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: FLUSH WITH WATER TO SEWER. FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:

GOGGLES: CHEMICAL GOGGLES.
GLOVES: RUBBER.
RESPIRATOR: NOT REQUIRED.

OTHER: SUFFICIENT TO PREVENT SKIN CONTACT.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: BESPLATE 242

MSDS No.: 11317
REVISION: 4

PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/78 EFFECTIVE DATE: 05/01/97

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

2910 HARVARD AVE.
CLEVELAND OH 44105
TELEPHONE: 216-441-4900

CHEMTREC:
TELEPHONE #: 800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: SACCHARIN

7.0%
CAS NUMBER: 81-07-2
EXPOSURE LIMIT: TWA: NONE ESTABLISHED
SUSPECT CARCINOGEN: YES

SECTION C. PHYSICAL DATA.

APPEARANCE: GOLDEN TAN LIQUID
ODOR: SLIGHT
SPECIFIC GRAVITY: 1.07
pH: 4-5
EVAPORATION RATE: (BUTYL ACETATE

BOILING POINT: 100C
FREEZING POINT: UK
VAPOR PRESSURE: UK
VAPOR DENSITY: UK
% VOLATILE-BY VOLUME: NA
SOLUBILITY IN WATER: 100%

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	0	0
FLAMMABILITY:	0	0
REACTIVITY:	0	0
SPECIAL:		

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: NONE

UNUSUAL FIRE OR EXPLOSION HAZARDS: NONE

PRODUCT NAME: BESPLATE 242 MSDS No.: 11317
REVISION: 4
PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/78 EFFECTIVE DATE: 05/01/97

EMERGENCY & FIRST AID PROCEDURES:
EYE CONTACT: FLUSH WITH WATER FOR 15 MINUTES. IF ANY IRRITATION PERSISTS, SEE A PHYSCIAN.

SKIN CONTACT: WASH WITH SOAP AND WATER.

INHALATION: NA

INGESTION: INDUCE VOMITING.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: FLUSH WITH WATER.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: FLUSH WITH WATER TO SEWER.
FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:
GOGGLES: CHEMICAL GOGGLES.
GLOVES: RUBBER.
RESPIRATOR: NOT NORMALLY REQUIRED.

OTHER: SUFFICIENT TO PREVENT SKIN CONTACT.

U.S.BORAX

MATERIAL SAFETY DATA SHEET

Meeting OSHA Standard 29CFR §1910.1200 (g)

EFFECTIVE DATE: September 15, 1985

SECTION I — PRODUCT IDENTIFICATION

PRODUCT TRADE NAME Anhydrous Boric Acid

CHEMICAL NAME AND SYNONYMS Boric oxide, Boron trioxide (See Pg.6)

CAS NO. 1303-86-2

CHEMICAL FAMILY: Borate

FORMULA: B_2O_3

HAZARD RATING: NFPA

Health	0	Minimal Hazard
Flammability	0	" "
Reactivity	0	" "

SECTION II — HAZARDOUS INGREDIENTS

Material or Component	%	Material or Component	%
None			

SECTION III — PHYSICAL DATA

Appearance: White, odorless solid
Specific gravity: 1.844
Solubility in water: 4% @ 20°C(68°F)
pH 1% solution = 5.1

(Note: When dissolved in water, converts to boric acid)

Melting point 325°C - 500°C

Hygroscopic in atmosphere

Heat of solution: 210 BTU/lb.

RECEIVED
DATE 12-4-85
INITIALS JA

24 HOUR EMERGENCY TELEPHONE NUMBER: (714) 774-2673

CONTACT: J. C. Middleton, Manager, Product Safety

"The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind expressed or implied is made with respect to the information contained herein."

ACUTE OVEREXPOSURE/METHOD OF EXPOSURE/SYMPTOMS

Eyes - may be slightly irritating as dry powder. Reversible.
Skin - no penetration of intact skin. Absorption into bloodstream through damaged skin may result in erythema, macular rash, CNS effects after 24 hours.
Ingestion - large doses (>10-15 grams) may cause erythema, macular rash, diarrhea, nausea, dizziness and CNS effects after 36-72 hours.

CHRONIC OVEREXPOSURE/METHOD OF EXPOSURE/SYMPTOMS

Large amounts absorbed into the blood stream by ingestion or through damaged skin may result in erythema, macular rash, nausea, diarrhea, dizziness, depression. No evidence of mutagenic, oncogenic or teratogenic activity.

OSHA Permissible Exposure LIMIT (PEL) 15 mg/M^3 29CFR §1910 Subpart Z

ACGIH Recommended Threshold Limit Value 10 mg/M^3 (1984-1985)

National Toxicology Program Annual Report on Carcinogens

Year 1983 Listed Not Listed X

International Agency for Research on Cancer (IARC)

Monograph Yes
No X

OSHA CARCINOGEN - No

EMERGENCY AND FIRST AID PROCEDURES:

EYES Flush with tepid water 15 minutes.

SKIN Flush with water.

INHALATION Remove to fresh air.

(CONT. PAGE 4)

,EPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Sweep or flush. Rinse with water.

WASTE DISPOSAL METHOD

Solid waste landfill or sanitary sewer. Not considered a hazardous waste.

SECTION VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Nuisance dust mask. Dust Foe #88(MSA); Comfo II with particle filter.

VENTILATION LOCAL EXHAUST X SPECIAL

MECHANICAL (General) OTHER

PROTECTIVE GLOVES Cloth

EYE PROTECTION Dust goggles. ANSI Standard 787-1-1968.060 Type ENCON 160 lens

OTHER PROTECTIVE EQUIPMENT None

SECTION IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Dry, indoor storage. Retain package integrity.

OTHER PRECAUTIONS

DATE: Sept. 15, 1985 SIGNATURE:

Chemical
An Allied Company

CALCIUM CHLORIDE, FLAKE

DATA SHEET

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME OR SYNONYM)	☒ C.A.S. NO. ☐ ALLIED PRODUCT CODE
FLAKE CALCIUM CHLORIDE POWDERED CALCIUM CHLORIDE	10035-04-8

CHEMICAL NAME
Calcium Chloride, Dihydrate

FORMULA	MOLECULAR WEIGHT
$CaCl_2 \cdot 2H_2O$	147.02

ADDRESS (No., STREET, CITY, STATE AND ZIP CODE)
ALLIED CHEMICAL
P.O. Box 1139R
Morristown, N.J. 07960

CONTACT	PHONE NUMBER	ISSUED DATE	REVISED DATE
Director, Product Safety	(201) 455-4157	June 12, 1980	Mar., 1982

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER
(201) 455-2000

Eyes: Flush promptly with plenty of water, continuing for at least 15 minutes. Get medical attention.
Inhalation: Remove to fresh air.
Skin: Wash with plenty of soap and water.
Ingestion: If conscious, immediately give 2 to 4 glasses of water, and induce vomiting by touching finger to back of throat.
Get medical attention for irritation, ingestion, or discomfort from inhalation.

C. HAZARDS INFORMATION

HEALTH

INHALATION
Dust or mist inhalation may irritate nose, throat, and lungs.

INGESTION
Low in toxicity, but more toxic than sodium chloride. LD_{50} (rat): 1.4 g/kg.*
–Reference (e). May irritate gastrointestinal tract. *anhydrous basis

SKIN
May cause skin irritation. Under conditions of prolonged contact or when moisture is present, superficial burns may resu
Contact with abraded skin or cuts can cause severe necrosis.

EYES
May irritate or burn eyes.

PERMISSIBLE CONCENTRATION: AIR
(SEE SECTION J) None established by OSHA.
Also, no TLV established by ACGIH.

BIOLOGICAL

UNUSUAL CHRONIC TOXICITY

☐ LIQUID ☒ SOLID ☐ GAS ☐ _____	APPEARANCE AND ODOR Small white flakes; odorless.

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BOILING POINT Unknown °C MELTING POINT 176 °C	SPECIFIC GRAVITY (H_2O = 1) 0.835 --Reference (b)	VAPOR DENSITY (AIR = 1) Not applicable: water vapor only.
SOLUBILITY IN WATER (% by Weight) 42 (anhydrous) @ 20°C	pH Neutral or slightly alkaline –Reference (c)	VAPOR PRESSURE (mm Hg at 20° C) ☐ (PSIG) ☐ Not applicable
EVAPORATION RATE (Butyl Acetate = 1) ☐ (Ether = 1) ☐ Not applicable	% VOLATILES BY VOLUME (At 20° C) Not applicable	

G. REACTIVITY DATA

STABILITY ☐ UNSTABLE ☒ STABLE	CONDITIONS TO AVOID

INCOMPATIBILITY (MATERIALS TO AVOID)

Sulfuric acid: yields hydrogen chloride gas, which is corrosive, irritating, and reactive. Water-reactive materials, such as sodiu cause an exothermic reaction. Methyl vinyl ether: starts runaway polymerization reaction--Reference (d). Zinc as in galvaniz iron: yields hydrogen gas with solutions, which may explode under these conditions. --Reference (d).

HAZARDOUS DECOMPOSITION PRODUCTS

None.

HAZARDOUS POLYMERIZATION ☐ MAY OCCUR ☒ WILL NOT OCCUR	CONDITIONS TO AVOID

H. HAZARDOUS INGREDIENTS (Mixtures Only)

MATERIAL OR COMPONENT/C.A.S. #	WT. %	HAZARD DATA (SEE SECT.
NOT APPLICABLE		

(F)

(71)

LCP CHEMICALS AND PLASTICS, INC.
RARITAN PLAZA II, RARITAN CENTER
EDISON, N.J. 08837

DATE: 11/86
EMERGENCY PHONE NO.:
(315) 487-4700
CHEMTREC:
(800) 424-9300

MATERIAL SAFETY DATA
FOR
CAUSTIC POTASH DRY

SECTION I — MATERIAL IDENTIFICATION *

CHEMICAL NAME: POTASSIUM HYDROXIDE, SOLID — C.A.S. NO.: 001-310-583
SYNONYMS: CAUSTIC POTASH, POTASSIUM HYDROXIDE
D.O.T. IDENTIFICATION NO.: UN 1813 — H.M.I.S.: 3-0-1-D+
TRADE NAME: POTASSIUM HYDROXIDE, DRY, SOLID, FLAKE
CHEMICAL FORMULA: KOH — RQ: 1000 LBS., 45.4 KG
D.O.T. SHIPPING NAME: POTASSIUM HYDROXIDE, DRY, SOLID, FLAKE
D.O.T. HAZARD GUIDE: #60 — CHEMICAL FAMILY: ALKALI
.F.P.A. REGISTRY: 3-0-1
ABELING: CORROSIVE - CLASS 8 — PLACARD: UN 1813

SECTION II — INGREDIENTS AND HAZARDS *

PRINCIPAL COMPONENT: KOH — PERCENT: 85-90%
TRACE IMPURITIES - REMAINDER IS WATER
AZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS OR GASES: THIS MATERIAL REACTS VIOLENTLY WITH ACIDS,HALOGENATED HYDROCARBONS, NITROCARBONS AND TRICHLOROETHYLENE. ANHYDROUS KOH CAN SLOWLY PICK UP MOISTURE FROM THE ATMOSPHERE AND REACT WITH CARBON DIOXIDE FROM AIR TO FORM POTASSIUM CARBONATE. IT ALSO REACTS WITH ALUMINUM, TIN AND ZINC IN THE PRESENCE OF MOISTURE.
DDITIONAL INFORMATION: THIS MATERIAL GENERATES CONSIDERABLE AMOUNTS OF HEAT WHEN DISSOLVED IN WATER.
AGCIH: CEILING LIMIT 2mg cu/M3

SECTION III — PHYSICAL DATA *

VAPOR PRESSURE {MM HG}: 1000 DEG C = 40 TO 50
APOR DENSITY {AIR = 1}: N.A.
PPEARANCE/ODOR: WHITE HYGROSCOPIC FLAKE, PELLET, BRIQUETTE, ETC. NO ODOR
PERCENT VOLATILE BY VOLUME: NONVOLATILE AT ROOM TEMPERATURE
VAPORATION RATE: SOLID
OLUBILITY IN WATER: 20 DEG C = 52.8% BY WEIGHT
SPECIFIC GRAVITY (H20=1): 2.044 — MOLECULAR WEIGHT: 56.1
THIS MATERIAL GENERATES CONSIDERABLE AMOUNTS OF HEAT WHEN DISSOLVED IN WATER.
FREEZE/SOLIDIFICATION TEMP: 715 DEG F

SECTION VII — ENVIRONMENTAL PROTECTION PROCEDURES

SPILL RESPONSE: SHOVEL UP SPILLS AND PLACE IN SUITABLE CONTAINERS FOR RECOVERY OR DISPOSAL. DELAY IN CLEAN UP WILL ALLOW ABSORPTION OF ATMOSPHERIC MOISTURE AND INCREASE PROBLEMS ASSOCIATED WITH CLEAN UP. AVOID DUSTING OR BODY CONTACT. RECOVER ALL MATERIAL WHEN IN ITS DRY STATE. USE WEAK ACID TO NEUTRALIZE REMAINING SPILLAGE AND FLUSH WITH WATER. CONFINE THE SPILL SITE, TOOLS AND CLOTHING TO A SMALL AREA.

WASTE DISPOSAL METHODS: PREPLANNING IS ESSENTIAL - FOLLOW APPROVED DISPOSAL PROCEDURE OR CONTACT YOUR SUPPLIER. FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS TO MEET LEGAL AND TECHNICAL REQUIREMENTS. DO NOT DISPOSE OF IT TO SEWERS OR NON-CHEMICAL SOLID WASTE SITES. DILUTE WITH WATER, NEUTRALIZE TO A SALT SOLUTION BEFORE DISPOSAL TO REGULAR OUTFALL.

PROTECTIVE EQUIPMENT: SAFETY EYEWASH/SHOWER STATION SHOULD BE LOCATED IN THE HANDLING AREA.

SECTION VIII — SPECIAL PROTECTION INFORMATION

EYE PROTECTION: SPLASH GOGGLES AND/OR FACE SHIELD

RESPIRATORY PROTECTION: A CLASS 2B NIOSH APPROVED PARTICLE RESPIRATOR OR DUST MASK SHOULD BE WORN IF DUST IS PRESENT.

SKIN PROTECTION: IMPERVIOUS COVERING TO AVOID BODY CONTACT.

OTHER PROTECTION: RUBBER BOOTS. RUBBERS OVER LEATHER SHOES IS NOT RECOMMENDED. RUBBER APRON, RAINWARE OR DISPOSAL TYVEK SUIT WITH HARD HAT SHOULD BE WORN.

VENTILATION RECOMMENDED: PROVIDE ADEQUATE VENTILATION TO MEET TLV REQUIREMENTS.

GLOVE TYPE RECOMMENDED: RUBBER

ADDITIONAL INFORMATION: SAFETY EYE WASH/SHOWER STATIONS MUST BE AVAILABLE IN THE WORK AREA.

SECTION IX — SPECIAL PRECAUTIONS

HYGIENIC PRACTICES IN HANDLING STORING: AVOID DUSTING AND BODY CONTACT. WEAR HARD HAT, GOGGLES AND/OR FACE SHIELD AND OTHER SUITABLE PROTECTIVE CLOTHING.

PRECAUTIONS TO BE TAKEN FOR HANDLING/STORING: STORE IN WELL SEALED CONTAINERS. AVOID HANDLING PROCEDURES THAT LEAD TO DUSTING, LEAK OR SPILLS. KEEP STORAGE AREA DRY AND SEPARATE FROM ACIDS. DO NOT STORE NEAR HALOGENATED HYDROCARBONS OR REACTIVE METALS.

PRECAUTIONS FOR REPAIR MAINTENANCE OF CONTAMINATED EQUIPMENT: WASH THOROUGHLY WITH WATER.

OTHER PRECAUTIONS: DRAINS SHOULD HAVE RETENTION BASINS TO ALLOW FOR NEUTRALIZATION OF SPILLS OR WASTE PRIOR TO DISPOSAL.

ADDITIONAL: DO NOT PERMIT EMPLOYEES TO HANDLE CAUSTIC POTASH WITHOUT ADVANCED TRAINING AND PROPER PROTECTIVE EQUIPMENT.

SECTION X — TRANSPORTATION

USUAL SHIPPING CONTAINERS: DRUMS, MULTILAYER BAGS

USUAL SHELF LIFE: LIFE OF CONTAINER.

STORAGE/TRANSPORT TEMPS: AMBIENT

SUITABLE STORAGE MATERIALS/COATINGS: STEEL, PLASTIC, PE (WHEN DRY)

UNSUITABLE: ALUMINUM OR GALVANIZED CONTAINERS

OTHER INFORMATION: KEEP CONTAINERS SEALED TO AVOID ABSORPTION OF MOISTURE

MATERIAL SAFETY DATA SHEET

CHROMATER 50

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME.....	Haviland Products Company
ADDRESS (STREET,CITY,STATE,ZIP)	421 Ann St., N.W., Grand Rapids, MI 49504
PHONE NUMBER.....	(616) 361-6691
EMERGENCY PHONE NUMBER.....	CHEMTREC (800) 424-9300
EFFECTIVE DATE.....	09/29/1993
TRADE NAME.....	CHROMATER 50
CHEMICAL FAMILY.....	Miscellaneous Blend

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #
**Chromic Acid (30% by wt)	1 mg/10m³ 8hr TWA	0.05mg/m³ (As Cr) 8hr TWA	1333-82-0
Sulfuric Acid (10% by wt)	1 mg/m³ 8hr TWA	1 mg/m³	7664-93-9

Chromic Acid Listed as a Carcinogen
SEE NOTE UNDER "REFERENCES" AT END OF MSDS

SECTION III - PHYSICAL DATA

BOILING POINT.....	215°F (102°C)
FREEZING POINT	<32°F (0°C)
VAPOR PRESSURE (mm Hg).....	10 @ 20°C
VAPOR DENSITY (Air=1).....	No Information Available
SOLUBILITY IN H20.....	Completely
APPEARANCE/ODOR.....	Orange Liquid; Irritating Acidic Odor
SPECIFIC GRAVITY (H20=1).....	1.170
pH	1% Solution: 1.6

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT.....	Will Not Burn
LOWER EXPLOSIVE LIMIT (% by Volume)	Not Applicable
UPPER EXPLOSIVE LIMIT (% by Volume)	Not Applicable
EXTINGUISH MEDIA.....	As for Surrounding Fires
SPECIAL FIRE FIGHTING PROCEDURES...	Under fire conditions, decomposing material may form a hot viscous foam. Self contained breathing apparatus should be worn by fire fighters.

FOR SPILL	Leaks should be stopped and spills reported to authorities. Neutralize with soda ash, lime or limestone. Flush, or transfer spilled material to waste treatment system.
WASTE DISPOSAL METHOD.....	Reduce hexavalent chrome in product with sodium bisulfite, sodium sulfite, or ferrous sulfate. Neutralize with soda ash, lime or limestone to pH of 7.5. Neutralization causes chrome precipitation. Dispose of solid in an approved waste landfill. Comply with federal, state, and local regulations.

SECTION VIII - SPECIAL PROTECTION

RESPIRATORY PROTECTION.....	NIOSH approved respirator for mist and vapors.
VENTILATION.....	To maintain vapors below limits.
PROTECTIVE GLOVES.....	Rubber or other impervious material.
EYE PROTECTION.....	Splash proof chemical goggles.
OTHER PROTECTIVE EQUIPMENT....	For operations where spills or splashing may occur, use an impervious body covering and boots. A safety shower and eye bath should be available.
HANDLING AND STORAGE.....	Do not store near combustible materials, heat, organics, or reducing agents. Keep containers closed when not in use. Protect from physical damage. Emptied containers retain product residues.

SECTION IX - SPECIAL PRECAUTIONS

HAZARD CLASS.....	Corrosive, 8, PG II
DOT SHIPPING NAME.....	CORROSIVE LIQUID, N.O.S. (CONTAINING CHROMIC ACID AND SULFURICACID)
UN NUMBER.....	UN1760
REPORTABLE QUANTITY (RQ).....	33 lbs.

REFERENCES HMIS: H-3,F-0,R-2

CHROM50

NOTE Hazardous Component(s) subject to reporting under 40 CFR 372 (SARA Title III, Sec. 313).

MATERIAL SAFETY DATA SHEET

CHROME REDUCING SALT G

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME..... Haviland Products Company
ADDRESS (STREET,CITY,STATE,ZIP) 421 Ann St., N.W., Grand Rapids, MI 49504
PHONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER..... CHEMTREC (800) 424-9300
EFFECTIVE DATE..... 5/2/89
TRADE NAME..... CHROME REDUCING SALT G
CHEMICAL FAMILY..... Miscellaneous Blend

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #
No hazardous materials (in accordance with OSHA 29 CFR 1910.1200).			

SECTION III - PHYSICAL DATA

BOILING POINT..... No Information Available
FREEZING POINT ..... 146°C
VAPOR PRESSURE (mm Hg)..... Not Applicable
VAPOR DENSITY (Air=1)..... Not Applicable
SOLUBILITY IN H2O..... Completely
APPEARANCE/ODOR..... White Granular Powder; Odorless
SPECIFIC GRAVITY (H2O=1)..... 1.544 (Solid)
PH..... Not Established

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT..... Not Flammable
LOWER EXPLOSIVE LIMIT (% by Volume) Not Applicable
UPPER EXPLOSIVE LIMIT (% by Volume) Not Applicable
EXTINGUISH MEDIA..... As for Surrounding Fires
SPECIAL FIRE FIGHTING PROCEDURES... None Currently Known
UNUSUAL FIRE HAZARD..... None Currently Known

SECTION V - HEALTH HAZARD DATA

CARCINOGENICITY..... None
NTP..... No
IARC..... No
OVER EXPOSURE EFFECTS..... None Currently Known
PRIMARY ROUTE(S) OF ENTRY..... Skin Contact

CHROMIC ACID

DATA SHEET

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME)	☒ C.A.S. NO ☐ ALLIED PRODUCT CODE #
Chromic Acid (all grades)	1333-82-0

CHEMICAL NAME AND/OR SYNONYM

Chromium Trioxide, Synonyms: Chromic acid, chromic anhydride

FORMULA	MOLECULAR WEIGHT
CrO_3	100.01

ADDRESS (No., STREET, CITY, STATE AND ZIP CODE)

ALLIED CORPORATION
CHEMICAL SECTOR
P.O. Box 1139R
Morristown, N.J. 07960

CONTACT	PHONE NUMBER	LAST ISSUE DATE	CURRENT ISSUE DATE
Director, Product Safety	(201) 455-4157	Jan., 1983	Dec., 1984

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER
(201) 455-2000

Skin: Wash with plenty of water without delay. After washing as instructed, a 10% solution of ascorbic acid can be a useful antidote for burns from chromic acid or hot chromate solutions. The ascorbic acid solution should be applied as a wet compress to the burned area. Remove contaminated clothing and shoes.

Eyes: Promptly flush with plenty of water for at least 15 minutes and get medical attention.

Ingestion: If conscious, have victim drink water to dilute acid. Do not induce vomiting (although product itself may act as an emetic).

Inhalation: Remove to fresh air; if breathing is difficult, give oxygen if qualified operator is available.

Get prompt medical attention for ingestion, inhalation, irritation, chemical or thermal burns or "chrome sores".

C. HAZARDS INFORMATION

HEALTH

INHALATION

Inhalation of dust or mists of chromic acid can cause ulceration and perforation of the nasal septum, as well as irritation and damage to the respiratory system. Symptoms of such irritation may resemble those of asthma. Overexposure to hexavalent chromium may cause cancer-risk (bronchogenic carcinoma). See Section K.

INGESTION

Can cause severe injury or death. Toxic effects may not appear right away. A systemic poison, chromic acid is primarily toxic to the kidneys, liver and gastrointestinal tract.

SKIN

Dusts and solutions can cause burns or primary irritation of body tissues. Contact with breaks in the skin can cause "chrome sores" (skin ulcers). Skin can become sensitized. Skin can absorption has been reported. Also, see Section K. LDL_0 (scu-dog): 300 mg/kg.

EYES

Dusts and strong solutions can burn eye tissues and cause blindness. Dilute solutions can cause irritation and conjunctivitis.

PERMISSIBLE CONCENTRATION: AIR (SEE SECTION J)		BIOLOGICAL
TLV = 0.05 mg/m^3 (as Cr)	OSHA TWA = 0.1 mg/m^3 (as CrO_3) (ceiling)	Action Level: 40-50 microgram (Cr)/liter in urine (sampled at end of day)

UNUSUAL CHRONIC TOXICITY

See Section K

...AL DATA

...L IS (AT NORMAL CONDITIONS):	APPEARANCE AND ODOR	
LIQUID ☒ SOLID ☐ GAS ☐	Dark red flakes or powder which are deliquescent. Odorless.	
BOILING POINT NA °C MELTING POINT 197 °C	SPECIFIC GRAVITY (H_2O = 1) 2.7	VAPOR DENSITY (AIR = 1) NA
SOLUBILITY IN WATER (% by Weight) 62.5% solution at 20°C	pH 1% solution; pH = 1.1	VAPOR PRESSURE (mm Hg at 20° C) ☐ (PSIG) ☐ NA
EVAPORATION RATE (Butyl Acetate = 1) ☐ (Ether = 1) ☐ NA	% VOLATILES BY VOLUME (At 20° C) NA	

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REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID
☐ UNSTABLE ☒ STABLE	Not pertinent.

INCOMPATIBILITY (MATERIALS TO AVOID)

Reacts with combustibles and many organics - may cause ignition. Reacts with reducing agents (reaction may be violent). Decomposes and/or reacts with glowing incandescence when mixed with such inorganics as ammonia gas, hydrogen sulfide, potassium and sodium.

AZARDOUS DECOMPOSITION PRODUCTS

Decomposes at high temperatures (250°C) to oxygen and chromic oxide, (Cr^{+3}).

AZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
☐ MAY OCCUR ☒ WILL NOT OCCUR	Not pertinent.

HAZARDOUS INGREDIENTS (Mixtures Only)

MATERIAL OR COMPONENT/C.A.S. #	WT. %	HAZARD DATA (SEE SECT. J)
Not Applicable		

(SC)

MATERIAL SAFETY
DATA SHEET

M & T HARSHAW
P. O. BOX 6768
SOMERSET, NJ 08875-6768

EMERGENCY TELEPHONE
NUMBER--
8:30 A.M. - 5:00 P.M.
(908) 302-3550

CHEMTREC - 24 HOURS
1-800-424-9300

NAME USED ON LABEL: Decalume*-D-3R
CHEMICAL NAME (if single substance): N/A
CHEMICAL FAMILY: Plating Chemical
FORMULA: Proprietary

INGREDIENTS

Identity	CAS No.	%	TLV
P-dimethylamino benzene sulfonic acid	121-58-4	9%	Not Established
4,4' Tetramethyldiamino phenylmethane	101-61-1	1%	Not Established
Softened Water	7732-14-5	90%	Not Established

ALL INGREDIENTS LISTED ARE ON THE TSCA INVENTORY

PHYSICAL DATA

Boiling Point: N/A
Specific Gravity: 1.01-1.03
Vapor Density: N/A
% Volatiles: N/A
Molecular Weight: N/A
Freezing Point: N/A
Vapor Pressure @ 20 C: N/A
Solubility in Water: complete
Evaporation Rate: N/A
Other: pH 2.0 - 3.0
Appearance and Odor: Dark blue to black liquid.

FIRE AND EXPLOSION DATA

Flash Point (Test Method) N/A
Autoignition Temperature N/A
Flammable Lts. LEL= UEL=
Extinguishing Media: Water spray, foam, carbon dioxide, dry chemical.
Special Fire Fighting Procedures: Fire fighters should be equipped with a self-contained breathing apparatus and personal protective clothing.
Unusual Fire and Explosion Hazards: Avoid eye and skin contact. Do not breathe fumes or inhale vapors from solution. Irritating fumes or vapors may develop if product is exposed to elevated temperatures or open flame.

PCODE: LDN

****
ENVIRONMENTAL INFORMATION
****

Spill Response: May be hazardous to aquatic life if released to open waters. In case of spill, cover spill with absorbant. Carefully sweep up material and transfer to a suitable container (lined steel drum) for disposal. After sweeping, flush area where spill occurred with water. Contain water residue mixture for disposal.

Recommended Disposal: Dispose of material as solid waste. Follow all chemical pollution control regulations.

EPA Haz. Waste Designation (for virgin product): D002
Other:

****
HEALTH HAZARD DATA
****

Eye Contact: May cause irritation.

Skin Contact: May cause irritation.

Inhalation: Fumes or vapors from heated solution may be irritating to the respiratory tract.

Chronic Toxicity: No known effects.

Suggested First Aid:
EYES: In case of contact, immediately flush eyes with flowing water for at least 15 minutes. Get medical attention.

SKIN: Flush with flowing water for 15 minutes, then wash area with mild soap and water. Call a physician.

INHALATION: Move exposed individual to fresh air. Call a physician

INGESTION: Never give fluids or induce vomiting if patient is unconscious or having convulsions. Get medical attention.

MATERIAL SAFETY
DATA SHEET

M & T HARSHAW
SOMERSET, NJ 08875-6768

NAME USED ON LABEL: Decalume* D-3R

****
REACTIVITY DATA
****

Stability: Stable
Conditions To Avoid: N/A

Incompatability (Materials to Avoid): N/A

Hazardous Polymerization: Will not occur
Conditions To Avoid: N/A

Hazardous Decomposition Products: N/A

****
SPECIAL PROTECTION INFORMATION
****

Ventilation: Local Exhaust is recommended.
Mechanical (general) is required.
Respiratory Protection: Use NIOSH approved air-supplied respirator if ventilation is inadequate.

Eye and Face Protection: Chemical workers goggles. Do not wear contact lenses.
Other Clothing and Equipment: PVC gloves. An eyewash and emergency shower should be readily available. Launder contaminated clothing before reuse.

****
SPECIAL PRECAUTIONS
****

Precautionary Label Information: CAUTION! May cause irritation. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling.
FIRST AID: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician. Flush skin with water. Launder contaminated clothing before reuse.

Storage and Handling: Normal warehouse handling and storage.

****
TRANSPORTATION
****

Department of Transportation (DOT)
DOT Proper Shipping Name: None required
DOT Hazard Class: None required
DOT Label: None required
DOT ID #: None required

****
MISCELLANEOUS
****

All pertinent information concerning the properties, safe handling, and health effects of the chemical(s) is disclosed on this MSDS. OTHER PRECAUTIONS: For industrial use only. Read technical data bulletin about this product prior to use.

****
REVISION(S)
****

1. Changed the ingredients to correctly correspond to process specs and raw material specs.
2. Deleted non-applicable information from "Miscellaneous" section to correctly correspond with corrected ingredients.
3. Added SARA page to include regulatory information.

Prepared by Safety & Environmental Affairs

Issued: 10/15/90
Supersedes: 04/13/89

The information set forth herein has been gathered from standard reference materials and/or M & T HARSHAW test data and is to the best knowledge and belief of M & T HARSHAW accurate and reliable. Such information is offered solely for your consideration, investigation and verification, and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones which exist. M & T HARSHAW makes no warranties, express or implied, with respect to the use of such information or the use of the specific material identified herein in combination with any other material or process, and assumes no responsibility therefor.

MATERIAL SAFETY
DATA SHEET

M & T HARSHAW
SOMERSET, NJ 08875-6768

NAME USED ON LABEL: Decalume* D-3R

****
ADDITIONAL INFORMATION
****

CLASSIFICATIONS

SARA TITLE III
Acute: Y
Chron: N
Press: N
React: N
Fire: N

RATINGS

HMIS
Flamm: 0
React: 0
Health: 1
PPE: J

NFPA
Flamm: 0
React: 0
Health: 1

Components of this product which appear in the ingredients section of this MSDS are identified below if they are present in excess of de minimus reporting levels. Components which are not required to be identified by specific chemical name may have a generic description.

SARA Title III Section 302 Extremely Hazardous Substance(s):
None

SARA Title III Section 313 Toxic Chemicals:
None

STATE RIGHT-TO-KNOW

Components of this product which are specifically identified in the ingredients section of this MSDS may be listed on the following:

1. Pennsylvania Hazardous Substance List
2. Massachusettes Hazardous Substance List
3. California Proposition 65 - None
4. New Jersey Hazardous Substance List:
   p-dimethylamino benzene sulfonic acid

PCODE: LDN

U.S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
TALCO MATERIAL SAFETY DATA SHEET #2007

CAS NUMBER 7440-50-8

SECTION I

MANUFACTURER'S NAME: Talco Metals

ADDRESS: 5201 Unruh Avenue
Philadelphia, PA 19135

EMERGENCY TELEPHONE NUMBER:
Chemtrec -- 800-424-9300
Talco Co -- 215-333-6800

CHEMICAL NAMES AND SYNONYMS:
Copper
CHEMICAL FAMILY: Metal

TRADE NAME AND SYNONYMS: T-Phos (CDA 122)
Oxygen-Free (CDA 102, ETP (CDA 110)
FORMULA: Cu

SECTION II - HAZARDOUS INGREDIENTS

Section 313 Supplier Notification

This product contains 99.9% Copper (CAS # 7440-50-8) and is subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372. This information must be included in all Material Safety Data Sheets that are copied and distributed for this material.

No other hazardous material is present in concentration greater than 1%.

SECTION III - PHYSICAL DATA

BOILING POINT (°C):	2324	SPECIFIC GRAVITY (H_2O=1):	8.92
VAPOR PRESSURE (mm Hg.):	NA	PERCENT , VOLATILE BY VOLUME (%):	NA
VAPOR DENSITY (AIR=1):	NA	EVAPORATION RATE (_____)=1:	NA
SOLUBILITY IN WATER:	Insoluble		

APPEARANCE AND ODOR: Various shapes and sizes; copper color; no odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): NA
FLAMMABLE LIMITS: NA
EXTINGUISING MEDIA: Dry Chemical.
SPECIAL FIRE FIGHTING PROCEDURES: Use approved self-contained breathing apparatus.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Water contact with molten copper may cause explosion. Potentially explosive reaction with actylenic compounds; 3-bromopropyne; ethylene oxide; lead azide; and ammonium nitrate. Ignites on contact with chlorine; chlorine trifluoride; flourine (above 121°C).

(CONTINUED ON PAGE 2)

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE): Approved respirator for dust or fumes.

VENTILATION: The area surrounding any plating tank should be suitably ventilated to prevent gases, mists, and particulate matter evolved from the plating tank from collecting to injurious levels. Maintain working environment below the recommended exposure limits (see Section V).

PROTECTIVE GLOVES: Rubber or leather

EYE PROTECTION : If copper metal is converted to particulates, avoid contact with eyes by appropriate safety goggles or glasses with full side shield.

OTHER PROTECTIVE EQUIPMENT: Protective coveralls and safety footwear.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep away from reactive products (see Section VI).

OTHER PRECAUTIONS: NA

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION.

TALCO COMPANY PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME: ALLOYCHEM, INC.	EMERGENCY TELEPHONE NO.: (212) 644-1510
ADDRESS (Number, Street, City, State, and ZIP Code): 964 Third Avenue, N.Y.C. 10155	
CHEMICAL NAME AND SYNONYMS: CUPRIC CYANIDE	TRADE NAME AND SYNONYMS: COPPER CYANIDE
CHEMICAL FAMILY: CYANIDE	FORMULA: Cu(CN)2

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
(not a mixture)		

RECEIVED
DATE 1/9/86
INITIALS

SECTION III - PHYSICAL DATA

BOILING POINT (°F.) Will not boil.		SPECIFIC GRAVITY (H_2O=1) bulk density	1.3
VAPOR PRESSURE (mm Hg.) Negligible		PERCENT, VOLATILE BY VOLUME (%)	0
VAPOR DENSITY (AIR=1) not applicable		EVAPORATION RATE (_____ =1)	0
SOLUBILITY IN WATER appreciable			
APPEARANCE AND ODOR White powder - pungent odor			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): Not flammable	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA: Not flammable			
SPECIAL FIRE FIGHTING PROCEDURES: None			
UNUSUAL FIRE AND EXPLOSION HAZARDS: Contact with acids or weak alkalis liberates poisonous and flammable hydrogen cyanide gas.			

(Continued on reverse side)

(9)

I PRODUCT IDENTIFICATION

MANUFACTURER'S NAME	Tennessee Chemical Company	REGULAR TELEPHONE NO. 404-239-6700 EMERGENCY TELEPHONE NO. Chemtrec 800-424-930
ADDRESS	3400 Peachtree Rd. NE, Suite 401 Atlanta, Georgia 30326	
TRADE NAME	Copper Sulfate	
SYNONYMS	Bluestone, Blue Vitriol	
SHIPPING NAME[1]	Hazardous substance, solid, n.o.s. DOT: RQ, 10 lb/4.54 kg (Cuoric sulfate) NA 9188, ORM-E IATA:	

II HAZARDOUS INGREDIENTS[2]

MATERIAL OR COMPONENT	CAS NO.	%	HAZARD DATA
Copper sulfate pentahydrate	7758-98-7	99.0	Health hazard: Oral LD_{50} (rats, male) = 300 mg/kg.
($CuSO_4 \cdot 5H_2O$)			Product is toxic orally but not dermally. It is a
Copper 25.2% *			skin sensitizer and skin irritant. It is corrosive
			to the eyes.
* Reportable under SARA Title III Sec. 313			Aquatic hazard: LC_{50} set at > 0.1 < 1 mg/l by EPA
and 40 CFR Part 372			water programs for hazardous substances.

III PHYSICAL DATA

BOILING POINT, 760 MM HG	- 5 H_2O @ 150° C.	MELTING POINT	- 4 H_2O @ 110° C.
SPECIFIC GRAVITY (H_2O = 1)	2.284	VAPOR PRESSURE	7.3 mg Hg @ 25° C.
VAPOR DENSITY (AIR = 1)	Not determined	SOLUBILITY IN H_2O % BY WT	22.37 @ 0° C. 117.95 @ 100° C.
% VOLATILES BY VOL.	Not determined	EVAPORATION RATE (BUTYL ACETATE = 1)	Not determined
APPEARANCE AND ODOR	Blue crystals or powder. No odor.	Ph (AS IS) Ph (~~1% SOLN~~)	Not applicable 5% soln. = pH 4.0

IV FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)	Not applicable	AUTOIGNITION TEMPERATURE	Not applicable		
FLAMMABLE LIMITS IN AIR, % BY VOL.	LOWER	Not applicable	UPPER	Not applicable	

EXTINGUISHING MEDIA	Copper sulfate does not burn, nor will it support combustion. If stored with other combustible products, use water, CO_2 or dry chemical.
SPECIAL FIRE FIGHTING PROCEDURES	If dry heated above 600° C., SO_2 is evolved. If water is used, it will solubilize the $CuSO_4 \cdot 5H_2O$, and care should be used to keep such water out of streams or other water bodies.
UNUSUAL FIRE AND EXPLOSION HAZARD	None

1. See references 1 and 2. 2. See instructions and references 1 to 8.

CONDITIONS CONTRIBUTING TO INSTABILITY

None known. Product is highly soluble in water, but does not react with the water

INCOMPATIBILITY

None known when product remains dry. Product readily dissolves in water. Solutions are corrosive to mild steel. Store solutions in plastic, rubber, 304, 347, or 316 stainless ste

HAZARDOUS DECOMPOSITION PRODUCTS

None at normal process temperatures and pressures. If dry heated above 1100° F (600° C) sulfur dioxide (SO_2) may be released.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

None known.

VII DISPOSAL, SPILL OR LEAK PROCEDURES

AQUATIC TOXICITY ~~[illegible]~~ LC_{50} 24 hr = Daphnia magna=0.182 mg/l. Rainbow trout = 0.17 mg/l. Bluegill = 1.5 mg/l. All values are expressed as copper sulfate pentahydrate. Test water was soft.

WASTE DISPOSAL METHOD

Sweep up crystal or powdered product and dispose in an approved landfill. If product is in confined solution, introduce lime or soda ash to form insoluble copper salts and then dispose in an approved landfill. Reportable Quantity of a spill is 10 lbs/4.54 kg. Product when discarded is not listed by EPA in 40 CFR § 261.33.

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

1). Contact appropriate, local, State, or Federal pollution control officials if warranted and especially if spilled into public waters.
2). If spill is confined to the use site, neutralize with lime or soda ash and use absorbent and remove to approved landfill.

NEUTRALIZING CHEMICALS

Soda ash or lime.

VIII SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

TWA = 1 mg(Cu)/m^3 (ACGIH) and PEL = 1 mg(Cu)/m^3 (OSHA) for all copper dusts and mists. If TWA or PEL exceeds this limit in workplace, appropriate ventilation should be provided, or respiratory protective equipment must be provided.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY (SPECIFY IN DETAIL) TWA = 1 mg(Cu)/m^3(ACGIH) PEL = 1 mg(Cu)/m^3 (OSHA) for all copper dusts and mists. If TWA or PEL exceeds this limit in workplace, respiratory protective equipment must be provided in accordance with Paragraph 1910.134 of Title 29, Code of Federal Regulations.

EYE

Chemical goggles should be worn when handling product.

GLOVES

Rubber gloves may be worn.

OTHER CLOTHING AND EQUIPMENT

Wear long sleeve protective clothing when handling product.
Avoid breathing dust.

TECHNICAL DATA

Product Information Needed For Reporting
Under CERCLA 302, 304; SARA 311, 312 or 313

1. Product Trade Name: Copper Sulfate
2. Chemical Name of Major Component: Cupric sulfate
3. Mixture: Yes (No)
4. Product CAS No.: 7758-98-7
5. Reportable Quantity: RQ 10/4.54
6. Name, CAS No., % by weight of each component of this product that is hazardous under terms of the OSHA Hazard Communication Standard and reporting requirement (x). (Greater than 1% if hazardous, and greater than 0.1% in case of carcinogens.)

Chemical Name	CAS No.	% w/w	302	304	311	312	313
Copper sulfate ($CuSO_4$)	7758-98-7	99.0	-	x	x	x	x

7. For Solids - Particle Size (circle): (>100 microns) (<100 microns)
   Liquids - Weight Per Gallon:
8. Product Hazard Rating for Product:
   NPFA Health: 3 Fire: 0 Reactivity: 0
9. SARA Title III Hazard Categories for Product, as defined in 29 CFR 1910.1200 and Federal Register 52:38364. (Applicable category is checked.)

   X Acute health
   ____ Chronic health
   ____ Sudden release of pressure
   ____ Flammable
   ____ Reactive

10. DOT Hazard Class: ORM-E
11. DOT Shipping Name: Hazardous Substance solid N.O.S.
    NA 9188 (Cupric Sulfate) RQ
12. Prepared by: Arthur F. Gohlke, Technical Service Specialist
13. Signature and Date:

Arthur F. Gohlke May 4, 1988

Notice: To the best of our knowledge the information contained herein is accurate. However, Tennessee Chemical Company assumes no liability whatsoever for the accuracy or completeness of this information. Final determination as to its suitability is the responsibility of the user. All determinations as to whether you must report and the extent of such reporting under this Act are solely your responsibility and Tennessee Chemical Company assumes no liability in this matter expressed or implied.

TENNESSEE CHEMICAL COMPANY

BASIC PRODUCERS OF COPPER, SULFUR, AND IRON COMPOUNDS

3400 Peachtree Road, N.E., Suite 401, Atlanta, Georgia 30326 Telephone (404) 239-8700 EasyLink 62029635 Telex 981036
Western Region - 553 Clark Street, Pittsburg, California 94565 - Phone (415) 439-1016

Enthone-OMI Inc.

____a subsidiary of ASARCO

MATERIAL SAFETY DATA SHEET

UDYLITE

CROMYLITE® 107A

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS
ENTHONE 203-934-8611
UDYLITE 313-497-9100
SEL-REX 313-497-9100

PRODUCT CODE#: KG01
DATE ISSUED: 4/13/93
SUPERCEDES: New (ULTRACHROME 107A)
PREPARER: H. T. Borden

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Water		7732-18-5	NI	NI	>90
Fluoride, as F		16984-48-8	2.5 mg/m3	2.5 mg/m3	<5
Silicate (not respirable)		NA	NA	NA	<2

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	1.055	BOILING POINT, °F	NI
EVAP.RATE (BUTYL ACETATE=1)	NA	MELTING POINT, °F	NA
VAPOR PRESSURE, mmHg	NA	SOLUBILITY IN WATER	100%
VAPOR DENSITY (AIR=1)	NA	APPEARANCE	Clear, Colorless Liquid
pH (AS IS)	2.4	ODOR	None

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	None	FLAMMABLE LIMITS (AIR)	NA	LEL	NA	UEL

EXTINGUISHING MEDIA

[X] Not Combustible [ ] Water fog or spray [ ] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [ ] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear self-contained breathing apparatus (SCBA) and complete personal protective equipment when potential for exposure to vapors or products of combustion exists.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Thermal decomposition may yield toxic fluoride fumes.

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Mist or vapor may severely irritate respiratory tract.

INGESTION: Can cause severe irritation to mouth, throat, esophagus, and stomach. Product is moderately toxic by ingestion.

SKIN: Can cause severe irritation. Product is moderately toxic by subcutaneous route.

EYES: Can cause severe irritation, damage to eyes.

EFFECTS OF CHRONIC EXPOSURE:

Chronic exposure effects not established.

CARCINOGEN: Not listed by NTP, IARC, OSHA.

REFERENCE: NA

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed DO NOT INDUCE VOMITING, give large amounts of water.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated. If irritation continues, seek medical attention.

EYES: Immediately flush eyes with plenty of water for at least 15 minutes holding lids apart to ensure flushing of entire surface. Washing eyes within several seconds of exposure is essential to minimize damage.
Seek immediate medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Avoid contact with skin, eyes, and clothing. Wear protective equipment (see Section VII). Do not breathe mist or vapors. Contain spill and soak up in suitable absorbent. Shovel up into plastic-lined steel containers and cover. Dispose of in accordance with Local, State, and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in a cool dry place. Loosen cover cautiously when opening.

ADDITIONAL INFORMATION:

Wash thoroughly after handling. Store above freezing temperature.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [ ] Face shield

PROTECTIVE GLOVES: [X] Neoprene [ ] Natural rubber Other: Butyl Rubber

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Wear full protective work clothing.

WORK/HYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of spilled or contaminated product follow Enthone-OMI Waste Disposal Procedures. If necessary, consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

KG01	CROMYLITE® 107A	4/13/93

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: None
	Unstable	

INCOMPATABILITY (Materials to avoid): None

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may yield toxic fluoride fumes.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: None
	X	Will not occur	

IX. ADDITIONAL INFORMATION

This product does not contain any chemicals subject to the reporting requirements of SARA, TITLE III, Section 313 (40CFR372) or known to the State of California to cause cancer or birth defects (to comply with California Statute [Section 25249.6]).

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone-OMI Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI Inc or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI control, user assumes all responsibility and risk.

MATERIAL SAFETY
DATA SHEET

M & T HARSHAW
P. O. BOX 6768
SOMERSET, NJ 08875-6768

EMERGENCY TELEPHONE NUMBER
8:30 A.M. - 5:00 P.M.
(908) 302-3550

CHEMTREC - 24 HOURS
1-800-424-9300

NAME USED ON LABEL: Decalume* D-1R
CHEMICAL NAME (if single substance): N/A
CHEMICAL FAMILY: Plating Chemical
FORMULA: Proprietary

INGREDIENTS

Identity	CAS No.	%	TLV
inert liquid	(see misc.)	>60	Not Established
sulfuric acid	7664-93-9	<10	1mg/M3
bis(3-sulfopropyl disulfide)disodium salt	27206-35-5	<20	not established
polyethylene glycol	25322-68-3	<10	not established

ALL INGREDIENTS LISTED ARE ON THE TSCA INVENTORY

PHYSICAL DATA

Boiling Point: about 212 F
Specific Gravity: 1.025-1.035
Vapor Density: N/A
% Volatiles: N/A
Molecular Weight: N/A
Freezing Point: about 32 F
Vapor Pressure @ 20 C: N/A
Solubility in Water: complete
Evaporation Rate: N/A
Other: pH 1.0 - 1.5
Appearance and Odor: water-white liquid

FIRE AND EXPLOSION DATA

Flash Point (Test Method)	Autoignition Temperature	Flammable Lts.
N/A	N/A	LEL= UEL=

Extinguishing Media: water spray, foam, carbon dioxide, dry chemical.
Fire fighters should be equipped with a self-contained breathing apparatus and personal protective clothing.
Special Fire Fighting Procedures: Avoid Eye and Skin Contact. Do not breathe fumes. Do not inhale vapors from solutions.
Unusual Fire and Explosion Hazards: Irritating fumes or vapors may develop if product is exposed to elevated temperatures or open flame.

****

ENVIRONMENTAL INFORMATION

****

Spill Response: May be hazardous to aquatic life if released to open waters. In case of spill, cover with absorbant material (sawdust). Sweep up spilled material into a suitable container (polyethylene lined steel drum) for disposal. After sweeping, flush area where spill occurred with water. Dilute water residue mixture may be flushed to sewer with copious amounts of water.
Recommended Disposal: Dispose of material as solid waste. Discharge to a public sewerage authority should coincide with all applicable local permits and notification requirements. Follow all chemical pollution control regulations.

EPA Haz. Waste Designation (for virgin product): D002
Other:

****

HEALTH HAZARD DATA

****

Eye Contact: May cause irritation.

Skin Contact: May cause irritation.

Inhalation: Fumes or vapors from heated solution may be irritating to the respiratory tract.

Chronic Toxicity: No known effects.

Suggested First Aid:
EYES: In case of contact, immediately flush eyes with flowing water for at least 15 minutes. Get medical attention.

SKIN: Flush with flowing water for 15 minutes, then wash area area with mild soap and water. Call a physician.
INHALATION: Move exposed individual to fresh air. Call a physician.

INGESTION: Never give fluids or induce vomiting if patient is unconscious or having convulsions.

****

REACTIVITY DATA

****

Stability: Stable
Conditions To Avoid: N/A

Incompatability (Materials to Avoid): N/A

Hazardous Polymerization: will not occur
Conditions To Avoid: N/A

Hazardous Decomposition Products: N/A

****

SPECIAL PROTECTION INFORMATION

****

Ventilation: Local Exhaust is recommended.
Mechanical (general) is required.
Respiratory Protection: Use NIOSH approved dust and mist respirator if exposure exceeds the TLV.

Eye and Face Protection: Chemical workers goggles. Do not wear contact lenses.
Other Clothing and Equipment: Rubber or neoprene gloves and protective apron. Eye wash and emergency shower should be readily available.

****

SPECIAL PRECAUTIONS

****

Precautionary Label Information: DANGER! Will cause skin burns. Do not get in eyes, on skin, or on clothing. Do not breathe vapors. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

Storage and Handling: Normal warehouse handling and storage.

****
TRANSPORTATION
****

Department of Transportation (DOT)
DOT Proper Shipping Name: None Required
DOT Hazard Class: Not Regulated
DOT Label: None Required
DOT ID #: None Required

****
MISCELLANEOUS
****

INERT LIQUID: Non-hazardous according to the criteria of paragraph (d) of the OSHA Hazard Communication Standard. All pertinent information concerning the properties, safe handling and health effects of the chemical(s) is disclosed on this MSDS. The specific identity is withheld as a Trade Secret in accordance with paragraph (i).

****
REVISIONS (SECTIONS SPECIFIED BELOW)
****

1. Updated the miscellaneous section.

Prepared by Safety & Environmental Affairs

Issued: 03/18/91
Supersedes: 06/05/90

The information set forth herein has been gathered from standard reference materials and/or M & T HARSHAW test data and is to the best knowledge and belief of M & T HARSHAW accurate and reliable. Such information is offered solely for your consideration, investigation and verification, and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones which exist. M & T HARSHAW makes no warranties, express or implied, with respect to the use of such information or the use of the specific material identified herein in combination with any other material or process, and assumes no responsibility therefor.

****

NAME USED ON LABEL: Decalume* D-1R

ADDITIONAL INFORMATION

****

CLASSIFICATIONS	RATINGS	
SARA TITLE III Acute: Y Chron: N Press: N React: N Fire: N	HMIS Flamm: 0 React: 0 Health: 2 PPE: J	NFPA Flamm: 0 React: 0 Health: 2

Components of this product which appear in the ingredients section of this MSDS are identified below if they are present in excess of de minimus reporting levels. Components which are not required to be identified by specific chemical name may have a generic description.

SARA Title III Section 302 Extremely Hazardous Substance(s):
Sulfuric Acid

SARA Title III Section 313 Toxic Chemicals:
Sulfuric Acid

STATE RIGHT-TO-KNOW

Components of this product which are specifically identified in the ingredients section of this MSDS may be listed on the following:

1. Pennsylvania Hazardous Substance List
2. Massachusettes Hazardous Substance List
3. California Proposition 65 - None

(29)

MATERIAL SAFETY
DATA SHEET

M & T HARSHAW
P. O. BOX 6768
SOMERSET, NJ 08875-6768

EMERGENCY TELEPHONE
NUMBER
8:30 A.M. - 5:00 P.M.
(908) 302-3550

CHEMTREC - 24 HOURS
1-800-424-9300

NAME USED ON LABEL: Dacalume D-2R
CHEMICAL NAME (if single substance): N/A
CHEMICAL FAMILY: Plating Chemical
FORMULA: Proprietary

****
INGREDIENTS
****

Identity	CAS No.	%	TLV
inert liquid	(See Misc.)	>70	Not established
polyamine	(See Misc.)	<1	Not established
sulfuric acid	7864-93-9	10-15	1 mg/M3
poly glycol	(See Misc.)	<5	Not established

ALL INGREDIENTS LISTED ARE ON THE TSCA INVENTORY

****
PHYSICAL DATA
****

Boiling Point: approx 212 F
Specific Gravity: 1.05 - 1.1
Vapor Density: N/A
% Volatiles: N/A
Molecular Weight: N/A
Freezing Point: approx 32 F
Vapor Pressure @ 20 C: N/A
Solubility in Water: complete
Evaporation Rate: N/A
Other: N/A
Appearance and Odor: White to light-yellow liquid.

****
FIRE AND EXPLOSION DATA
****

Flash Point (Test Method)	Autoignition Temperature	Flammable Lts.
N/A	N/A	LEL- UEL-

Extinguishing Media: Water spray, foam, carbon dioxide, dry chemical.
Fire fighters should be equipped with self-contained breathing apparatus and protective clothing.
Special Fire Fighting Procedures: Avoid eye and skin contact. Do not breathe fumes or inhale vapors from solution.
Unusual Fire and Explosion Hazards: Irritating fumes or vapors may develop if product is exposed to elevated temperatures or open flame.

****
ENVIRONMENTAL INFORMATION
****

Spill Response: May be hazardous to aquatic life if released to open waters. In case of spill, cover spill with absorbant. Carefully sweep up material and transfer to a suitable container (lined steel drum) for disposal. After sweeping, flush area where spill occurred with water. Contain water residue mixture for disposal.

Recommended Disposal: Dispose of material as solid waste. Follow all chemical pollution control regulations.

EPA Haz. Waste Designation (for virgin product): D002
Other:

****
HEALTH HAZARD DATA
****

Primary Route Of Exposure: dermal yes inhalation yes
Eye Contact: Will cause burns.

Skin Contact: Will cause burns.

Inhalation: Fumes or vapors from heated solution may be irritating to the respiratory tract.

Chronic Toxicity: No known effects.

Suggested First Aid:
EYES: In case of contact, immediately flush eyes with flowing water for at least 15 minutes. Get medical attention.

SKIN: Flush with flowing water for 15 minutes, then wash area with mild soap and water. Call a physician.
INHALATION: Move exposed individual to fresh air. Call a physician.

INGESTION: Never give fluids or induce vomiting if patient is unconscious or having convulsions. Get medical attention.

MATERIAL SAFETY
DATA SHEET

M & T HARSHAW
SOMERSET, NJ 08875-6768

NAME USED ON LABEL: Decalume* D-2R

****
REACTIVITY DATA
****

Stability: Stable
Conditions To Avoid: N/A

Incompatability (Materials to Avoid): Oxidizers.

Hazardous Polymerization: Will not occur
Conditions To Avoid: N/A

Hazardous Decomposition Products: N/A

****
SPECIAL PROTECTION INFORMATION
****

Ventilation: Local Exhaust is recommended.
Mechanical (general) is required.
Respiratory Protection: Use NIOSH approved air-supplied or chemical cartridge respirator.

Eye and Face Protection: Chemical workers goggles. Do not wear contact lenses.
Other Clothing and Equipment: PVC and neoprene gloves, protective apron and boots. An eyewash and emergency shower should be readily available. Launder contaminated clothing before reuse.

****
SPECIAL PRECAUTIONS
****

Precautionary Label Information: Danger! Causes burns to eyes and skin. Do not get in eyes, on skin, or clothing. Avoid breathing vapor. Keep container closed. Wash thoroughly after using.

Storage and Handling: Warehouse handling and storage in a cool, dry area suitable for corrosives. Keep container tightly closed.

****
TRANSPORTATION
****

Department of Transportation (DOT)
DOT Proper Shipping Name: Corrosive Liquid,n.o.s.(contains sulfuric acid)
DOT Hazard Class: Corrosive Material
DOT Label: Corrosive
DOT ID #: UN1760

****
MISCELLANEOUS
****

INERT LIQUID AND POLYAMINE: Non-hazardous according to the criteria of paragraph (d) of the OSHA Hazard Communication Standard.
POLY GLYCOL: Hazardous according to the criteria of paragraph (d) of the OSHA Hazard Communication Standard. The specific identity is withheld as a Trade Secret according to paragraph (i) of the Standard.
All pertinent information concerning the properties, safe handling, and health effects of the chemical(s) is disclosed on this MSDS.
OTHER PRECAUTIONS: For industrial use only. Read technical data bulletin about this product prior to use.

****
REVISIONS (SECTIONS SPECIFIED BELOW)
****

Prepared by Safety & Environmental Affairs

Issued: 04/04/90
Supersedes: 04/13/89

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MATERIAL SAFETY
DATA SHEET

M & T HARSHAW
SOMERSET, NJ 08875-6768

NAME USED ON LABEL: Decalume* D-2R

****
ADDITIONAL INFORMATION
****

CLASSIFICATIONS		RATINGS			
SARA TITLE III		HMIS	Flamm: 0	NFPA	Flamm: 0
Acute:	Y		React: 0		React: 0
Chron:	Y		Health: 2		Health: 2
Press:	N		PPE: J		
React:	N				
Fire:	N				

Components of this product which appear in the ingredients section of this MSDS are identified below if they are present in excess of de minimus reporting levels. Components which are not required to be identified by specific chemical name may have a generic description.

SARA Title III Section 302 Extremely Hazardous Substance(s):
Sulfuric Acid

SARA Title III Section 313 Toxic Chemicals:
Sulfuric Acid

STATE RIGHT-TO-KNOW

Components of this product which are specifically identified in the ingredients section of this MSDS may be listed on the following:

1. Pennsylvania Hazardous Substance List
2. Massachusettes Hazardous Substance List
3. California Proposition 65 - None

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ECONO-CHROME ANTI-SPRAY MSDS No.: 11707
REVISION: 3
PREPARED BY: TSCA COORDINATOR ISSUE DATE:07/01/90 EFFECTIVE DATE: 05/01/9

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

2910 HARVARD AVE.
CLEVELAND OH 44105
TELEPHONE: 216-441-4900

CHEMTREC:
TELEPHONE #: 800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: AMINES, TALLOW ALKYL, ETHOXYLATED

5.0 - 10.0%
CAS NUMBER: 61791-26-2
EXPOSURE LIMIT: TWA: NONE ESTABLISHED
SUSPECT CARCINOGEN: NO

SECTION C. PHYSICAL DATA.

APPEARANCE: RED LIQUID
ODOR: NONE
SPECIFIC GRAVITY: 1.002
pH: 10-11
EVAPORATION RATE: < BUTYL ACETATE

BOILING POINT: UK
FREEZING POINT: UK
VAPOR PRESSURE: UK
VAPOR DENSITY: UK
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: 100%

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	2	2
FLAMMABILITY:	0	0
REACTIVITY:	0	0
SPECIAL:		

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: SELF CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR SHOULD BE WORN.

UNUSUAL FIRE OR EXPLOSION HAZARDS: NONE KNOWN.

PRODUCT NAME: ECONO-CHROME ANTI-SPRAY MSDS No.: 11707
REVISION: 3
PREPARED BY: TSCA COORDINATOR ISSUE DATE:07/01/90 EFFECTIVE DATE: 05/01/97

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID:

CHEMICAL INCOMPATIBILITIES: STRONG ACIDS

HAZARDOUS DECOMPOSITION PRODUCTS: NONE KNOWN

SECTION F. HEALTH HAZARD DATA.

SUMMARY OF RISKS: SARA-ACUTE

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: NONE KNOWN.

TARGET ORGANS: EYES, RESPIRATORY SYSTEM, SKIN.

PRIMARY ENTRY ROUTES: CONTACT

ACUTE EFFECTS: CHEMICAL BURN

CHRONIC EFFECTS: NONE KNOWN

SIGNS & SYMPTOMS OF OVEREXPOSURE:
EYE CONTACT: BURNING SENSATION

SKIN CONTACT: BURNING SENATION

INHALATION: IRRITATION

INGESTION: BURNING OF MOUTH AND THROAT.

PRODUCT NAME: ECONO-CHROME ANTI-SPRAY MSDS No.: 11707
REVISION: 3
PREPARED BY: TSCA COORDINATOR ISSUE DATE:07/01/90 EFFECTIVE DATE: 05/01/97

EMERGENCY & FIRST AID PROCEDURES:

EYE CONTACT: FLUSH WITH WATER FOR AT LEAST 15 MINUTES AND CONTINUE UNTIL MEDICAL ATTENTION IS OBTAINED.

SKIN CONTACT: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTIC IF ANY IRRITATION PERSISTS.

INHALATION: REMOVE TO FRESH AIR.

INGESTION: IF CONSCIOUS, GIVE PLENTY OF MILK OR WATER. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: CAREFULLY MOP UP. NEUTRALIZE FINAL TRACES WITH A DILUTE ACID. FLUSH AREA WITH WATER.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: DILUTE WITH WATER. NEUTRALIZE WITH DILUTE ACID TO WITHIN POTW pH DISCHARGE LIMITS AND SEWER. FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:

GOGGLES: CHEMICAL GOGGLES AND FACE SHIELD.
GLOVES: NEOPRENE.
RESPIRATOR: NOT NORMALLY REQUIRED.

OTHER: SUFFICIENT TO PREVENT SKIN CONTACT.

PRODUCT NAME: ECONO-CHROME ANTI-SPRAY MSDS No.: 11707
REVISION: 3
PREPARED BY: TSCA COORDINATOR ISSUE DATE:07/01/90 EFFECTIVE DATE: 05/01/9.

WORKPLACE CONSIDERATIONS:
VENTILATION: NORMAL.
SAFETY STATIONS: EYE WASH
OTHER: SAFETY SHOWER

SECTION I. SPECIAL PRECAUTIONS.

SPECIAL HANDLING & STORAGE PROCEDURES: NORMAL HANDLING AND STORAGE.

D.O.T. CLASS: 8.0 UN REGISTER: UN-3267
IMCO CLASS: 8.0 UN REGISTER: UN-3267

EXPLANATION OF SYMBOLS
NA = NOT APPLICABLE UK = UNKNOWN

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION, AND INVESTIGATION. WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, McGEAN-ROHCO, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

THIS MATERIAL SAFETY DATA SHEET HAS BEEN PREPARED TO COMPLY WITH TITLE 29 CODE OF FEDERAL REGULATIONS, PART 1910.1200, OSHA HAZARD COMMUNICATION STANDARD, AND TO FULFILL THE ANNUAL CHEMICAL NOTIFICATION REQUIREMENTS OF SARA TITLE III, SECTION 313.

RUN: 02/16/94 3:53:16 PM

McGEAN-ROHCO, INC.
MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ELECTROCLEANER 59 SPECIAL

MSDS No.: 13080
REVISION: 3

PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 10/28/93

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

38521 SCHOOLCRAFT AVE.
LIVONIA MI 48150
TELEPHONE: 313-872-1800

CHEMTREC:
TELEPHONE #:800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: SODIUM HYDROXIDE

CAS NUMBER:1310-73-2 40.0 - 50.0%
EXPOSURE LIMIT: TWA:2mg/CU METER--CEILING
SUSPECT CARCINOGEN: NO

INGREDIENT: SODIUM SILICATE

CAS NUMBER:6834-92-0 10.0 - 20.0%
EXPOSURE LIMIT: TWA:15mg/CU METER NUISANCE DUST
SUSPECT CARCINOGEN: NO

INGREDIENT: TETRASODIUM PYROPHOSPHATE

CAS NUMBER:7722-88-5 5.0 - 15.0%
EXPOSURE LIMIT: TWA:5mg/CU METER
SUSPECT CARCINOGEN: NO

SECTION C. PHYSICAL DATA.

APPEARANCE: WHITE POWDER
ODOR: ODORLESS

SPECIFIC GRAVITY: NA
pH: NA

EVAPORATION RATE: NA

BOILING POINT: NA
FREEZING POINT: NA

VAPOR PRESSURE: NA
VAPOR DENSITY: NA
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: COMPLETE

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	3	3
FLAMMABILITY:	0	0
REACTIVITY:	1	1
SPECIAL:		

PRODUCT NAME: ELECTROCLEANER 59 SPECIAL MSDS No.: 13080
REVISION: 3
PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 10/28/93

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: SELF CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR SHOUD BE WORN.

UNUSUAL FIRE OR EXPLOSION HAZARDS: CAN MELT AND FLOW IN A FIRE.CAN REACT VIOLENTLY WITH WATER.ALUMINUM REACTION CAN GIVE FLAMMABLE GAS.

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID: NA

CHEMICAL INCOMPATIBILITIES: STRONG ACIDS.NITRO COMPOUNDS.METALS SUCH AS ALUMINUM, TIN,ZINC.

HAZARDOUS DECOMPOSITION PRODUCTS: NONE KNOWN.

SECTION F. HEALTH HAZARD DATA.

SUMMARY OF RISKS: SARA--ACUTE

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: DERMATITIS AND RESPIRATORY AILMENTS.

TARGET ORGANS: SKIN,EYES,LUNGS,RESPIRATORY TRACT.

PRIMARY ENTRY ROUTES: THROUGH CONTACT AND INHALATION OF DUST.

ACUTE EFFECTS: "BURNING" OF SKIN OR EYES. VERY CORROSIVE.

CHRONIC EFFECTS: NONE KNOWN.

SIGNS & SYMPTOMS OF OVEREXPOSURE:
EYE CONTACT: BURNING SENSATION.

SKIN CONTACT: BURNING SENSATION.

INHALATION: IRRITATION,BURNING OF MUCOUS MEMBRANES.

INGESTION: BURNING OF MOUTH AND THROAT.

RUN: 02/16/94 3:53:19 PM McGEAN-ROHCO, INC.
MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ELECTROCLEANER 59 SPECIAL MSDS No.: 13080
REVISION: 3
PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 10/28/93

EMERGENCY & FIRST AID PROCEDURES:

EYE CONTACT: FLUSH WITH WATER FOR AT LEAST 15 MINUTES AND CONTINUE UNTIL MEDICAL ATTENTION IS OBTAINED.

SKIN CONTACT: FLUSH WITH WATER FOR 15 MINUTES. GET MEDICAL ATTENTION.

INHALATION: REMOVE TO FRESH AIR.

INGESTION: GIVE PLENTY OF MILK OR WATER. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: SHOVEL INTO SUITABLE CONTAINERS. FLUSH AREA WITH WATER. NEUTRALIZE FINAL TRACES WITH A DILUTE ACID SUCH AS ACETIC.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: IF ALLOWED SEND TO A SANITARY LANDFILL. OTHERWISE DISSOLVE AND CAREFULLY NEUTRALIZE AND SEWER. FOLLOW ALL LOCAL,STATE,AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:

GOGGLES: CHEMICAL GOGGLES. FACE SHIELD.

GLOVES: RUBBER.

RESPIRATOR: IF CEILING IS EXCEEDED,MUST BE NIOSH OR MSHA APPROVED.

OTHER: IMPERVIOUS CLOTHING SUFFICIENT TO PREVENT SKIN CONTACT.

RUN: 02/16/94 3:53:21 PM McGEAN-ROHCO, INC.
MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ELECTROCLEANER 59 SPECIAL MSDS No.: 13080
REVISION: 3
PREPARED BY: TSCA COORDINATOR ISSUE DATE:01/01/83 REVISION DATE: 10/28/93

WORKPLACE CONSIDERATIONS:
VENTILATION: SUFFICIENT TO KEEP BELOW CEILING LIMITS.
SAFETY STATIONS: EYE WASH.
OTHER: SAFETY SHOWER.

SECTION I. SPECIAL PRECAUTIONS.

SPECIAL HANDLING & STORAGE PROCEDURES: STORE IN A DRY AREA AWAY FROM ACIDS AND AMPHOTERIC METALS SUCH AS ALUMINUM. ADD SLOWLY TO WATER TO PREVENT BOILING AND SPLATTERING.

D.O.T. CLASS: 8.0 UN REGISTER: UN-1823
IMCO CLASS: 8.0 UN REGISTER: UN-1823

EXPLANATION OF SYMBOLS
NA = NOT APPLICABLE UK = UNKNOWN

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FALCONBRIDGE LIMITED

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MATERIAL SAFETY DATA SHEET

SECTION 1

Chemical Name: ELECTROLYTIC NICKEL CAS # 7440-02-0

Trade Names and Synonyms: Falconbridge Nickel Squares, Nickel Crowns, D-Crowns, SUPERELECTRO TM

Chemical Family: Metal (99.9% nickel metal)

Formula: Ni

Manufacturer's Name:	Emergency Telephone Number:
Falconbridge Limited	(705) 693-2761

Address: P.O. Box 40, Commerce Court West, Toronto, Ontario, Canada M5L 1B4

Main Use(s): Electroplating, electroforming, alloy additions

SECTION II - HAZARDOUS INGREDIENTS

Nickel (99.9% nickel metal)

Exposure Limits:

1 mg/m³ for nickel and its insoluble compounds and 0.1 mg/m³ for soluble nickel compounds as established by *OHSA - PEL and ACGIH - TLV. (See also SECTION VIII)

SECTION III - PHYSICAL DATA

Boiling Point: 2730°C	Specific Gravity (H_2O = 1): 8.9
Appearance: Metallic	Odour: None

*See SECTION IX for definition of abbreviations and terms

RECEIVED
DATE 1/4/90
INITIALS

SECTION IV - REACTIVITY DATA

Stability: Stable X Unstable

Cautions:

Contact with mineral acids will release hydrogen - a dangerous gas

Under specific conditions, exposure to carbon monoxide will produce nickel carbonyl - a highly toxic gas.

SECTION V - HEALTH HAZARD DATA

GENERAL:

Under normal handling and use, exposure to massive forms of nickel presents few health hazards.

ACUTE:

Sensitization: Exposure to nickel may cause dermatitis or other allergic reactions in sensitive individuals.

Asthma: Rare cases of asthma have been reported to have occurred in individuals exposed to some forms of dusts, fumes, gases or mists containing nickel, particularly the nickel sulphate form.

CHRONIC:

According to OSHA CFR 1910.1200 (d)(4)(i), nickel metal is considered a possible cancer hazard because the NTP has concluded that it may be reasonably anticipated to be a human carcinogen.

IARC has stated that some chemicals resulting from certain steps in the nickel refining process are human carcinogens. However, IARC has concluded other forms and uses of nickel are only suspected human carcinogens, the exact forms of which have not been identified.

Finally, ACGIH states that only the dust and fumes from the roasting of nickel sulphide ores are carcinogenic to humans.

IMPORTANT NOTE:

The only reliable, scientific studies showing an excess of cancer of the respiratory tract have been demonstrated to result from certain steps in the process of nickel production. On the other hand, several studies of workers exposed to various forms of nickel and its compounds have not shown any increased risk of cancer.

(See references (1),(2),(3),(4),(5) in SECTION IX.)

SECTION VI - FIRE AND EXPLOSION DATA

Special Fire Fighting Procedures: None
Unusual Fire and Explosion Hazards: None

SECTION VII - SPILLAGE, LEAKAGE, HANDLING

Under normal handling and uses material is not dusty and does not present spillage and leakage problems. No protection required, except avoid prolonged or repeated direct skin contact if sensitive to nickel. In such circumstances, gloves are recommended.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Respiratory:

If solid nickel forms are converted in manufacturing processes to dusts, fumes, gases or mists, and ventilation is not adequate to maintain nickel concentrations below recommended exposure limits,(SEE SECTION II), then respiratory protection should be used. NIOSH approved respirators according to OSHA CFR 1910.134 are recommended.

Ventilation:

If solid forms of nickel are converted to dusts, fumes, gases or mists, maintain working environment below the recommended exposure limits (SECTION II) by use of appropriate ventilation.

Protective Gloves:

Leather or rubber gloves are recommended.

Eye Protection:

If nickel metal is dissolved, avoid solution contact by use of protective goggles.

SECTION IX - DEFINITIONS/REFERENCES

Definitions:

OHSA -	Occupational Safety and Health Act
PEL -	Permissible Exposure Limit
ACGIH -	American Conference of Governmental Industrial Hygienists
TLV -	Threshold Limiting Value
NTP -	National Toxicology Programme
IARC -	International Agency for Research on Cancer
NIOSH -	National Institute for Occupational Safety and Health

References:

(1) Godbold, I.H. Jr. and Tompkins, E.A.; A Long-term mortality study of workers occupationally exposed to metallic nickel at the Oak Ridge Gaseous Diffusion Plant. J. Occup. Med. 21, 799-806, 1979.

(2) Cragle, D.L., Hollis, D.L., Shy, C.M., and Newport, T. A retrospective cohort mortality study among workers occupationally exposed to metallic nickel dust at the Oak Ridge Gaseous Diffusion Plant. Paper presented at an International Symposium on Nickel in the Human Environment. Lyon, France 1983. In Press

(3) Edgdahl, R. and Rice, E.; A Cancer Incidence Study at a Hydrometallurgical Nickel Refinery. Paper presented at an International Symposium on Nickel in the Human Environment. Lyon, France 1983. In Press

(4) Cox, J.E., Doll, R. Scott, W.A. and Smith, S.; Mortality of Nickel Workers: Experience with Men Working with Metallic Nickel. Brit. J. Ind. Med. 38, 235-239, 1981

(5) Enterline, P.E. and Marsh, C.M.; Mortality among workers in a nickel refinery and alloy manufacturing plant in West Virginia. J. Nat. Cancer Inst. 68, 925-933, 1982

Falconbridge Limited
October. 1985

Printed in Canada

Enthone-OMI, Inc.

a subsidiary of ASARCO

MATERIAL SAFETY DATA SHEET

ENTHONE

ENSTRIP 110C

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS

ENTHONE	203-934-8611
UDYLITE	313-497-9100
SEL-REX	313-497-9100

PRODUCT CODE#: 2586
DATE ISSUED: 2/9/89
SUPERCEDES: 6/3/87
PREPARER: F.R. Hirtler

FRH/SSIC

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Water		7732-18-5	NI	NI	>90
Ammonium Nitrate		6484-52-2	NI	NI	<10
Ammonium Chloride		12125-02-9	NI	10 mg/m3*	1

*As fume

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	1.044	BOILING POINT, °F	209
EVAP.RATE (BUTYL ACETATE=1)	NI	MELTING POINT, °F	NI
VAPOR PRESSURE, mmHg	NI	SOLUBILITY IN WATER	complete
VAPOR DENSITY (AIR=1)	NI	APPEARANCE	clear liquid
pH (AS IS)	8.5	ODOR	none

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	None	FLAMMABLE LIMITS (AIR)	NA	LEL	NA	UEL

EXTINGUISHING MEDIA

[X] Not Combustible [ ] Water fog or spray [ ] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [ ] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear self-contained breathing apparatus (SCBA) and complete personal protective equipment when potential for exposure to vapors or products of combustion exists.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Exposing dried salts to shock or high temperatures may cause explosion (See Section VI).

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Mist or vapor may irritate respiratory tract.

INGESTION: Can cause irritation to mouth, throat, esophagus, and stomach.

SKIN: Can cause irritation.

EYES: Can cause severe irritation.

EFFECTS OF CHRONIC EXPOSURE:

Nausea, vomiting, disturbances of the digestive tract, chrome sores, bone fluorosis and possibly osteosclerosis and lung cancer.

CARCINOGEN: Not listed by NTP, IARC, OSHA

REFERENCE:

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed give large amounts of water and INDUCE VOMITING.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water for 15 minutes. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated.
Seek immediate medical attention.

EYES: Flush eyes with plenty of water, holding lids apart to ensure flushing of entire surface to prevent or relieve irritation.
If irritation persists, seek medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Avoid contact with skin, eyes and clothing. Wear protective equipment (see Section VII). Do not breathe mist or vapors. Contain spill and soak up in suitable absorbent. Shovel into plastic lined steel containers. Dilute residual material with copious amounts of water and neutralize. Dispose of in accordance with Local, State and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in a cool dry place. Loosen cover cautiously when opening.

ADDITIONAL INFORMATION:

Contains ammonium nitrate in water solution. If material is evaporated to dryness, treat as ammonium nitrate which is an oxidizer and which may explode under confinement and high temperature or if subjected to strong shocks.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL.
Use cartridge filter for alkaline mist.

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [X] Face shield

PROTECTIVE GLOVES: [X] Neoprene [X] Natural rubber Other:

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Chemically resistant coveralls, hat, and shoes or boots.

WORKHYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of operating solutions consult Enthone-OMI Waste Disposal Procedures. For major spills consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State, and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID:	Evaporation to dryness.
	Unstable		

INCOMPATABILITY (Materials to avoid): Strong reducers, strong bases most common metals, combustibles.

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic ammonia, oxides of nitrogen, chlorine.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

This product contains one or more chemicals which are subject to the reporting requirements of SARA, TITLE III, Section 313 (40 CFR 372). The chemical(s) are listed in Section II, HAZARDOUS INGREDIENTS, along with the CAS (Chemical Abstract Service) # and the ingredient concentration which will be within 5% of the figure stated. This notice must be included in any subsequent copying of this MSDS.

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI, Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone-OMI, Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI, Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI's control, user assumes all responsibility and risk.

Enthone-OMI, Inc.

a subsidiary of ASARCO

MATERIAL SAFETY DATA SHEET

ENTHONE

ENSTRIP® 110S

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS

ENTHONE	203-934-8611
UDYLITE	313-497-9100
SEL-REX	313-497-9100

PRODUCT CODE#: 2583
DATE ISSUED: 4/5/91
SUPERCEDES: 1/24/91
PREPARER: S.D. Koch

SDK

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Water		7732-18-5	NI	NI	>95
Sodium fluoroborate		13755-29-8	2.5mg/m3*	2.5mg/m3*	<5

*As F

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	1.034	BOILING POINT, °F	213
EVAP.RATE (BUTYL ACETATE=1)	NI	MELTING POINT, °F	31
VAPOR PRESSURE, mmHg	NI	SOLUBILITY IN WATER	miscible
VAPOR DENSITY (AIR=1)	NI	APPEARANCE	clear, colorless liquid
pH (AS IS)	3.6	ODOR	none

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	None	FLAMMABLE LIMITS (AIR)	NA	LEL	NA	UEL

EXTINGUISHING MEDIA

[X] Not Combustible [X] Water fog or spray [X] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear NIOSH approved full protective clothing and self-contained breathing apparatus. Keep containers cool to prevent rupture and release of material.

UNUSUAL FIRE AND EXPLOSION HAZARDS

When heated above the boiling point, produces irritating mist.

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Mist or vapor may irritate respiratory tract.

INGESTION: Can cause severe irritation to mouth, throat, esophagus, and stomach.

SKIN: Can cause severe irritation.

EYES: Can cause severe irritation, damage to eyes.

EFFECTS OF CHRONIC EXPOSURE:

Chronic exposure effects not established.

CARCINOGEN: Not listed by NTP, IARC, OSHA

REFERENCE:

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed DO NOT INDUCE VOMITING, give large amounts of water.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water for 15 minutes. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated.
Seek immediate medical attention.

EYES: Immediately flush eyes with plenty of water for at least 15 minutes holding lids apart to ensure flushing of entire surface. Washing eyes within several seconds of exposure is essential to minimize damage.
Seek immediate medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Avoid contact with skin, eyes, and clothing. Wear protective equipment (see Section VII). Do not breathe mist or vapors. Contain spill and soak up in suitable absorbent. Shovel up into plastic-lined steel containers and cover. Dispose of in accordance with Local, State, and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in a cool dry place. Loosen cover cautiously when opening.

ADDITIONAL INFORMATION:

Wash thoroughly after handling.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL. Use cartridge filter for acid mist.

EYE PROTECTION: [X] Safety glasses [X] Chemical safety goggles [ ] Face shield

PROTECTIVE GLOVES: [X] Neoprene [X] Natural rubber Other:

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Chemically resistant coveralls, hat, and shoes or boots.

WORK/HYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of spilled or contaminated product follow Enthone-OMI Waste Disposal Procedures. If necessary, consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See Incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Cyanides, sulfides

HAZARDOUS DECOMPOSITION PRODUCTS: Sodium fluoride, boron trifluoride gas.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

This product does not contain any chemicals subject to the reporting requirements of SARA, TITLE III, Section 313 (40CFR372) or known to the State of California to cause cancer or birth defects (to comply with California Statute [Section 252249.6]).

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI, Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone-OMI, Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI, Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI's control, user assumes all responsibility and risk.

Enthone-OMI Inc.

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MATERIAL SAFETY DATA SHEET

ENTHONE

ENSTRIP® S

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS
(203) 934-8611
8:30 a.m. - 5 p.m. (EST)

PRODUCT CODE#: 2501
DATE ISSUED: 9/1/94
SUPERCEDES: 2/14/92
PREPARER: L.T. Horbal

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Sodium m-Nitrobenzenesulfonate		127-68-4	NI	NI	>95

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	NI
EVAP.RATE (BUTYL ACETATE=1)	NA
VAPOR PRESSURE, mmHg	NA
VAPOR DENSITY (AIR=1)	NA
pH (AS IS)	NA

BOILING POINT, °F	NA
MELTING POINT, °F	NI
SOLUBILITY IN WATER	essentially complete
APPEARANCE	off-white powder
ODOR	slightly aromatic

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	None	FLAMMABLE LIMITS (AIR)	NA	LEL	NA	UEL

EXTINGUISHING MEDIA

[ ] Not Combustible [X] Water fog or spray [X] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear self-contained breathing apparatus (SCBA) and complete personal protective equipment when potential for exposure to vapors or products of combustion exists.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Product will self-sustain combustion when ignited.

Printed on recycled paper

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Can cause irritation.

INGESTION: Can cause irritation to mouth, throat, esophagus, and stomach.

SKIN: Can cause irritation.

EYES: Can cause severe irritation.

EFFECTS OF CHRONIC EXPOSURE:

None known.

CARCINOGEN: Not listed by NTP, IARC, OSHA

REFERENCE: -

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed DO NOT INDUCE VOMITING, give large amounts of water.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water for 15 minutes. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated.
Seek immediate medical attention.

EYES: Flush eyes with plenty of water, holding lids apart to ensure flushing of entire surface to prevent or relie irritation.
If irritation persists, seek medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Avoid contact with skin, eyes, and clothing. Wear protective equipment (See section VII). Sweep or shovel spilled material into clean plastic lined container and cover. Flush spill area with copious amounts of water. Dispose of in accordance with Local, State and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in a cool, dry place. Keep away from acids and oxidizers. Loosen cover cautiously when opening.

ADDITIONAL INFORMATION:

Wash thoroughly after handling.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL. Use cartridge filter for dusts.

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [ ] Face shield

PROTECTIVE GLOVES: [X] Neoprene [X] Natural rubber Other:

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Chemically resistant coveralls, hat, and shoes or boots.

WORK/HYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of operating solutions consult Enthone-OMI Waste Disposal Procedures. For major spills consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State, and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

2501	ENSTRIP® S	9/1/94

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See Incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Oxidizing agents, acids, acid salts.

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic oxides of nitrogen, sulfur and carbon.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

This product does not contain any chemicals subject to the reporting requirements of SARA, TITLE III, Section 313 (40CFR372) or known to the State of California to cause cancer or birth defects (to comply with California Statute [Section 25249.6]).

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone-OMI Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI's control, user assumes all responsibility and risk.

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MATERIAL SAFETY DATA SHEET

ENTHONE

ENTEK® CU-56

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS
ENTHONE 203-934-8611
UDYLITE 313-497-9100
SEL-REX 313-497-9100

PRODUCT CODE#: 2806
DATE ISSUED: 2/9/89
SUPERCEDES: 4/30/87
PREPARER: F.R. Hirtler

FRH/OK

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Methanol	Methyl alcohol	67-56-1	260 mg/m3	260 mg/m3	>40
Benzotriazole		95-14-7	NI*	NI*	<5
Sodium m-Nitrobenzenesulfonate		127-68-4	NI	NI	<5
Water		7732-18-5	NI	NI	>45

*Recommended: PEL: 15 mg/m3; TLV: 10 mg/m3

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER=1)	0.950	BOILING POINT, °F	172
EVAP. RATE (BUTYL ACETATE=1)	NI	MELTING POINT, °F	20
VAPOR PRESSURE, mmHg	55	SOLUBILITY IN WATER	complete
VAPOR DENSITY (AIR=1)	NI	APPEARANCE	light yellow liquid
pH (AS IS)	7.4	ODOR	alcoholic

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	100 (O.C.); 80 (C.C.)	FLAMMABLE LIMITS (AIR)	NI	LEL	NI	UEL

EXTINGUISHING MEDIA

[ ] Not Combustible [X] Water fog or spray [X] Carbon Dioxide [X] Dry Chemical [X] Alcohol Foam [ ] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear NIOSH approved full protective clothing and self-contained breathing apparatus. Keep containers cool to prevent rupture and release of material.

UNUSUAL FIRE AND EXPLOSION HAZARDS

At high temperatures may release toxic oxides of nitrogen and sulfur.

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Dizziness, drowsiness, disturbance of vision.

INGESTION: May be fatal and can cause blindness.

SKIN: Can cause irritation.

EYES: Can cause severe irritation, damage to eyes.

EFFECTS OF CHRONIC EXPOSURE:

Prolonged exposure may lead to impairment of vision.

CARCINOGEN: Not listed by NTP, IARC, OSHA

REFERENCE:

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed give large amounts of water and INDUCE VOMITING.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water for 15 minutes. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated.
Seek immediate medical attention.

EYES: Immediately flush eyes with plenty of water for at least 15 minutes holding lids apart to ensure flushing of entire surface. Washing eyes within several seconds of exposure is essential to minimize damage.
Seek immediate medical attention.

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VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Protect area from sources of ignition. Do not breath mist or vapors. Wear protective equipment. Contain spill and soak up with suitable material such as sand, earth, then transfer to clean steel drum and cover. Dispose of in accordance with Lo State and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in cool dry place; avoid heat, sparks and open flame.

ADDITIONAL INFORMATION:

Use explosion proof electrical equipment.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL. Use cartridge filter for organic vapors.

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [X] Face shield

PROTECTIVE GLOVES: [X] Neoprene [X] Natural rubber Other:

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Chemically resistant coveralls, hat, and shoes or boots.

WORK/HYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of operating solutions consult Enthone Waste Disposal Procedures. For major spills consult Enthone for disposal assistance. Dispose of in accordance with Local, State, and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See Incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Alkali metals, concentrated nitric and sulfuric acids, acyl chlorides.

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic carbon monoxide, carbon dioxide, oxides of nitrogen and sulfur, also nitroaromatics.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

This product contains one or more chemicals which are subject to the reporting requirements of SARA, TITLE III, Section 313 (40 CFR 372). The chemical(s) are listed in Section II, HAZARDOUS INGREDIENTS, along with the CAS (Chemical Abstract Service) # and the ingredient concentration which will be within 5% of the figure stated. This notice must be included in any subsequent copying of this MSDS.

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Enthone-OMI Inc.

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MATERIAL SAFETY DATA SHEET

ENTHONE

ENTEK® WT-113

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611.

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS

ENTHONE	203-934-8611
UDYLITE	313-497-9100
SEL-REX	313-497-9100

PRODUCT CODE#: 2971
DATE ISSUED: 8/19/93
SUPERCEDES: 8/2/91(W.T. Cmpd WT-113
PREPARER: L.T. Horgal

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Sodium diethyldithiocarbamate		148-18-5	NI	NI	<30
Water		7732-18-5	NI	NI	>70

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	1.095	BOILING POINT, °F	220
EVAP.RATE (BUTYL ACETATE=1)	NI	MELTING POINT, °F	21
VAPOR PRESSURE, mmHg	NI	SOLUBILITY IN WATER	complete
VAPOR DENSITY (AIR=1)	NI	APPEARANCE	pale yellow liquid
pH (AS IS)	12.6	ODOR	pungent

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	124	FLAMMABLE LIMITS (AIR)	NI	LEL	NI	UEL

EXTINGUISHING MEDIA

[ ] Not Combustible [X] Water fog or spray [X] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear NIOSH approved full protective clothing and self-contained breathing apparatus. Keep containers cool to prevent rupture and release of material.

UNUSUAL FIRE AND EXPLOSION HAZARDS

When exposed to temperatures above 130°F product may release toxic carbon disulfide gas.

Printed on recycled paper

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Mist or vapor may irritate respiratory tract.

INGESTION: Can cause irritation to mouth, throat, esophagus, and stomach.

SKIN: Can cause irritation.

EYES: Irritating to eyes.

EFFECTS OF CHRONIC EXPOSURE:

May cause reproductive and mutagenic harm.

CARCINOGEN: Not listed by NTP, IARC, OSHA.

REFERENCE:

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed DO NOT INDUCE VOMITING, give large amounts of water.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of soap and water. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear. If irritation continues, seek medical attention.

EYES: Flush eyes with plenty of water, holding lids apart to ensure flushing of entire surface to prevent or relieve irritation.
If irritation persists, seek medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:
Avoid contact with skin, eyes, and clothing. Wear protective equipment (see Section VII). Do not breathe mist or vapors. Contain spill and soak up in suitable absorbent. Shovel up into plastic-lined steel containers and cover. Dispose of in accordance with Local, State, and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:
Store in a cool, dry place. Keep away from acids and oxidizers. Loosen cover cautiously when opening.

ADDITIONAL INFORMATION:
Store above freezing temperature.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL. Use cartridge filter for alkaline mist.

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [X] Face shield

PROTECTIVE GLOVES: [X] Neoprene [X] Natural rubber Other:

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:
Chemically resistant coveralls, hat, and shoes or boots.

WORK/HYGENIC PRACTICES:
Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:
For waste disposal of spilled or contaminated product follow Enthone-OMI Waste Disposal Procedures. If necessary, consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Temperatures above 130°F
	Unstable	

INCOMPATABILITY (Materials to avoid): Oxidizing agents, acids, acid salts.

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic oxides of sulfur, nitrogen and carbon.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

This product does not contain any chemicals subject to the reporting requirements of SARA, TITLE III, Section 313 (40CFR372) or known to the State of California to cause cancer or birth defects (to comply with California Statute [Section 25249.6]).

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone-OMI Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI's control, user assumes all responsibility and risk.

Enthone-OMI Inc.

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MATERIAL SAFETY DATA SHEET

ENTHONE

ENTHOBRITE® CLZ-940B

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS

ENTHONE	203-934-8611
UDYLITE	313-497-9100
SEL-REX	313-497-9100

PRODUCT CODE#: 4136
DATE ISSUED: 3/18/93
SUPERCEDES: 6/30/92
PREPARER: L.T. Horbal

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Water		7732-18-5	NI	NI	>20
1-Propanol	n-Propyl alcohol	71-23-8	500mg/m3	492mg/m3	<10
4-Phenyl-3-butene-2-one	Benzylidene acetone	122-57-6	NI	NI	<5
o-chlorobenzaldehyde		89-98-5	NI	NI	<5
Balance of materials not considered hazardous.					

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	1.093	BOILING POINT, °F	210
EVAP.RATE (BUTYL ACETATE=1)	NI	MELTING POINT, °F	25
VAPOR PRESSURE, mmHg	NI	SOLUBILITY IN WATER	completed
VAPOR DENSITY (AIR=1)	NI	APPEARANCE	yellow liquid
pH (AS IS)	4.5-6.9	ODOR	irritating

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	128(c.c.)	FLAMMABLE LIMITS (AIR)	NI	LEL	NI	UEL

EXTINGUISHING MEDIA

[ ] Not Combustible [X] Water fog or spray [X] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear NIOSH approved full protective clothing and self-contained breathing apparatus. Keep containers cool to prevent rupture and release of material.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Vapors may travel to sources of ignition distant from point of handling or spillage.

Printed on recycled paper

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Mist or vapor may irritate respiratory tract.

INGESTION: Can cause irritation to mouth, throat, esophagus, and stomach. May lead to nausea, vomiting, coma and death.

SKIN: Can cause irritation.

EYES: Can cause irritation.

EFFECTS OF CHRONIC EXPOSURE:

May lead to sensitization and allergic reaction.

CARCINOGEN: Not listed by NTP, IARC, OSHA

REFERENCE:

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed give large amounts of water and INDUCE VOMITING.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated. If irritation continues, seek medical attention.

EYES: Flush eyes with plenty of water, holding lids apart to ensure flushing of entire surface to prevent or relieve irritation.
If irritation persists, seek medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Avoid contact with skin, eyes, and clothing. Wear protective equipment (see Section VII). Do not breathe mist or vapors. Eliminate sources of ignition such as heat, sparks, and open flames. Ensure that the area is properly ventilated. Contain spill and soak up in suitable absorbent. Shovel up into plastic-lined steel containers and cover. Dispose of in accordance with Local, State, and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in a cool, dry place. Keep away from alkalies and oxidizers. Loosen cover cautiously when opening.

ADDITIONAL INFORMATION:

Store above freezing temperature.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL. Use cartridge filter for acid mist.

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [X] Face shield

PROTECTIVE GLOVES: [X] Neoprene [X] Natural rubber Other:

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Chemically resistant coveralls, hat, and shoes or boots.

WORK/HYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of spilled or contaminated product follow Enthone-OMI Waste Disposal Procedures. If necessary, consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200
PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See Incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Alkalis and oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic oxides of carbon and sulfur; chlorine and hydrogen chloride.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

This product does not contain any chemicals subject to the reporting requirements of SARA, TITLE III, Section 313 (40CFR372) or known to the State of California to cause cancer or birth defects (to comply with California Statute [Section 25249.6]).

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone-OMI Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI's control, user assumes all responsibility and risk.

Enthone-OMI Inc.

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MATERIAL SAFETY DATA SHEET

ENTHONE

ENTHOBRITE® CLZ-RINSE AID NF

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS

ENTHONE	203-934-8611
UDYLITE	313-497-9100
SEL-REX	313-497-9100

PRODUCT CODE#: 4139
DATE ISSUED: 3/23/94
SUPERCEDES: New
PREPARER: D. Friday

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Water		7732-18-5	NI	NI	>65
Diethylene glycol monoethyl ether	Carbitol	111-90-0	NI	NI	<25
Surfactant not known to be hazardous		-	NI	NI	<15

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	1.014	BOILING POINT, °F	217
EVAP.RATE (BUTYL ACETATE=1)	NI	MELTING POINT, °F	18
VAPOR PRESSURE, mmHg	NI	SOLUBILITY IN WATER	complete
VAPOR DENSITY (AIR=1)	NI	APPEARANCE	clear liquid
pH (AS IS)	3.3	ODOR	mild

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	>200	FLAMMABLE LIMITS (AIR)	NI	LEL	NI	UEL

EXTINGUISHING MEDIA

[X] Not Combustible [X] Water fog or spray [X] Carbon Dioxide [X] Dry Chemical [X] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear NIOSH approved full protective clothing and self-contained breathing apparatus. Keep containers cool to prevent rupture and release of material.

UNUSUAL FIRE AND EXPLOSION HAZARDS

None known.

Printed on recycled paper

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Mist or vapor may irritate respiratory tract.

INGESTION: Can cause irritation to mouth, throat, esophagus, and stomach.

SKIN: Can cause irritation.

EYES: Irritating to eyes.

EFFECTS OF CHRONIC EXPOSURE:

Diethylene glycol monoethyl ether may potentially cause reproductive or mutagenic harm, at high exposures.

CARCINOGEN: Not listed by NTP, IARC, OSHA.

REFERENCE:

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed DO NOT INDUCE VOMITING, give large amounts of water.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of soap and water. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear. If irritation continues, seek medical attention.

EYES: Flush eyes with plenty of water, holding lids apart to ensure flushing of entire surface to prevent or relieve irritation.
If irritation persists, seek medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Avoid contact with skin, eyes, and clothing. Wear protective equipment (see Section VII). Do not breathe mist or vapors. Contain spill and soak up in suitable absorbent. Shovel up into plastic-lined steel containers and cover. Dispose of in accordance with Local, State, and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in a cool, dry place. Keep away from alkalies and oxidizers. Loosen cover cautiously when opening.

ADDITIONAL INFORMATION:

Wash thoroughly after handling.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL. Use cartridge filter for organic vapors.

EYE PROTECTION: [X] Safety glasses [X] Chemical safety goggles [ ] Face shield

PROTECTIVE GLOVES: [X] Neoprene [X] Natural rubber Other:

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Chemically resistant coveralls, hat, and shoes or boots.

WORK/HYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of operating solutions consult Enthone-OMI Waste Disposal Procedures. For major spills consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State, and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

4139	ENTHOBRITE® CLZ-RINSE AID NF	3/23/94

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See Incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Oxidizing Agents, Alkalis.

HAZARDOUS DECOMPOSITION PRODUCTS: In a fire: toxic carbon oxides.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	—

IX. ADDITIONAL INFORMATION

WARNING: This product contains a chemical known to the State of California to cause cancer. However, the concentration is less than 0.1%, and therefore OSHA does not require this hazard information on the material safety data sheet (MSDS) and label (29CFR1910.1200). (This statement is necessary to comply with California Statute [Section 252249.6]). This product contains one or more chemicals which are subject to the reporting requirements of SARA, TITLE III, Section 313 (40 CFR 372). The chemical(s) are listed in Section II, HAZARDOUS INGREDIENTS, along with the CAS (Chemical Abstract Service) # and the ingredient concentration which will be within 5% of the figure stated. This notice must be included in any subsequent copying of this MSDS.

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone-OMI Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI' control, user assumes all responsibility and risk.

Enthone-OMI, Inc.

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MATERIAL SAFETY DATA SHEET

ENTHONE

ENTHOX® Z-994

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300 (Transportation)
MFSA 313-644-5626
NON-EMERGENCY PHONE NUMBERS
ENTHONE 203-934-8611
UDYLITE 313-497-9100
SEL-REX 313-497-9100

PRODUCT CODE#: 4318
DATE ISSUED: 7/24/89
SUPERCEDES: 4/3/89
PREPARER: S.D. Koch

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Sodium bifluoride *Based on F		3333-83-1	2.5mg/m3*	2.5mg/m3*	<30
Sodium Chromate +Ceiling value based on Cr	#Based on Cr (VI)	7775-11-3	0.1mg/m3+	.05mg/m3#	<20
Remainder of ingredients not known to be hazardous					

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER=1)	NI	BOILING POINT, °F	NA
EVAP. RATE (BUTYL ACETATE=1)	NA	MELTING POINT, °F	NI
VAPOR PRESSURE, mmHg	NA	SOLUBILITY IN WATER	essentially soluble
VAPOR DENSITY (AIR=1)	NA	APPEARANCE	red-orange powder
pH (AS IS)	NA	ODOR	acidic-fluoridic

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	NA	FLAMMABLE LIMITS (AIR)	NA	LEL	NA	UEL

EXTINGUISHING MEDIA

[X] Not Combustible [X] Water fog or spray [ ] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear self-contained breathing apparatus (SCBA) and complete personal protective equipment when potential for exposure to vapors or products of combustion exists.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Strong oxidizer. May react violently with organic materials and reducing agents. At temperatures above 320°F may release toxic and highly corrosive hydrogen fluoride gas.

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Dust may cause ulceration and perforation of respiratory system with possible risk of lung cancer.

INGESTION: Can cause severe burns to mouth, throat, esophagus, and stomach. Material is a systemic poison to kidneys, liver and gastrointestinal tract; toxic effect may not appear immediately. May be fatal.

SKIN: Can cause severe burns including penetration of skin, attack on underlying tissues and bones. Absorption may lead to hypocalcemia, kidney failure and death.

EYES: Causes severe burns with damage to eyes and possible blindness.

EFFECTS OF CHRONIC EXPOSURE:

Can cause sensitization of skin, disturbances of digestive tract, chrome sores, bone fluorosis and possibly osteosclerosis and lung cancer.

CARCINOGEN: Chromates : human positive

REFERENCE: IARC 23,205,80

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed give large amounts of water and INDUCE VOMITING.
Seek immediate medical attention.

SKIN: If necessary treat affected areas with antidote solution (see pg.4 Section IX).
Seek immediate medical attention.
Remove contaminated clothing and wash before reuse. Discard footwear if it cannot be decontaminated.

EYES: Immediately flush eyes with plenty of water for at least 15 minutes holding lids apart to ensure flushing of entire surface. Washing eyes within several seconds of exposure is essential to minimize damage.
Seek immediate medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:
Avoid contact with skin, eyes and clothing. Wear protective equipment (see Section VII). Sweep or shovel spilled material into clean steel drum and cover. Flush spill area with water, treat with reducing agent and neutralize. Keep resultant slurry or solution out of sewer. Dispose of in accordance with Federal , State and Local Regulations.

STORAGE AND HANDLING PRECAUTIONS:
Store in a cool, dry place. Avoid wooden flooring. Keep away from combustibles, organic materials and reducing agents.

ADDITIONAL INFORMATION:
Wash thoroughly after handling.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL.
Use cartridge filter for acidic dust.

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [X] Face shield

PROTECTIVE GLOVES: [X] Neoprene [ ] Natural rubber Other: PVC

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:
Chemically resistant coveralls, hat, and shoes or boots. CAUTION: If clothing becomes contaminated, wash off immediately; spontaneous ignition may occur on contact with cloth or paper.

WORK/HYGENIC PRACTICES:
Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:
For waste disposal of spilled or contaminated product follow Enthone-OMI Waste Disposal Procedures. If necessary, consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Combustibles, organic materials, reducing agents, alkaline materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic and corrosive hydrogen fluoride gas, toxic oxides of nitrogen and sulfur.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

It is highly recommended that procedures be established by your company's physician including First Aid and Medical Treatment to be used in case of fluoride exposure including administration by qualified personnel of antidotes.

WARNING: This product contains a chemical known to the State of California to cause cancer (this statement complies with California Statute [Section 25249.6]). This product contains one or more chemicals which are subject to the reporting requirements of SARA, TITLE III, Section 313(40 CFR 372). The chemical(s) are listed in Section II, with the CAS # and the concentration (within 5% of the figure stated). This notice must be included in any subsequent copying of this MSDS.

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI, Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data does Enthone-OMI, Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI, Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI's control, user assumes all responsibility and risk.

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Enthone-OMI, Inc.

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MATERIAL SAFETY DATA SHEET

ENTHONE

ENTHOX® 995

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300 (Transportation)
MFSA 313-644-5626
NON-EMERGENCY PHONE NUMBERS
ENTHONE 203-934-8611
UDYLITE 313-497-9100
SEL-REX 313-497-9100

PRODUCT CODE#: 4319
DATE ISSUED: 7/24/89
SUPERCEDES: 8/22/88
PREPARER: S.D. Koch

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%
Chromic acid *Ceiling value based on Cr03	Chromium trioxide +Based on Cr (VI)	1333-82-0	0.1mg/m3*	.05mg/m3+	<40
Sodium nitrate		7631-99-4	NI	NI	<10
Sodium bisulfate		7681-38-1	NI	NI	<5

Remainder of ingredients not known to be hazardous.

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	NI	BOILING POINT, °F	NA
EVAP.RATE (BUTYL ACETATE=1)	NA	MELTING POINT, °F	NI
VAPOR PRESSURE, mmHg	NA	SOLUBILITY IN WATER	essentially complete
VAPOR DENSITY (AIR=1)	NA	APPEARANCE	reddish-orange powder
pH (AS IS)	NA	ODOR	acid-like

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	NA	FLAMMABLE LIMITS (AIR)	NA	LEL	NA	UEL

EXTINGUISHING MEDIA

[X] Not Combustible [X] Water fog or spray [ ] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear self-contained breathing apparatus (SCBA) and complete personal protective equipment when potential for exposure to vapors or products of combustion exists.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Strong oxidizer. May react violently with organic materials and reducing agents.

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Dust may cause ulceration and perforation of respiratory system with possible risk of lung cancer.

INGESTION: Can cause severe burns to mouth, throat, esophagus, and stomach. Material is a systemic poison to kidneys, liver and gastrointestinal tract; toxic effect may not appear immediately. May be fatal.

SKIN: May cause burns and "chrome sores". Skin absorption may lead to kidney failure.

EYES: Causes severe burns with damage to eyes and possible blindness.

EFFECTS OF CHRONIC EXPOSURE:

May cause sensitization of skin, ulceration of respiratory tract and possibly lung cancer.

CARCINOGEN: Chromic acid : human positive

REFERENCE: IARC 23,205,80

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed give large amounts of water and INDUCE VOMITING.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water for 15 minutes. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated.
Seek immediate medical attention.

EYES: Immediately flush eyes with plenty of water for at least 15 minutes holding lids apart to ensure flushing of entire surface. Washing eyes within several seconds of exposure is essential to minimize damage.
Seek immediate medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:

Avoid contact with skin, eyes and clothing. Wear protective equipment (see Section VII). Sweep or shovel spilled material into clean steel drum and cover. Flush spill area with water, treat with reducing agent and neutralize. Keep resultant slurry or solution out of sewer. Dispose of in accordance with Federal , State and Local Regulations.

STORAGE AND HANDLING PRECAUTIONS:

Store in a cool, dry place. Avoid wooden flooring. Keep away from combustibles, organic materials and reducing agents.

ADDITIONAL INFORMATION:

Wash thoroughly after handling.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL. Use cartridge filter for acidic dust.

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [X] Face shield

PROTECTIVE GLOVES: [X] Neoprene [ ] Natural rubber Other: PVC

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:

Chemically resistant coveralls, hat, and shoes or boots. CAUTION: If clothing becomes contaminated, wash off immediately; spontaneous ignition may occur on contact with cloth or paper.

WORK/HYGENIC PRACTICES:

Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:

For waste disposal of operating solutions consult Enthone-OMI Waste Disposal Procedures. For major spills consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State, and Federal regulations.

CAS = Chemical Abstract Service
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NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See Incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Combustibles, organic materials, reducing agents, alkaline materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic oxides of sulfur and nitrogen.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

WARNING: This product contains a chemical known to the State of California to cause cancer. (This statement is necessary to comply with California Statute [Section 25249.6]). This product contains one or more chemicals which are subject to the reporting requirements of SARA, TITLE III, Section 313 (40 CFR 372). The chemical(s) are listed in Section II, HAZARDOUS INGREDIENTS, along with the CAS (Chemical Abstract Service) # and the ingredient concentration which will be within 5% of the figure stated. This notice must be included in any subsequent copying of this MSDS.

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI, Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; no does Enthone-OMI, Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by thone-OMI, Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are ond Enthone-OMI's control, user assumes all responsibility and risk.

MATERIAL SAFETY DATA SHEET

Manville

No.: 2475 Rev. No.: 2
Date Revised: 04/07/87

NFPA FIRE HAZARD SYMBOL†
†See NFPA 704 for detailed explanation.

I. PRODUCT IDENTIFICATION

ade Name(s) : FIBRACEL CELLULOSE ONLY 3H-40
eneric Name: CELLULOSE FIBER
e ical Name: CELLULOSE

CAS #: 65996-61-4
Formula: $(C_6H_{10}O_5)n$

Manufacturer: MANVILLE SPECIALTY PRODUCTS GROUP
Address: P.O.BOX 5108
City: DENVER State: CO Zip: 80217

Telephone: (303)978-3120
Emergency:

II. PRODUCT INGREDIENTS

INGREDIENT NAME	CAS NUMBER	%	PEL and TLV (except as noted)
LLULOSE FIBER	65996-61-4	100	5 MG/M³ NUISANCE (RESPIRABLE DUST)

III. PHYSICAL DATA

rance and Odor: FINE WHITE POWDER - NO ODOR.

Boiling Point: NA
Vapor Pressure: NA
er Solubility (%) : NIL
Density (Air=1) : NA

Evaporation Rate (NA = 1) : NA
Specific Gravity (water = 1) : 1.25
Melting Point: ND
% Volatile by Volume: ND

IV. FIRE AND EXPLOSION DATA

sh Point (Method) : NA
mmable Limits: LEL: NA % UEL: NA %
guishing Media: WATER, CO_2, DRY CHEMICAL.
al Fire or Explosion Hazards: NONE

ecial Fire-Fighting Procedures: NONE

NFPA Flammable/Combustible Liquid Classification: NA
Auto-Ignition Temperature: NA

V. HEALTH HAZARDS A. Summary/Risks

mary: NUISANCE DUSTS - NO KNOWN ACUTE OR CHRONIC HEALTH HAZARDS.

IS PRODUCT IS NOT CONSIDERED A CARCINOGEN BY NTP, IARC AND OSHA.

cal conditions which may be aggravated: PRE-EXISTING UPPER RESPIRATORY AND LUNG DISEASES SUCH AS, BUT LIMITED TO, BRONCHITIS, EMPHYSEMA AND ASTHMA.
rget Organ(s) : UPPER RESPIRATORY SYSTEM.
ute Health Effects: TRANSITORY UPPER RESPIRATORY IRRITANT.

e Health Effects: NO KNOWN CHRONIC HEALTH HAZARDS.

mary Entry Route(s) : INHALATION

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V. HEALTH HAZARDS B. Signs/Symptoms of Overexposure

Inhalation: CONGESTION AND IRRITATION OF HE THROAT, NASAL PASSAGES AND UPPER RESPIRATORY SYSTEM.

Skin Contact: NA

Skin Absorption: NA

Ingestion: NOT HAZARDOUS.

Eyes: TEMPORARY IRRITATION AND INFLAMMATION.

V. HEALTH HAZARDS C. First Aid/Emergency Procedures

Inhalation: REMOVE TO FRESH AIR. DRINK WATER TO CLEAR THROAT AND BLOW NOSE.

Skin Contact: NA

Skin Absorption: NA

Ingestion: NA

Eyes: FLUSH WITH COPIOUS QUANTITIES OF WATER FOR A MINIMUM OF 15 MINUTES.

VI. REACTIVITY DATA

MATERIAL IS STABLE. HAZARDOUS POLYMERIZATION CANNOT OCCUR.
Chemical Incompatibilities: STRONG OXIDIZING AGENTS.
Conditions to Avoid: NONE IN DESIGNED USE.

Hazardous Decomposition Products: CARBON DIOXIDE, CARBON MONOXIDE.

VII. SPILL OR LEAK PROCEDURES

Procedures for Spill/Leak: VACUUM CLEAN SPILLAGE. IF SWEEPING IS NECESSARY USE A DUST SUPPRESSANT.

Waste Management: NOT HAZARDOUS AS DEFINED BY RCRA(40 CFR PART 261). COMPLY WITH FEDERAL, STATE AND LOCAL REGULATIONS. METHOD OF DISPOSAL - LANDFILL. RQ - N/A.

VIII. SPECIAL PROTECTION INFORMATION

Goggles: NOT NORMALLY REQUIRED.
Gloves: NOT NORMALLY REQUIRED.
Respirator: USE A MASK SUCH AS 3M 8710 OR EQUIVALENT FOR PROTECTION AGAINST NUISANCE DUSTS.

Ventilation: USE SUFFICIENT NATURAL OR MECHANICAL VENTILATION TO MAINTAIN AIRBORNE CONCENTRATIONS BELOW PEL/TLV.
Other: NA

Special Considerations for repair/maintenance of contaminated equipment: INSURE PROPER RESPIRATORY PROTECTION.

IX. SPECIAL PRECAUTIONS

Storage Segregation Hazard Classes: NA
*** ALWAYS SEGREGATE MATERIALS BY MAJOR HAZARD CLASS ***
Special Handling/Storage: REPAIR ALL BROKEN BAGS IMMEDIATELY.

Special Workplace Engineering Controls: NOT NORMALLY REQUIRED.

Other: NA

Prepared/Revised by: KENNETH A. ROBERTS Title: MANAGER, PRODUCT SAFETY

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such information is intended or given.

MATERIAL SAFETY
DATA SHEET

M & T HARSHAW
P. O. BOX 6768
SOMERSET, NJ 08875-6768

EMERGENCY TELEPHONE
NUMBER
8:30 A.M. - 5:00 P.M.
(908) 302-3550

CHEMTREC - 24 HOURS
1-800-424-9300

NAME USED ON LABEL: Fumetrol* 208 Mist Suppressant
CHEMICAL NAME (if single substance): N/A
CHEMICAL FAMILY: Plating Chemical
FORMULA: Proprietary

****

INGREDIENTS

****

Identity	CAS No.	%	TLV
inert liquid	(See Misc.)	>70	Not established
alkyl glycol ether	(See Misc.)	5-10	Not established
organic fluorosulfonate	(See Misc.)	<5	2.5 mg/M3 as F

ALL INGREDIENTS LISTED ARE ON THE TSCA INVENTORY

****

PHYSICAL DATA

****

Boiling Point: N/A
Specific Gravity: 1.02
Vapor Density: N/A
% Volatiles: N/A
Molecular Weight: N/A

Freezing Point: N/A
Vapor Pressure @ 20 C: N/A
Solubility in Water: complete
Evaporation Rate: N/A
Other: N/A

Appearance and Odor: White/pale yellow, slight cloudy liquid.

****

FIRE AND EXPLOSION DATA

****

Flash Point (Test Method)	Autoignition Temperature	Flammable Lts.
N/A	N/A	LEL= UEL=

Extinguishing Media: Water spray, foam, carbon dioxide, dry chemical.
Fire fighters should be equipped with a self-contained breathing apparatus and personal protective clothing.
Special Fire Fighting Procedures: Avoid eye and skin contact. Do not breathe fumes or inhale vapors or mists from solution.
Unusual Fire and Explosion Hazards: Irritating fumes or vapors may develop if product is exposed to elevated temperatures or open flame.

NAME USED ON LABEL: Fumetrol 208 Mist Suppressant

****
ENVIRONMENTAL INFORMATION
****

Spill Response: May be hazardous to aquatic life if released to open waters. Cover spill with absorbant material. Transfer to a suitable container for disposal.

Recommended Disposal: Dispose of absorbant material as solid waste. Follow all chemical pollution control regulations.

EPA Haz. Waste Designation (for virgin product):
Other:

****
HEALTH HAZARD DATA
****

Eye Contact: Will cause irritation.

Skin Contact: Will cause irritation.

Inhalation: Fumes or vapors from heated solution may be irritating to the respiratory tract.

Chronic Toxicity:
Repeated exposure to fluoride containing dust may cause excessive calcification of the bones and certain ligaments. Stiffness and limitation of motion may result.

Suggested First Aid:
EYES: In case of contact, immediately flush eyes with flowing water for at least 15 minutes. Get medical attention.

SKIN: Flush with flowing water for 15 minutes, then wash area with mild soap and water. Call a physician.
INHALATION: Move exposed individual to fresh air. Call a physician.

INGESTION: Never give fluids or induce vomiting if patient is unconscious or having convulsions. If conscious, give a glassful of water, then induce vomiting by giving an emetic. Call a physician.

NAME USED ON LABEL: Fumetrol 208 Mist Suppressant

****
REACTIVITY DATA
****

Stability: Stable
Conditions To Avoid: N/A

Incompatibility (Materials to Avoid): N/A

Hazardous Polymerization: Will not occur
Conditions To Avoid: N/A

Hazardous Decomposition Products: N/A

****
SPECIAL PROTECTION INFORMATION
****

Ventilation: Local Exhaust is recommended.
Mechanical (general) is required.
Respiratory Protection: Use NIOSH approved organic vapor respirator with a dust and mist prefilter if ventilation is inadequate.

Eye and Face Protection: Chemical workers goggles. Do not wear contact lenses.
Other Clothing and Equipment: PVC gloves and protective clothing. An eyewash and emergency shower should be readily available. Launder contaminated clothing before reuse.

****
SPECIAL PRECAUTIONS
****

Precautionary Label Information: Warning! Causes irritation. Harmful if swallowed. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Never give anything by mouth to an unconscious person.

Storage and Handling: Normal warehouse handling and storage in a cool, dry area.

****
TRANSPORTATION
****

Department of Transportation (DOT)
DOT Proper Shipping Name: None required
DOT Hazard Class: None required
DOT Label: None required
DOT ID #: None required

****
MISCELLANEOUS
****

INERT LIQUID: Non-hazardous according to the criteria of paragraph (d) of the OSHA Hazard Communication Standard.
ALKYL GLYCOL ETHER AND ORGANIC FLUOROSULFONATE: Hazardous according to the criteria of paragraph (d) of the OSHA Hazard Communication Standard. The specific identity is withheld as a Trade Secret according to paragraph (i) of the Standard.
All pertinent information concerning the properties, safe handling, and health effects of the chemical(s) is disclosed on this MSDS.
OTHER PRECAUTIONS: For industrial use only. Read technical data bulletin about this product prior to use.

****
REVISION(S)
****

1. Updated entire MSDS using spell mode.

Prepared by Safety & Environmental Affairs

Issued: 05/04/89
Supersedes: 10/12/87

The information set forth herein has been gathered from standard reference materials and/or M & T HARSHAW test data and is to the best knowledge and belief of M & T HARSHAW accurate and reliable. Such information is offered solely for your consideration, investigation and verification, and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones which exist. M & T HARSHAW makes no warranties, express or implied, with respect to the use of such information or the use of the specific material identified herein in combination with any other material or process, and assumes no responsibility therefor.

NAME USED ON LABEL: Fumetrol 208 Mist Suppressant

****
ADDITIONAL INFORMATION
****

CLASSIFICATIONS	RATINGS	
SARA TITLE III	HMIS	NFPA
Acute: Y	Flamm: 0	Flamm: 0
Chron: N	React: 0	React: 0
Press: N	Health: 1	Health: 1
React: N	PPE: I	
Fire: N		

Components of this product which appear in the ingredients section of this MSDS are identified below if they are present in excess of de minimus reporting levels. Components which are not required to be identified by specific chemical name may have a generic description.

SARA Title III Section 302 Extremely Hazardous Substance(s):
None

SARA Title III Section 313 Toxic Chemicals:
None

STATE RIGHT-TO-KNOW

Components of this product which are specifically identified in the ingredients section of this MSDS may be listed on the following:

1. Pennsylvania Hazardous Substance List
2. Massachusettes Hazardous Substance List
3. California Proposition 65 - None

MATERIAL SAFETY DATA SHEET

HAVABLACK 50

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME..... Haviland Products Company
DDRESS (STREET,CITY,STATE,ZIP) 421 Ann St., N.W., Grand Rapids, MI 49504
HONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER..... CHEMTREC (800) 424-9300
FFECTIVE DATE..... 10/16/89
RADE NAME..... HAVABLACK 50
HEMICAL FAMILY..... Miscellaneous Blend

SECTION II - HAZARDOUS INGREDIENTS

AZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #
Acetic Acid (Ethanoic cid) (Vinegar Acid) Methane Carboxylic Acid)	10ppm (25mg /m³)	10ppm (25mg/m³)	64-19-7
ilver (as metal) (<1.0%)	Not Established	.01-0.1mg/m³	7440-22-4

SECTION III - PHYSICAL DATA

BOILING POINT..... Approximately 108°C
REEZING POINT ..... Approximately -17°F
APOR PRESSURE (mm Hg)..... Approximately 11
VAPOR DENSITY (Air=1)..... Approximately 2.1
SOLUBILITY IN H20..... Completely
APPEARANCE/ODOR..... Clear, Colorless Liquid; Sharp Acrid Odor
SPECIFIC GRAVITY (H20=1)..... 1.06
PH..... Not Established

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT..... 104°F, 40°C, TCC
LOWER EXPLOSIVE LIMIT (% by Volume) Approximately 5.0
UPPER EXPLOSIVE LIMIT (% by Volume) Approximately 17
EXTINGUISH MEDIA..... Alcohol-type foam, dry chemical, CO_2, water spray.
SPECIAL FIRE FIGHTING PROCEDURES... Use water spray to cool fire exposed structures, tanks, and disperse vapor cloud. Wear self contained breathing apparatus.

MATERIAL SAFETY DATA SHEET

HAVABLACK 50

UNUSUAL FIRE HAZARD..... Vapors are heavier than air and may travel considerable distances to source of ignition and flashback. Oxidizing solution may react with organic material.

SECTION V - HEALTH HAZARD DATA

CARCINOGENICITY..... None
NTP..... No
IARC..... No
OVER EXPOSURE EFFECTS..... Breathing vapors causes coughing, chest pains and irritation of nose and throat. May cause nausea and vomiting. Contact with skin and eyes may cause burns. Chronic effects include: argyria, bronchitis, tooth erosion, gastointestinal disturbances.

PRIMARY ROUTE(S) OF ENTRY..... Eye and Skin Contact
FIRST AID PROCEDURES..... In case of contact: Immediately flush eyes and eyes with plenty of water for at least 15 minutes. Get medical attention.
If inhaled: Remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Get medical attention.
Ingestion: Do not induce vomiting. Call a Physician Immediately.

EXPOSURE AGGRAVATED MEDICAL CONDITIONS Respiratory Conditions

SECTION VI - REACTIVITY DATA

CHEMICAL STABILITY..... Stable
CONDITIONS TO AVOID..... Not Applicable
INCOMPATIBLE MATERIALS..... Avoid alkali, amines. May react explosively with nitric acid, hydrogen peroxide, permanganate and other oxidizing agents.

DECOMPOSITION PRODUCTS..... Thermal decomposition can produce: carbon monoxide, carbon dioxide, nitrogen oxides.

HAZARDOUS POLYMERIZATION..... Will Not Occur
POLYMERIZATION AVOID..... Not Applicable

SECTION VII - SPILL OR LEAK PROCEDURE

FOR SPILL ..... Eliminate all sources of ignition. Dike spill area. Neutralize with alkali or absorbent.

MATERIAL SAFETY DATA SHEET

HAVABLACK 50

WASTE DISPOSAL METHOD..... Neutralize with alkali and chemical precipitation of metallic constituents. Consult all applicable regulations for disposal.

SECTION VIII - SPECIAL PROTECTION

RESPIRATORY PROTECTION..... Use NIOSH approved organic vapor cartridge.

VENTILATION..... To keep vapors below limits.
PROTECTIVE GLOVES..... Rubber or other impervious material.
EYE PROTECTION..... Chemical splash goggles and face shield.
OTHER PROTECTIVE EQUIPMENT.... Rubber apron or other impervious material, boots, eye bath, safety shower.
HANDLING AND STORAGE..... Use only DOT approved containers. If frozen, thaw by moving to warm area. DO NOT REUSE CONTAINERS.

SECTION IX - SPECIAL PRECAUTIONS

HAZARD CLASS..... Corrosive
DOT SHIPPING NAME..... ACETIC ACID SOLUTION
UN NUMBER..... UN2790
REPORTABLE QUANTITY (RQ)..... 119 lbs.

REFERENCES HMIS: H-2,F-1,R-1

HABLK50

MATERIAL SAFETY DATA SHEET

HAVABLACK 140

SECTION IX - SPECIAL PRECAUTIONS

HAZARD CLASS..... None
DOT SHIPPING NAME..... NONE
UN NUMBER..... N.R.
REPORTABLE QUANTITY (RQ)..... 70 lbs.

REFERENCES HMIS: H-1,F-0,R-0

HABLK140

NOTE Hazardous Component(s) subject to reporting under 40 CFR 372 (SARA Title III, Sec. 313).

Enthone-OMI, Inc.

a subsidiary of ASARCO

MATERIAL SAFETY DATA SHEET

ENTHONE

ENTHOBRITE® CLZ-940A

P.O. BOX 1900
NEW HAVEN, CT 06508

(203) 934-8611

24 HOUR EMERGENCY PHONE NUMBERS
CHEMTREC 800-424-9300

NON-EMERGENCY PHONE NUMBERS

ENTHONE	203-934-8611
UDYLITE	313-497-9100
SEL-REX	313-497-9100

PRODUCT CODE#: 4135
DATE ISSUED: 1/7/88
SUPERCEDES: 3/4/87
PREPARER: F.R. Hirtler

FRH/SOK

II. HAZARDOUS INGREDIENTS

COMPONENT	COMMON NAME	CAS NO.	OSHA-PEL	ACGIH-TLV	%

Aqueous solution of materials not known to be hazardous.

III. PHYSICAL PROPERTIES

SPECIFIC GRAVITY (WATER =1)	1.108	BOILING POINT, °F	206
EVAP.RATE (BUTYL ACETATE=1)	NI	MELTING POINT, °F	NI
VAPOR PRESSURE, mmHg	NI	SOLUBILITY IN WATER	complete
VAPOR DENSITY (AIR=1)	NI	APPEARANCE	pale yellow liquid
pH (AS IS)	ca. 6.5	ODOR	insignificant

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °F	None	FLAMMABLE LIMITS (AIR)	NA	LEL	NA	UEL

EXTINGUISHING MEDIA

[ ] Not Combustible [X] Water fog or spray [X] Carbon Dioxide [ ] Dry Chemical [ ] Alcohol Foam [X] Foam [ ] Sand or Earth

SPECIAL FIRE FIGHTING PROCEDURES

Wear NIOSH approved full protective clothing and self-contained breathing apparatus. Keep containers cool to prevent rupture and release of material.

UNUSUAL FIRE AND EXPLOSION HAZARDS

None known.

V. HEALTH HAZARD DATA

EFFECTS OF ACUTE EXPOSURE:

INHALATION: Mist or vapor may irritate respiratory tract.

INGESTION: May cause irritation to mouth, throat, esophagus and stomach.

SKIN: Can cause irritation.

EYES: Can cause irritation.

EFFECTS OF CHRONIC EXPOSURE:

Chronic exposure effects not established.

CARCINOGEN: Not listed by NTP, IARC, OSHA

REFERENCE:

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove person from contaminated area. If breathing has stopped, resuscitate and administer oxygen if available.
Seek immediate medical attention.

INGESTION: Never give anything by mouth to an unconscious person, obtain immediate medical attention. If vomiting occurs spontaneously, keep airway clear. If swallowed give large amounts of water and INDUCE VOMITING.
Seek immediate medical attention.

SKIN: Immediately wash contaminated skin with plenty of water. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear if it cannot be decontaminated. If irritation continues, seek medical attention.

EYES: Flush eyes with plenty of water, holding lids apart to ensure flushing of entire surface to prevent or relieve irritation.
If irritation persists, seek medical attention.

VI. PRECAUTIONS FOR SAFE HANDLING AND USE

SPILL PROCEDURES:
Avoid contact with skin, eyes, and clothing. Wear protective equipment (see Section VII). Do not breathe mist or vapors. Contain spill and soak up in suitable absorbent. Shovel up into plastic-lined steel containers and cover. Dispose of in accordance with Local, State, and Federal regulations.

STORAGE AND HANDLING PRECAUTIONS:
Store in a cool, dry place. Keep away from oxidizers. Loosen cover cautiously when opening.

ADDITIONAL INFORMATION:
Store above freezing temperature.

VII. CONTROL MEASURES

VENTILATION: Local exhaust recommended.

RESPIRATOR: Use NIOSH approved respirator when air concentration is greater than the TLV or PEL.
Use cartridge filter for acid mist.

EYE PROTECTION: [ ] Safety glasses [X] Chemical safety goggles [X] Face shield

PROTECTIVE GLOVES: [X] Neoprene [X] Natural rubber Other:

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:
Chemically resistant coveralls, hat, and shoes or boots.

WORK/HYGENIC PRACTICES:
Emergency eye wash and safety shower should be available. Wash thoroughly after handling.

ADDITIONAL INFORMATION:
For waste disposal of operating solutions consult Enthone-OMI Waste Disposal Procedures. For major spills consult Enthone-OMI for disposal assistance. Dispose of in accordance with Local, State, and Federal regulations.

CAS = Chemical Abstract Service
NI = No relevant information available
NA = Not applicable
Trade Secret = Claimed as allowed under 29 CFR 1910.1200

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value
NTP = National Toxicology Program
IARC = Int'l Agency for Research on Cancer

4135	ENTHOBRITE® CLZ-940A	7-55

VIII. REACTIVITY DATA

X	Stable	CONDITIONS TO AVOID: Stable under normal conditions. See Incompatibility information.
	Unstable	

INCOMPATABILITY (Materials to avoid): Oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic oxides of carbon and sulfur.

HAZARDOUS POLYMERIZATION		May occur	CONDITIONS TO AVOID: NA
	X	Will not occur	

IX. ADDITIONAL INFORMATION

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Enthone-OMI, Inc. furnishes the data contained herein in good faith at customer's request without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; n does Enthone-OMI, Inc. grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone-OMI, Inc. or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone-OMI's control, user assumes all responsibility and risk.

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MATERIAL SAFETY DATA SHEET

HAVABLACK 140

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME..... Haviland Products Company
ADDRESS (STREET,CITY,STATE,ZIP) 421 Ann St., N.W., Grand Rapids, MI 4950-
PHONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER..... CHEMTREC (800) 424-9300
EFFECTIVE DATE..... 1/11/86
TRADE NAME..... HAVABLACK 140
CHEMICAL FAMILY..... Miscellaneous Blend

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #
Silver Nitrate (1.4% by wt) **SEE NOTE UNDER "REFERENCES" AT END OF MSDS	Not Established	.01-0.1mg/m³	7440-22-4

SECTION III - PHYSICAL DATA

BOILING POINT..... Approximately 212°F
FREEZING POINT ..... Approximately 30°F
VAPOR PRESSURE (mm Hg)..... Approximately 17mm Hg
VAPOR DENSITY (Air=1)..... No Information Available
SOLUBILITY IN H2O..... Completely Soluble
APPEARANCE/ODOR..... Colorless Liquid; Odorless
SPECIFIC GRAVITY (H2O=1)..... 1.01
PH..... Not Established

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT..... Will Not Burn
LOWER EXPLOSIVE LIMIT (% by Volume) Not Applicable
UPPER EXPLOSIVE LIMIT (% by Volume) Not Applicable
EXTINGUISH MEDIA..... As for Surrounding Fires
SPECIAL FIRE FIGHTING PROCEDURES... None Currently Known
UNUSUAL FIRE HAZARD..... Oxidizing solution may react with organic material.

SECTION V - HEALTH HAZARD DATA

CARCINOGENICITY..... None
NTP..... No
IARC..... No

MATERIAL SAFETY DATA SHEET

HAVABLACK 140

OVER EXPOSURE EFFECTS.....	Caustic and irritating to skin, mucous membranes and eyes. Can cause burns causing skin to darken and/or peel. Argyria (chronic).
PRIMARY ROUTE(S) OF ENTRY.....	Eye and Skin Contact
FIRST AID PROCEDURES.....	In case of contact: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention. Ingestion: Do not induce vomiting. Call a Physician Immediately. For Skin: Thoroughly flush skin with plenty of water and wash contaminated clothes before reuse. Inhalation: Not a primary route of entry.

EXPOSURE AGGRAVATED MEDICAL CONDITIONS None Currently Known

SECTION VI - REACTIVITY DATA

CHEMICAL STABILITY.....	Stable.
CONDITIONS TO AVOID.....	Not Applicable
INCOMPATIBLE MATERIALS.....	Organic Material.
DECOMPOSITION PRODUCTS.....	When evaporated to solid, may emit nitroge oxides above 444°.
HAZARDOUS POLYMERIZATION.....	Will Not Occur
POLYMERIZATION AVOID.....	Not Applicable

SECTION VII - SPILL OR LEAK PROCEDURE

FOR SPILL	Contain spill with absorbent material. Sna up with absorbent material.
WASTE DISPOSAL METHOD.....	Chemical precipitation of metals may be necessary. Consult all applicable regulations.

SECTION VIII - SPECIAL PROTECTION

RESPIRATORY PROTECTION.....	Not necessary when used according to instructions.
VENTILATION.....	Not Necessary
PROTECTIVE GLOVES.....	Rubber or other impervious material.
EYE PROTECTION.....	Chemical splash goggles.
OTHER PROTECTIVE EQUIPMENT....	Impervious clothing necessary to prevent skin contact. A safety shower and eye ba should be available.
NDLING AND STORAGE.....	Store in dark area away from sunlight. Protect from freezing.

(53)

MATERIAL SAFETY DATA SHEET

HAVABLACK CATALYST

SECTION I — IDENTIFICATION

MANUFACTURER'S NAME..... Haviland Products Company
ADDRESS (STREET,CITY,STATE,ZIP) 421 Ann St., N.W., Grand Rapids, MI 49504
PHONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER..... CHEMTREC (800) 424-9300
EFFECTIVE DATE..... 10/16/89
TRADE NAME..... HAVABLACK CATALYST
CHEMICAL FAMILY..... Miscellaneous Blend

SECTION II — HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #
Acetic Acid (Ethanoic Acid)	10ppm (25mg /m³)	10ppm (25mg/m³)	64-19-7

SECTION III — PHYSICAL DATA

BOILING POINT..... Approximately 108°C
FREEZING POINT ..... Approximately -10°F
VAPOR PRESSURE (mm Hg)..... Approximately 11
VAPOR DENSITY (Air=1)..... Approximately 2.1
SOLUBILITY IN H2O..... Completely
APPEARANCE/ODOR..... Clear, Colorless Liquid; Sharp Acrid Odor
SPECIFIC GRAVITY (H2O=1)..... 1.06
PH..... Not Established

SECTION IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT..... 104°F, 40°C, TCC
LOWER EXPLOSIVE LIMIT (% by Volume) Approximately 5.0
UPPER EXPLOSIVE LIMIT (% by Volume) Approximately 17
EXTINGUISH MEDIA..... Alcohol foam, dry chemical, CO_2, water spray.
SPECIAL FIRE FIGHTING PROCEDURES... Use water spray to cool fire exposed structures, tank, and disperse vapor cloud. Wear self contained breathing apparatus.
UNUSUAL FIRE HAZARD..... Vapors are heavier than air and may travel considerable distance to source of ignition and flashback.

SECTION V — HEALTH HAZARD DATA

CARCINOGENICITY..... None

MATERIAL SAFETY DATA SHEET

HAVABLACK CATALYST

NTP..... No
IARC..... No
OVER EXPOSURE EFFECTS..... Breathing of vapors causes coughing, chest pains, and irritation of nose and throat. May cause nausea and vomiting. Contact with skin and eyes may cause burns. Chronic effects include: bronchitis, tooth erosion, gastrointestinal disturbances.
PRIMARY ROUTE(S) OF ENTRY..... Inhalation, Eye and Skin Contact
FIRST AID PROCEDURES..... In case of contact: Immediately flush eyes and skin with plenty of water for at least 15 minutes. For eyes, get medical attention.
If inhaled: Remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Get medical attention.
Ingestion: Do not induce vomiting. Call a Physician Immediately. If conscious give milk or water.

EXPOSURE AGGRAVATED MEDICAL CONDITIONS Respiratory Conditions

SECTION VI - REACTIVITY DATA

CHEMICAL STABILITY..... Stable
CONDITIONS TO AVOID..... Not Applicable
INCOMPATIBLE MATERIALS..... Avoid alkali, amines. May react explosively with nitric acid, hydrogen peroxide, permanganate, and other oxidizing agents.
DECOMPOSITION PRODUCTS..... Thermal decomposition can produce carbon monoxide and/or carbon dioxide.
HAZARDOUS POLYMERIZATION..... Will Not Occur
POLYMERIZATION AVOID..... Not Applicable

SECTION VII - SPILL OR LEAK PROCEDURE

FOR SPILL ..... Eliminate all sources of ignition. Dike spill area. Neutralize with alkali or use absorbent.
WASTE DISPOSAL METHOD..... Neutralize with alkali. Comply with all federal, state and local regulations.

MATERIAL SAFETY DATA SHEET

HAVABLACK CATALYST

PROTECTIVE GLOVES..... Rubber or other impervious material.
EYE PROTECTION..... Chemical splash goggles and face shield.
OTHER PROTECTIVE EQUIPMENT.... Rubber apron or other impervious material and boots. A safety shower and eye bath should be available.
HANDLING AND STORAGE..... Use only DOT approved containers. If frozen, thaw by moving to warm area. DO NOT REUSE CONTAINERS.

SECTION IX - SPECIAL PRECAUTIONS

HAZARD CLASS..... Corrosive
DOT SHIPPING NAME..... ACETIC ACID SOLUTION
UN NUMBER..... UN2790
REPORTABLE QUANTITY (RQ)..... 5000 lbs.

REFERENCES HMIS: H-2,F-1,R-1

HABLKCAT

Material Safety Data Sheet

QUICK IDENTIFIER
Common Name: (used on label and list)

(50)

May be used to comply with OSHA's Hazard Communication Standard, 29CFR 1910. 1200. Standard must be consulted for specific requirements.

SECTION 1 - HAVAFLOC AN

Manufacturer's Name: Haviland Products Company

Address: 421 Ann St. N.W.

Emergency Telephone No.: CHEMTREC (800) 424-9300

City, State, and ZIP: Grand Rapids, MI 49504

Other Information Calls: (616) 361-6691

Signature of Person Responsible for Preparation (Optional):

Date Prepared: 12/2/85

SECTION 2 – HAZARDOUS INGREDIENTS/IDENTITY

Hazardous Component(s) (chemical & common name(s))	OSHA PEL	ACGIH TLV	Other Exposure Limits	% (optional)	CAS NO.
No hazardous components (in accordance with 29 CFR 1910.1200)					

SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS

Boiling Point: NA

Specific Gravity (H,O=1): 0.78 (solid)

Vapor Pressure (mm Hg): NA

Vapor Density (Air = 1): NA

Solubility in Water: Complete, very viscous >1%

Reactivity in Water: Unknown

Appearance and Odor: White powder, no odor

Melting Point: NA

SECTION 4 – FIRE & EXPLOSION DATA

Flash Point: F. C. Method Used: Not flammable

Flammable Limits in Air % by Volume: LEL Lower: NA UEL Upper: NA

Auto-Ignition Temperature: Will not burn

Extinguisher Media: As for surrounding fire

Special Fire Fighting Procedures: Use self-contained breathing apparatus in confined areas

Unusual Fire and Explosion Hazards: Under certain conditions can form explosive mixtures when suspended in air

NA = Not applicable

HYSICAL HAZARDS (REACTIVITY DATA)

Conditions to Avoid: Avoid creating explosive concentrations of dust

Incompatibility to Avoid: Strong oxidizing agents

Hazardous Decomposition Products: Carbon dioxide, carbon monoxide, nitrogen oxides

Hazardous Polymerization: May Occur ☐ Will Not Occur ☒ Conditions to Avoid: NA

ECTION 6 – HEALTH HAZARDS

Acute: Possible slight irritation to skin or eyes.

2. Chronic: No effects identified

Signs and Symptoms of Exposure: Possible irritation

Medical Conditions Generally Aggravated by Exposure: Unknown

Chemical Listed as Carcinogen Potential Carcinogen: National Toxicology Program Yes ☐ No ☒ | I.A.R.C. Monographs Yes ☐ No ☒ | OSHA Yes ☐ No ☒

Emergency and First Aid Procedures: * Designates primary route of entry

ROUTES OF ENTRY

1. Inhalation: Remove to fresh air.

*2. Eyes: Flush immediately with large amounts of water for at least 15 minutes, holding eyelids apart. Washing within one minute is essential to achieve maximum effectiveness.

*3. Skin: Wash with plenty of soap and water. Remove contaminated clothing and footwear. Wash clothing before reuse. Get medical attention if irritation should develop.

4. Ingestion: DO NOT INDUCE VOMITING. If vomiting should occur spontaneously, keep airway clear. Get medical attention.

ECTION 7 – SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be Taken in Handling and Storage: Store in cool, dry place. Practice reasonable care and cleanliness.

Other Precautions: Emptied containers retain product residues.

Steps to be Taken in Case Material is Released or Spilled: Clean up by sweeping up, shoveling up or by using explosion-proof vacuum equipment. Avoid creating explosive concentrations of dust. Wet powders are extremely slippery. Reuse material or place in labeled waste container.

Waste Disposal Methods (Consult federal, state, and local regulations): Dispose in an approved chemical waste landfill in accordance with applicable federal, state, and local regulations.

SECTION 8 – SPECIAL PROTECTION INFORMATION/CONTROL MEASURES

Respiratory Protection (Specify Type): None required under normal use. NIOSH/MSHA respirator if necessary

Ventilation: To maintain low dust concentration — Local Exhaust: Recommended — Mechanical (General): Acceptable — Special: NA — Other: NA

Protective Gloves: Rubber or plastic — Eye Protection: Chemical splash goggles or face shield

Other Protective Clothing or Equipment: A safety shower and eyebath should be available.

Hygienic Practices: Wash thoroughly after handling.

IMPORTANT

Leave any blank spaces. If required information is unavailable, unknown, or does not apply, so indicate.

MATERIAL SAFETY DATA SHEET

HYDROGEN PEROXIDE 50%

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME..... Haviland Products Company
ADDRESS (STREET,CITY,STATE,ZIP) 421 Ann St., N.W., Grand Rapids, MI 49504
PHONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER..... CHEMTREC (800) 424-9300
EFFECTIVE DATE..... 09/29/1993
TRADE NAME..... HYDROGEN PEROXIDE 50%
CHEMICAL FAMILY..... Peroxide

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #
Hydrogen Peroxide	1ppm 8hr TWA	1ppm 8hr TWA	7722-84-1

SECTION III - PHYSICAL DATA

BOILING POINT..... 226°F (108°C)
FREEZING POINT ..... -62°F (-52°C)
VAPOR PRESSURE (mm Hg)..... 18 @ 20°C (68°F)
VAPOR DENSITY (Air=1)..... 0.9 (Calculated)
SOLUBILITY IN H20..... Completely
APPEARANCE/ODOR..... Clear, Colorless Liquid; Slightly Pungent Odor
SPECIFIC GRAVITY (H20=1)..... 1.196
PH..... As is 2.0 - 3.0, 1 % Solution 5.0 - 6.0

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT..... Not Flammable
LOWER EXPLOSIVE LIMIT (% by Volume) Not Applicable
UPPER EXPLOSIVE LIMIT (% by Volume) Not Applicable
EXTINGUISH MEDIA..... As for Surrounding Fires
SPECIAL FIRE FIGHTING PROCEDURES... Flood with water. Wear self contained breathing apparatus and full personal protective clothing (rubber suit and boots).
UNUSUAL FIRE HAZARD..... Strong oxidizer. Contact with clothing or combustibles may cause fire. Contact with organic liquids or vapors may cause immediate fire or explosion, especially if heated, or may result in a delayed detonation.

MATERIAL SAFETY DATA SHEET

HYDROGEN PEROXIDE 50%

SECTION V - HEALTH HAZARD DATA

CARCINOGENICITY.....	None
NTP.....	No
IARC.....	No
OVER EXPOSURE EFFECTS.....	Coughing, headache, nausea, skin and lung irritation, eye burns.
PRIMARY ROUTE(S) OF ENTRY.....	Eye and Skin Contact
FIRST AID PROCEDURES.....	If swallowed: If conscious, drink plenty of water to dilute. DO NOT induce vomiting. Call a physician immediately. If Inhaled: Remove to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen. In Case of Contact: Immediately flush skin and eyes with plenty of water for at least 15 minutes. For eyes, contact a physician. Remove and wash contaminated clothing promptly.
EXPOSURE AGGRAVATED MEDICAL CONDITIONS	None Currently Known

SECTION VI - REACTIVITY DATA

CHEMICAL STABILITY.....	Stable
CONDITIONS TO AVOID.....	Heat or Contamination
INCOMPATIBLE MATERIALS.....	Cyanides, hexavalent chromium compounds, nitric acid, potassium permanganate, many other oxidizing and reducing agents, and many flammables.
DECOMPOSITION PRODUCTS.....	Oxygen Gas
HAZARDOUS POLYMERIZATION.....	Will Not Occur
POLYMERIZATION AVOID.....	Not Applicable

SECTION VII - SPILL OR LEAK PROCEDURE

FOR SPILL	Flood area with water and drain to an approved chemical sewer or waste water treatment system. May be destroyed with sodium metabisulfite or sodium sulfite after diluting to 5-10% peroxide.
WASTE DISPOSAL METHOD.....	Drain to approved chemical sewer or waste water treatment system. Comply with all federal, state and local regulations.

SECTION VIII - SPECIAL PROTECTION

RESPIRATORY PROTECTION.....	Self contained breathing apparatus should be available.

VENTILATION..... To maintain vapors below limits
PROTECTIVE GLOVES..... Rubber or other impervious materials.
EYE PROTECTION..... Chemical splash proof goggles.
OTHER PROTECTIVE EQUIPMENT.... A safety shower and eye bath should be available. For operations where spills or splashing may occur, use an impervious body covering and boots.
HANDLING AND STORAGE..... Do not store where contact with incompatable material may occur.

SECTION IX - SPECIAL PRECAUTIONS

HAZARD CLASS..... Oxidizer, 5.1, PG II
DOT SHIPPING NAME..... HYDROGEN PEROXIDE, AQUEOUS SOLUTION
UN NUMBER..... UN2014
REPORTABLE QUANTITY (RQ)..... Not Listed

REFERENCES HMIS H=2, F=0, R=1

HYDPER50

Oakite®

4394

MATERIAL SAFETY DATA SHEET

PRODUCT CODE: 4394
OAKITE INPRO-CLEAN 4000 T

HMIS 2 1 1 B

SECTION I - PRODUCT IDENTIFICATION

TRADE NAME	OAKITE INPRO-CLEAN 4000 T	EMERGENCY TELEPHONE NUMBER: (800) 424-9300 (CHEMTREC)
CHEMICAL NAME AND SYNONYMS	NA; Mixture	
MANUFACTURER'S NAME AND TELEPHONE NO.	OAKITE PRODUCTS INC. (908) 464-6900 (8am-5pm) A Member of The CHEMETALL Group	
ADDRESS	50 Valley Road Berkeley Heights NJ 07922	
DATE OF PREPARATION	09-12-95	

SECTION II - HAZARDOUS INGREDIENTS

	CAS NO.	% BY WT	ACGIH TLV (TWA)	OSHA PEL (TWA)	UNITS
Terpene hydrocarbon mixture *	Trade mark	40-50	NE	NE	
Non-hazardous ingredients		Bal.			

Unidentified ingredients are considered not hazardous under Federal Hazard Communication Standard (29 CFR 1910.1200).

All components of this material are on the US TSCA Inventory.

CARCINOGENICITY: No substance in this product is listed by IARC, NTP, or regulated by OSHA as a carcinogen.

* This material's specific chemical identity is being withheld as a trade secret.

SECTION III - PHYSICAL DATA

BOILING POINT (F)	209 F	SPECIFIC GRAVITY (H20=1)	1.047
VAPOR PRESSURE (mm Hg)	~<0.375 @ 25C	Bulk Density	8.74 lbs/gal
VAPOR DENSITY (Air=1)	>1	PERCENT VOLATILE	
SOLUBILITY IN WATER	Complete	BY WEIGHT(%) Excludes H2O	40-50
EVAPORATION RATE	NE	PH	

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NA - Not Applicable

NE - Not Established

APPEARANCE AND ODOR	Clear liquid; very faint lilac odor.	PH (concentrate)	6.5 - 7.5

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used): >200F (TCC)
FLAMMABLE LIMITS: LEL: 0.09 UEL: 0.55

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, or foam.

SPECIAL FIRE FIGHTING PROCEDURES: Wear Self-Contained Breathing Apparatus (SCBA). Use water spray to cool fire-exposed containers.

UNUSUAL FIRE AND EXPLOSION HAZARDS: See Section VII.(WHMIS)
See Section VI.(U.S.)

SECTION V - HEALTH HAZARD INFORMATION

ROUTE(S) OF ENTRY:	INHALATION:	SKIN:	INGESTION:
	x	x	x

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known
SYMPTOMS/EFFECTS OF OVEREXPOSURE:
Inhalation of vapor may cause irritation of mucous membrane, headache, dizziness, nausea. Direct contact with skin may cause irritation. Possible skin absorption. Eye contact is irritating and may cause damage.

FIRST AID

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes while holding eyelids open. Get medical attention.

SKIN: Wash affected area with large amounts of water. If irritation develops get medical attention.

INGESTION: Contact local poison control center or physician IMMEDIATELY!

INHALATION: Move victim to fresh air. Treat symptomatically.

SECTION VI - REACTIVITY DATA

NA - Not Applicable NE - Not Established

STABILITY: NORMALLY STABLE
Avoid extreme heat.
NCOMPATIBLE MATERIALS: Strong oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, Carbon dioxide.

SECTION VII - SPILL OR LEAK PROCEDURES

ROCEDURES: Wear personal protective equipment (See Section VIII). Clean up with noncombustible absorbant material. Store in dry container for disposal.

WASTE DISPOSAL METHOD: Dispose of in accordance with Local State and Federal regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY: Respirator not normally required. For symptoms of overexposure, wear a NIOSH-approved respirator for organic vapors.

EYEWEAR: Wear chemical safety goggles.

LOTHING/GLOVES: Wear neoprene or other chemical-resistant gloves.

VENTILATION: Local exhaust may be necessary for some handling/use conditions. Specific needs should be addressed by supervisory or health/safety personnel.

SECTION IX - SPECIAL PRECAUTIONS

tore in closed container in cool well-ventilated area. Keep away from heat, sparks, open flame.

PPROVAL Michael Chang Mgr. Health & Environmental Dept. 09/12/1995
NAME TITLE DATE OF PRINTING

A - Not Applicable

NE - Not Established

LEAD 9/27/85

LEAD
LEAD
LEAD

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACTS
GASTON L. PILLORI
(201) 796-7100

DATE 05/14/88
PO NBR: 1196
ACCT: 349110-02
INDEX: 12881310240
CAT NO: L246500

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 7439-92-1

SUBSTANCE: **LEAD**

TRADE NAMES/SYNONYMS:
WHITE LEAD; C.I. PIGMENT METAL 4; C.I. 77575; LEAD FLAKE; KS-4; LEAD S2; SI; SO; PLUMBUM; S1; L-18; L-24; L-29; L-27; T-134; ACC12510

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: PB MOL WT: 207.19

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=2 PERSISTENCE=3

COMPONENTS AND CONTAMINANTS

PERCENT: 99.8

COMPONENT: LEAD

OTHER CONTAMINANTS: BISMUTH, COPPER, ARSENIC, ANTIMONY, TIN, IRON, SILVER, ZINC

EXPOSURE LIMITS:
0.05 MG(PB)/M3 OSHA TWA;
0.10 MG(PB)/M3 NIOSH RECOMMENDED CEILING
0.15 MG(PB)/M3 ACGIH TWA; 0.45 MG(PB)/M3 ACGIH STEL (NOTICE OF INTENDED CHANGE 1984-1985)

PHYSICAL DATA

DESCRIPTION: BLUISH-WHITE, SILVERY GRAY METAL

BOILING POINT: 3164 F (1740 C) MELTING POINT: 622 F (328 C)

SPECIFIC GRAVITY: 11.3 VAPOR PRESSURE: 1.3 MM @ 970 C

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: HNO3, HOT CONC H2SO4

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
MODERATE HAZARD IN DUST FORM WHEN EXPOSED TO HEAT OR FLAME.

FLASH POINT: NON-FLAMMABLE

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FIREFIGHTING:
MOVE CONTAINERS FROM FIRE AREA IF POSSIBLE (1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3, GUIDE PAGE 53).

EXTINGUISH USING AGENT INDICATED. USE FLOODING AMOUNTS OF WATER AS A FOG. AVOID BREATHING DUSTS AND FUMES FROM BURNING MATERIAL; KEEP UPWIND. (BUREAU OF EXPLOSIVE, EMERGENCY HANDLING OF HAZARDOUS MATERIALS IN SURFACE TRANSPORTATION, 1981).

TOXICITY

450 MG/KG/6 YEAR ORAL-WOMAN TDLO; 1000 MG/KG INTRAPERITONEAL-RAT LDLO; 160 MG/KG ORAL-PIGEON LDLO; MUTAGENIC DATA (RTEC); CARCINOGEN STATUS: NONE. LEAD IS A CUMULATIVE NEUROTOXIN. POISONING AFFECTS THE CENTRAL NERVOUS SYSTEM, GASTROINTESTINAL TRACT, BLOOD AND KIDNEYS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
NEUROTOXIN/NEPHROTOXIN/TERATOGEN.
ACUTE EXPOSURE- INHALATION AND SUBSEQUENT ABSORPTION OF LARGE AMOUNTS OF LEAD MAY CAUSE THIRST, A METALLIC TASTE, A BURNING SENSATION IN THE MOUTH AND THROAT, EXCESSIVE SALIVATION, ABDOMINAL PAIN WITH SEVERE COLIC, VOMITING, DIARRHEA OF BLACK OR BLOODY STOOLS, CONSTIPATION, FATIGUE, SLEEP DISTURBANCES, DULLNESS, RESTLESSNESS, IRRITABILITY, MEMORY LOSS, LOSS OF CONCENTRATION, DELIRIUM, OLIGURIA OFTEN WITH HEMATURIA AND ALBUMINURIA, ENCEPHALOPATHY WITH VISUAL FAILURE, PARESTHESIAS, MUSCLE PAIN AND WEAKNESS, CONVULSIONS, AND PARALYSIS. DEATH MAY RESULT FROM CARDIORESPIRATORY ARREST, COMA, OR DEHYDRATION FROM FLUID LOSS AND SHOCK WHICH MAY BE DELAYED FOR 1-2 DAYS. SURVIVAL FROM ACUTE EXPOSURE MAY RESULT IN THE ONSET OF CHRONIC INTOXICATION. LIVER DAMAGE MAY INCLUDE ENLARGEMENT AND TENDERNESS, ICTERUS, AND JAUNDICE. THE APPROXIMATE FATAL DOSE OF ABSORBED LEAD IS APPROXIMATELY 0.5 GRAMS. PATHOLOGIC FINDINGS FROM ACUTE POISONING INCLUDE GASTROINTESTINAL INFLAMMATION AND RENAL TUBULAR DEGENERATION.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO LOW LEVELS OF LEAD MAY RESULT IN AN ACCUMULATION IN BODY TISSUES AND EXERT ADVERSE EFFECTS ON THE BLOOD, NERVOUS SYSTEMS, HEART, ENDOCRINE AND IMMUNE SYSTEMS, KIDNEYS, AND REPRODUCTION. EARLY STAGES OF LEAD POISONING, "PLUMBISM", MAY BE EVIDENCED BY ANOREXIA, WEIGHT LOSS, CONSTIPATION, APATHY OR IRRITABILITY, OCCASIONAL VOMITING, FATIGUE, HEADACHE, WEAKNESS, METALLIC TASTE IN THE MOUTH, GINGIVAL LEAD LINE IN PERSONS WITH POOR DENTAL HYGIENE, AND ANEMIA. LOSS OF RECENTLY DEVELOPED MOTOR SKILLS IS GENERALLY OBSERVED ONLY IN CHILDREN. MORE ADVANCED STAGES OF POISONING MAY BE CHARACTERIZED BY INTERMITTENT VOMITING, IRRITABILITY AND NERVOUSNESS, MYALGIA OF THE ARMS, LEGS, JOINTS AND ABDOMEN, PARALYSIS OF THE EXTENSOR MUSCLES OF THE ARMS AND LEGS WITH WRIST AND/OR FOOT DROP. DISTURBANCES OF MENSTRUAL CYCLES AND SPONTANEOUS ABORTIONS MAY OCCUR IN WOMEN. SEVERE "PLUMBISM" MAY RESULT IN PERSISTENT VOMITING, ATAXIA, PERIODS OF STUPOR OR LETHARGY, ENCEPHALOPATHY WITH VISUAL DISTURBANCES WHICH MAY PROGRESS TO OPTIC NEURITIS AND ATROPHY, HYPERTENSION, PAPILLEDEMA, CRANIAL NERVE PARALYSIS, DELIRIUM, CONVULSIONS, AND COMA. NEUROLOGIC SEQUELAE MAY INCLUDE MENTAL RETARDATION, SEIZURES, CEREBRAL PALSY, AND DYSTONIA MUSCULORUM DEFORMANS. IRREVERSIBLE KIDNEY DAMAGE HAS BEEN ASSOCIATED WITH INDUSTRIAL EXPOSURE. REPRODUCTIVE EFFECTS HAVE BEEN EXHIBITED IN BOTH MALES AND FEMALES. PATERNAL EFFECTS MAY INCLUDE DECREASED SEX DRIVE, IMPOTENCE, STERILITY AND ADVERSE EFFECTS ON THE SPERM WHICH MAY INCREASE THE RISK OF BIRTH DEFECTS. MATERNAL EFFECTS MAY INCLUDE MISCARRIAGE AND STILLBIRTHS IN EXPOSED WOMEN OR WOMEN WHOSE HUSBANDS WERE EXPOSED, ABORTION, STERILITY OR DECREASED FERTILITY, AND ABNORMAL MENSTRUAL CYCLES. LEAD CROSSES THE PLACENTA AND MAY AFFECT THE FETUS CAUSING BIRTH DEFECTS, MENTAL RETARDATION, BEHAVIORAL DISORDERS, AND DEATH DURING THE FIRST YEAR OF CHILDHOOD. ANIMAL STUDIES INDICATE THAT REPRODUCTIVE EFFECTS MAY BE ADDITIVE IF BOTH PARENTS ARE EXPOSED TO LEAD.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. GET MEDICAL ATTENTION. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

SKIN CONTACT:

ACUTE EXPOSURE- CONTACT WITH LEAD POWDERS OR DUST MAY BE IRRITATING. LEAD IS NOT ABSORBED THROUGH THE SKIN, BUT MAY BE TRANSFERRED TO THE MOUTH INADVERTENTLY BY CIGARETTES, CHEWING TOBACCO, FOOD, OR MAKE-UP.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO THE POWDER OR DUST MAY RESULT IN DERMATITIS. SYSTEMIC TOXICITY MAY DEVELOP IF LEAD IS TRANFERRED TO THE MOUTH BY CIGARETTES, CHEWING TOBACCO, FOOD, OR MAKE-UP.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMDEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMUUNTS OF WATER (APPROXIMATELY 15-20 MINUTES) UNTIL NO EVIDENCE OF CHEMICAL REMAINS.

EYE CONTACT:

ACUTE EXPOSURE- LEAD DUST OR POWDERS MAY BE IRRITATING. METALLIC LEAD PARTICLES MAY CAUSE AN INFLAMMATORY FOREIGN BODY REACTION AND INJURY IS GENERALLY THOUGHT TO BE MECHANICAL AND NOT TOXIC.

CHRONIC EXPOSURE- PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION.

INGESTION:
NEUROTOXIN.
ACUTE EXPOSURE- INGESTION OF LEAD MAY PRODUCE HEADACHE, NAUSEA, VPMITING, CONSTIPATION, ABDOMINAL SPASMS, METALLIC TASTE IN MOUTH, BLACK STOOLS, EXCESSIVE URINATION, HYPOTENSION, COLLAPSE AND COMA.

FIRST AID- DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL ATTENTION.

REACTIVITY

REACTIVITY:
REACTS WITH STRONG OXIDIZERS, HYDROGEN PEROXIDE, CHLORINE TRIFLUORIDE AND ACTIVE METALS. THE FINELY DIVIDED LEAD PRODUCED BY REDUCTION OF OXIDE WITH FURFURAL VAPOR AT 290 C IS PYROPHORIC AND CHEMICALLY REACTIVE, THIS IS ASCRIBED TO OXIDE FORMATION ON EXPOSURE TO AIR. UPON SOLDERING, MELTING AND LEAD COATING LEAD FUME IS FORMED WHICH CAN BE INHALED.

INCOMPATIBILITIES:
LEAD:
AMMONIUM NITRATE: EXPLOSIVE REACTION.
CHLORINE TRIFLUORIDE: VIOLENT REACTION.
DISODIUM ACETYLIDE: TRITURATION IN MORTAR MAY BE VIOLENT AND LIBERATE CARBON.
HYDROGEN PEROXIDE, 60% TRIOXANE SOLUTION: SPONTANEOUSLY DETONABLE.
NITRIC ACID: LEAD-CONTAINING RUBBER MAY IGNITE.
SODIUM AZIDE: FORMS LEAD AZIDE IN COPPER PIPE.
SODIUM CARBIDE: VIGOROUS REACTION.
SULFURIC ACID (HOT): REACTS.
ZIRCONIUM-LEAD ALLOYS: IGNITION ON IMPACT.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS ARE TOXIC OXIDES OF LEAD.

POLYMERIZATION:
NONE KNOWN.

****

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY.

****

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

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PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
0.5 MG(PB)/M3- HIGH-EFICIENCY PARTICULATE RESPIRATOR.

2.5 MG(PB)/M3- HIGH-EFFICIENCY PARTICULATE RESPIRATOR WITH A FULL FACEPIECE.

50 MG(PB)/M3- TYPE 'C' SUPPLIED-AIR RESPIRATOR OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE OR CONTINUOUS-FLOW MODE.

100 MG(PB)/M3- TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS FLOW MODE.

FIFIREFIGHTING- SELF CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 02/08/85 REVISION DATE: 09/27/85

-ADDITIONAL INFORMATION-

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

Oakite® MATERIAL SAFETY DATA SHEET

PRODUCT CODE: 4583
LOW HEAT CLEANER 3
75-D-1

HMIS 3 0 0 F

SECTION I - PRODUCT IDENTIFICATION

T ADE NAME	LOW HEAT CLEANER 3	EMERGENCY TELEPHONE NUMBER:
CHEMICAL NAME AND SYNONYMS	NA-Mixture	(800) 424-9300 (CHEMTREC)
M NUFACTURER'S NAME A D TELEPHONE NO.	OAKITE PRODUCTS INC. (908) 464-6900 (8am-5pm)	
ADDRESS	50 Valley Road Berkeley Heights NJ 07922	
D TE OF PREPARATION	10-01-93	

SECTION II - HAZARDOUS INGREDIENTS

	CAS NO.	% BY WT	ACGIH TLV (TWA)	OSHA PEL (TWA)	UNITS
P tassium hydoxide -(ceiling)	0001310583	20-30	2	NE	mg/m^3
Sodium hydroxide -(ceiling)	0001310732	<5	2	2	mg/m^3
Ethydride surfactant	Trademark	<5	NE	NE	
N n-hazardous ingredients		Bal.			

Unidentified ingredients are considered not hazardous under Federal Hazard C mmunication Standard (29 CFR 1910.1200).

All component of this material are on the US TSCA Inventory.

CARCINOGENICITY: No substance in this product is listed by IARC, NTP, or regulated by OSHA as a carcinogen.

SECTION III - PHYSICAL DATA

BOILING POINT (F)	>212	SPECIFIC GRAVITY (H20=1)	1.34
VAPOR PRESSURE (mm Hg)	<18	Bulk Density	11.2 lbs/gal
V POR DENSITY (Air=1)	<1	PERCENT VOLATILE BY WEIGHT(%) Excludes H2O	0
SOLUBILITY IN WATER	Complete	PH	
EVAPORATION RATE (Water=1)	1		

* - Not Applicable NE - Not Established

Oakite® MATERIAL SAFETY DATA SHEET

PPEARANCE AND ODOR Brown liquid; sweet odor. Concentrate

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

LASH POINT (Method Used): NONE
LAMMABLE LIMITS: LEL: NA UEL: NA

XTINGUISHING MEDIA: Use media suitable for surrounding materials.

PECIAL FIRE FIGHTING PROCEDURES: Wear Self-Contained Breathing Apparatus (SCBA).

JNUSUAL FIRE AND EXPLOSION HAZARDS: See Section VII.(WHMIS) See Section VI.(U.S.)

SECTION V - HEALTH HAZARD INFORMATION

ROUTE(S) OF ENTRY:	INHALATION:	SKIN:	INGESTION:
	X	X	X

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known.

SYMPTOMS/EFFECTS OF OVEREXPOSURE:
Inhalation of mist may cause respiratory irritation with coughing, sneezing, salivation and difficult breathing. Severe exposures may lead to chemical pneumonitis. Severe skin burns. Eye contact causes severe or permanent damage.

FIRST AID

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes while holding eyelids open. Get prompt medical attention.

SKIN: Immediately remove contaminated clothing. Wash skin with large amounts of water for at least 15 minutes. Get prompt medical attention.

INGESTION: Contact local poison control center or physician IMMEDIATELY!

INHALATION: Move victim to fresh air and restore breathing if necessary. Stay with victim until emergency medical help arrives.

SECTION VI - REACTIVITY DATA

NE - Not Established

NA - Not Applicable

Oakite® MATERIAL SAFETY DATA SHEET

STABILITY: NORMALLY STABLE
COMPATIBLE MATERIALS: Acids. Contact with certain metals may yield explosive hydrogen gas.
HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen.

SECTION VII - SPILL OR LEAK PROCEDURES

PROCEDURES: Wear personal protective equipment (See Section VIII). Neutralize using a weak acid. Clean up with absorbant material.

WASTE DISPOSAL METHOD: Dispose of in accordance with Local State and Federal regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY: If TLV is exceeded, or for symptoms of overexposure, wear a NIOSH-approved dust/mist respirator.

EYEWEAR: If splash potential exists wear chemical splash goggles or faceshield.

CLOTHING/GLOVES: If potential for skin contact exists, wear neoprene or other chemical resistant gloves and apron or coveralls and/or foot coverings, as needed.

VENTILATION: Local exhaust may be necessary for some handling/use conditions. Specific needs should be addressed by supervisory or health/safety personnel.

SECTION IX - SPECIAL PRECAUTIONS

CORROSIVE. Store in closed container in well-ventilated area. NOTE: IF DILUTING (OR DISSOLVING) ALWAYS ADD THIS PRODUCT TO WATER SLOWLY AND WITH CONSTANT STIRRING.

SHIPPING DESCRIPTION; Compounds, Cleaning Liquid, 8, (potassium hydroxide, sodium hydroxide), NA1760. Corrosive, II.

APPROVAL: Michael Chang Mgr.Health & Environmental Dept. 03/01/1994

NAME	TITLE	DATE OF PRINTING

NA - Not Applicable NE - Not Established

Oakite® MATERIAL SAFETY DATA SHEET

Oakite Products, Inc. warrants that the product or products described herein will conform with its published specifications. The products supplied by Oakite and information related to them are intended for use by buyers having necessary industrial skill and knowledge. Buyers should undertake sufficient verification and testing to determine the suitable of the Oakite materials for their own particular purpose. Since buyer's conditions of use of products are beyond Oakite's control, Oakite does not warrant any reconmmendations and information for the use of such products. OAKITE DISCLAIMS ALL OTHER WARRANTIES INCLUDING THE IMPLEID WARRANTY OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE IN CONNECTION WITH USE OF ITS PRODUCTS.

MATERIAL SAFETY DATA SHEET

(60)

PRODUCT NAME: METAL CLEANER 373

MSDS No.: 13097
REVISION: 2

PREPARED BY: TSCA COORDINATOR ISSUE DATE:04/01/85 REVISION DATE: 10/18/91

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

38521 SCHOOLCRAFT AVE.
LIVONIA MI 48150
TELEPHONE: 313-872-1800

CHEMTREC:
TELEPHONE #:800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: SODIUM HYDROXIDE

CAS NUMBER:1310-73-2 20.0 - 25.0%
EXPOSURE LIMIT: TWA:2mg/CU METER--CEILING
SUSPECT CARCINOGEN: NO

INGREDIENT: SODIUM SILICATE

CAS NUMBER:6834-92-0 20.0 - 25.0%
EXPOSURE LIMIT: TWA:15mg/CU METER NUISANCE DUST
SUSPECT CARCINOGEN: NO

SECTION C. PHYSICAL DATA.

APPEARANCE: WHITE POWDER
ODOR: MUSTY

SPECIFIC GRAVITY: NA
pH: NA

EVAPORATION RATE: NA

BOILING POINT: NA
FREEZING POINT: NA

VAPOR PRESSURE: NA
VAPOR DENSITY: NA
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: COMPLETE

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	3	3
FLAMMABILITY:	0	0
REACTIVITY:	1	1
SPECIAL:		

PRODUCT NAME: METAL CLEANER 373 MSDS No.: 13097
REVISION: 2
KEPARED BY: TSCA COORDINATOR ISSUE DATE:04/01/85 REVISION DATE: 10/18/91

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: SELF CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR SHOUD BE WORN.

UNUSUAL FIRE OR EXPLOSION HAZARDS: CAN MELT AND FLOW IN A FIRE.CAN REACT VIOLENTLY WITH WATER.ALUMINUM REACTION CAN GIVE FLAMMABLE GAS.

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID: NA

CHEMICAL INCOMPATIBILITIES: STRONG ACIDS. METALS SUCH AS ALUMINUM,TIN,ZINC.

HAZARDOUS DECOMPOSITION PRODUCTS: NONE KNOWN.

SECTION F. HEALTH HAZARD DATA.

SUMMARY OF RISKS: SARA--ACUTE

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: DERMATITIS AND RESPIRATORY AILMENTS.

TARGET ORGANS: SKIN,EYES,LUNGS,RESPIRATORY TRACT.

PRIMARY ENTRY ROUTES: THROUGH CONTACT AND INHALATION OF DUST.

ACUTE EFFECTS: "BURNING" OF SKIN OR EYES. VERY CORROSIVE.

CHRONIC EFFECTS: NONE KNOWN.

SIGNS & SYMPTOMS OF OVEREXPOSURE:
EYE CONTACT: BURNING SENSATION.

SKIN CONTACT: BURNING SENSATION.

INHALATION: IRRITATION,BURNING OF MUCOUS MEMBRANES.

INGESTION: BURNING OF MOUTH AND THROAT.

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PRODUCT NAME: METAL CLEANER 373 MSDS No.: 13097
REVISION: 2
.EPARED BY: TSCA COORDINATOR ISSUE DATE:04/01/85 REVISION DATE: 10/18/91

ERGENCY & FIRST AID PROCEDURES:

EYE CONTACT: FLUSH WITH WATER FOR AT LEAST 15 MINUTES AND CONTINUE UNTIL MEDICAL ATTENTION IS OBTAINED.

SKIN CONTACT: FLUSH WITH WATER FOR 15 MINUTES. GET MEDICAL ATTENTION.

INHALATION: REMOVE TO FRESH AIR.

INGESTION: IF CONSCIOUS, GIVE PLENTY OF MILK OR WATER. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: SHOVEL INTO SUITABLE CONTAINERS. FLUSH AREA WITH WATER. NEUTRALIZE FINAL TRACES WITH A DILUTE ACID SUCH AS ACETIC.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: IF ALLOWED SEND TO A SANITARY LANDFILL. OTHERWISE DISSOLVE IN WATER AND ADJUST pH TO WITHIN POTW DISCHARGE LIMITS AND SEWER. FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:

GOGGLES: CHEMICAL GOGGLES. FACE SHIELD.

GLOVES: RUBBER.

RESPIRATOR: IF CEILING IS EXCEEDED, MUST BE NIOSH OR MSHA APPROVED.

OTHER: IMPERVIOUS CLOTHING SUFFICIENT TO PREVENT SKIN CONTACT.

PRODUCT NAME: METAL CLEANER 373

MSDS No.: 13097
REVISION: 2

PREPARED BY: TSCA COORDINATOR ISSUE DATE:04/01/85 REVISION DATE: 10/18/91

WORKPLACE CONSIDERATIONS:

VENTILATION: SUFFICIENT TO KEEP BELOW CEILING LIMITS.
SAFETY STATIONS: EYE WASH.
OTHER: SAFETY SHOWER.

SECTION I. SPECIAL PRECAUTIONS.

SPECIAL HANDLING & STORAGE PROCEDURES: STORE IN A DRY AREA AWAY FROM ACIDS AND AMPHOTERIC METALS SUCH AS ALUMINUM. ADD SLOWLY TO WATER TO PREVENT BOILING AND SPLATTERING.

D.O.T. CLASS: 8.0 UN REGISTER: UN-1759
IMCO CLASS: 8.0 UN REGISTER: UN-1759

EXPLANATION OF SYMBOLS
NA = NOT APPLICABLE UK = UNKNOWN

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION, AND INVESTIGATION. WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, McGEAN-ROHCO, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

THIS MATERIAL SAFETY DATA SHEET HAS BEEN PREPARED TO COMPLY WITH TITLE 29 CODE OF FEDERAL REGULATIONS, PART 1910.1200, OSHA HAZARD COMMUNICATION STANDARD, AND TO FULFILL THE ANNUAL CHEMICAL NOTIFICATION REQUIREMENTS OF SARA TITLE III, SECTION 313.

MATERIAL SAFETY DATA SHEET
(29 CFR PART 1910.1200-HAZARD COMMUNICATION)

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SECTION 1 - IDENTIFICATION

PRODUCT/TRADE NAME: Muriate of potash
SYNONYMS/CAS MANT: POTASSIUM CHLORIDE
CAS NO.: 7447-40-7
RECOMMENDED USE: FERTILIZER BLEND

MANUFACTURER/DISTRIBUTOR: KALIUM CHEMICALS
ADDRESS: 1200 - 1801 Hamilton Street
Regina, Saskatchewan S4P 4B5
EMERGENCY TEL. NO.: (306) 566-8400

SECTION 2: - HAZARDOUS INGREDIENTS

HAZARDOUS CHEMICAL	CAS NO.	% BY WT.	ACGIH TLV	LISTED BY RTECS AS CARCINOGEN
N/A				

RECEIVED
DATE 2/3/86
INITIALS

INFORMATION IN SECTION 2 HAS BEEN EXCLUDED DUE TO TRADE SECRETS: YES: __ NO: X

SECTION 3 - PHYSICAL DATA

LIQUID: ( ) GAS: ( ) SOLID: (X) EVAPORATION RATE: N/A
VAPOR PRESSURE: N/A SOLUBILITY IN WATER: (36%) - 276 gpl 0°C BOILING PT: MP-790°C
% VOLATILE BY WT: N/A S.G./APPARENT DENSITY: 1.988 VAPOR DENSITY (AIR-1): N/A
pH: N/A APPEARANCE & ODOR: White crystalline or granulated solid - no odor

SECTION 4 - FIRE, HAZARDS & REACTIVITY DATA

FLASH POINT: N/A FLAMMABLE LIMITS: LEL: N/A UEL: N/A
INCOMPATIBILITY: Avoid contact with hot Nitric Acid
HAZARDOUS POLYMERIZATION: (N/A) CORROSIVE: (N/A) STABLE: (X) UNSTABLE: (N/A)
THERMAL DECOMPOSITION PRODUCTS: N/A

EXTINGUISHING MEDIA: N/A

SPECIAL FIREFIGHTING PROCEDURES: N/A

UNUSUAL FIRE & EXPLOSION HAZARDS: N/A

N/A - Not Applicable
N/K - Information Unknown

PRODUCT: MURIATE OF POTASH

SECTION 5 - HEALTH HAZARDS DATA

SIGNS/SYMPTOMS/EFFECTS OF OVEREXPOSURE: DUST IRRITATING TO MUCOUS MEMBRANES

PROBABLE ROUTES OF EXPOSURE: INHALATION: (N/A) SKIN: (X) EYES: (X) INGESTION: (N/A)

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: N/A

SKIN: WASH WITH WATER

EYES: WASH WITH WATER FOR 15 MINUTES. CONSULT A PHYSICIAN.

INGESTION: N/A

TOXICITY DATA: LC50: N/K

LD50: 2,430 mg/kg, rat, oral

SECTION 6 - SPILL OR LEAK PROCEDURES

SPILLS/LEAKS: SWEEP UP DRY AND PLACE IN SUITABLE CONTAINER. WASH AREA WITH WATER.

WASTE DISPOSAL: SANITARY LAND FILL. DISPOSE IN COMPLIANCE WITH LOCAL REGULATIONS

SECTION 7 - SPECIAL PROTECTION

RESPIRATORY PROTECTION: DUST MASK RECOMMENDED

VENTILATION: LOCAL EXHAUST: (N/A) MECHANICAL (GENERAL): (N/A)

SPECIAL: (N/A) OTHER: (N/A)

GLOVES: ANY TYPE EYE PROTECTION: SAFETY GLASSES

OTHER CLOTHING: N/A

SECTION 8 - SPECIAL PRECAUTIONS

HANDLING & STORING: N/A

OTHER PRECAUTIONS: N/A

N/A - Not Applicable
N/K - Information Unknown

PREPARED BY: DAVID A. ZIRK
TITLE: CHIEF CHEMIST
DATE: March 1985

OXY.

Occidental Chemical Corporation
Industrial & Specialty Chemicals Division

(62)

MSDS 57(

MATERIAL SAFETY DATA SHEET

Product Information

Product Name
MURIATIC ACID (HYDROCHLORIC ACID)

CAS Registry Number
7647-01-0

Common Name or Synonym
Hydrogen chloride solution
Muriatic acid
Chlorohydric acid

Chemical Family
Inorganic acid

RECEIVED
DATE 11-25-85
INITIALS

Chemical Name
Hydrochloric acid

Chemical Formula
HCl

Health Data

WARNING! CORROSIVE AT CONCENTRATIONS ABOVE 15%.

First Aid Measures

Eye Contact: Immediately flush eyes with a directed stream of water for at least 15 minutes. Forcibly hold eyelids apart to ensure complete irrigation of all eye and lid tissue. GET IMMEDIATE MEDICAL ATTENTION. Contact lenses should not be worn when working with this chemical.

Skin Contact: Immediately flush contaminated skin with water and wash with soap and water. If large areas of the body are contaminated or if clothing is penetrated, immediately use safety shower preferably removing clothing while under the shower. Flush exposed areas with large amounts of water for at least 15 minutes. GET PROMPT MEDICAL ATTENTION. Wash clothing before reuse.

Ingestion: If person is conscious immmediately administer large quantitites of water. Do not induce vomiting. Avoid having an unconscious person vomit. GET IMMEDIATE MEDICAL ATTENTION.

Inhalation: Move the exposed person to fresh air at once. If breathing has stopped perform artificial respiration. Keep the affected person warm and at rest. GET MEDICAL ATTENTION AS SOON AS POSSIBLE.

Effects of Overexposure: Hydrochloric acid will produce irritation and burns of the skin and mucous membranes, the severity being determined by the concentration of the solution and duration of exposure. Contact with the eyes may cause severe burns. Unless removed quickly by thorough irrigation with water, prolonged or permanent visual impairment or loss of sight may result.

Vapors have an irritating effect on the respiratory tract causing coughing, burning of throat, choking sensation, bronchitis and pulmonary edema. Ingestion of concentrated hydrochloric acid causes severe burns of the mouth, esophagus and stomach.

Toxicity: Corrosivity (rabbit):
0.01%-15% Concentration: Noncorrosive
>15% Concentration: Corrosive

Acute Oral Toxicity:
LD_{50} (rabbit): 900 mg/Kg

Acute Inhalation Toxicity
LC_{50} (rat, one hour): 3124 ppm

Emergency Telephone Number Available 24 Hrs./Day 1-716/278-7021

MATERIAL SAFETY DATA SHEET

Fire and Explosion Hazard Data

Flash Point: Nonflammable

Extinguishing Media: Use water spray, fog, foam, dry chemicals, CO_2 or other agents as appropriate for surrounding fire.

Special Fire Fighting Procedure & Personal Protection: Use self-contained breathing apparatus and full protective equipment.

Unusual Fire and Explosion Hazards: Reacts with active metals (potassium, sodium, calcium, powdered aluminum, zinc, magnesium) to produce flammable hydrogen.

Special Protection

Ventilation: Provide good general room ventilation to minimize exposure. Use local exhaust ventilation at points of vapor emission.

Respiratory: Use NIOSH/MSHA approved organic vapor acid-gas respirator for areas where airborne exposure is excessive.

Gloves: Wear protective gloves, such as rubber or neoprene, to minimize skin contact. Wash thoroughly after handling.

Eye Protection: Wear safety glasses with side shields or chemical goggles.

Other Protective Equipment: Eye wash facility should be in close proximity. Use of rubberized coveralls, rubber shoes and an emergency shower availability are suggested.

Physical Data

Boiling Point
20°Be'-80°C
22°Be'-55°C

Specific Gravity (H_2O=1)
20°Be' - 1.16 (9.67 lbs/gal)
22°Be' - 1.18 (9.83 lbs/gal)

Solubility In Water
Complete

pH
1.0

Appearance and Color
Clear, colorless to pale yellow liquid. Pungent irritating odor.

Melting Point
20°Be': −53°C (−63.4°F)
22°Be': −66°C (−86.3°F)

MATERIAL SAFETY DATA SHEET

Regulatory Status Continued

Muriatic acid is contained on a composite list as required under §101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) usually referred to as Superfund. The list includes substances designated pursuant to §3001 of the Solid Waste Disposal Act (RCRA), toxic pollutants under §307 of the Clean Water Act, hazardous air pollutants under §112 of the Clean Air Act, imminently hazardous chemicals determined under §7 of TSCA and substances designated pursuant to §102 of CERCLA.

Muriatic acid is designated a hazardous substance by 29 CFR §1910, Subpart Z, Toxic and Hazardous Substances, OSHA.

Muriatic acid is designated a hazardous substance by American Conference of Governmental Industrial Hygienists.

OSHA Standard 29 CFR §1910.1200 Hazard Communication requires that information be provided to employees concerning hazardous chemicals by means of a hazard communication program including container labels, Material Safety Data Sheet literature, training and access to written records.

Muriatic acid is a Generally Recognized As Safe (GRAS) substance and as such certified food grade material can be used as a food additive as exempted by the Food, Drug and Cosmetic Act (21 CFR § 582.

Information contained in this section is provided as a service and while based on generally available resources and information should not be considered to be an all-inclusive regulatory bibliography of the product, particularly regarding non-federal laws and regulations. Users are advised to check with state and local authorities concerning any applicable regulations regarding transportation, handling, use or disposal of this product.

Additional Information

See OCC Product Data Sheet 720 and 103 for product specifications, packaging and other information.

See OCC Bulletin 152 "Handling Rubber Line Tank Cars" and Bulletin 156 "Tank Car Loading and Unloading Platforms" for additional information on handling.

Muriatic acid is listed in the TSCA Chemical Substances Inventory under CAS No. 7647-01-0.

Hazard ratings for Muriatic acid according to the Hazardous Materials Identifications System (HMIS) developed by the National Paint and Coatings Association are:

Health, 3	Flammability, 0;
Reactivity, 1;	Personal Protection, G.

For additional non-emergency information, contact Technical Service, Occidental Chemical Corporation, Industrial & Specialty Chemicals Division, 716/286-3000.

☐ New ☒ Revised Date June 1985

OXY

Occidental Chemical Corporation
Industrial & Specialty Chemicals Division
Occidental Chemical Center, 360 Rainbow Boulevard South
Box 728, Niagara Falls, New York 14302 716/286-3000

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Muriatic Acid

MSDS 57C

MATERIAL SAFETY DATA SHEET

Ingredients

	Percent	Threshold Limit Values
HCl		The American Conference of Governmental Industrial Hygienists (ACGIH) has established a Ceiling Limit of 5 ppm (7 mg/m³) for HCl.
20°Be'	31.4	
22°Be'	35.2	
Water	64.8-68.6	None established.

Hazardous Reactivity

Incompatibility: Contact with most metals will produce flammable hydrogen. Mixing with strong oxidizers can produce poisonous chlorine gas. Reacts exothermically with alkalies and active metals.

Hazardous Decomposition Products: Flammable hydrogen gas can be produced by the reaction with most metals. Chlorine gas will be released by mixing with strong oxidizers.

Conditions To Avoid: Avoid contact with metals and strong oxidizers.

Handling and Storage

Precautions: Store in a cool, dry, well-ventilated area away from heat and oxidizing agents. Use equipment designed for acid service for handling and storage.

Environmental Protection

Procedure In Case Of Spill Or Release: Get protective equipment. Contain spill and pump into marked containers for reclamation or disposal. For small spills, neutralize with soda ash or dilute caustic soda solution and flush to a sewer system in accordance with regulatory permit requirements. If possible, clean up spill area on a dry basis and then flush with plenty of water.

Waste Disposal Method: Dispose of spilled or waste product, contaminated soil and other contaminated materials in licensed landfill or treatment facility in accordance with all local, state and federal regulations.

Regulatory Status

§311 of the Clean Water Act lists Muriatic acid as a hazardous substance which, if discharged into or upon water, may require immediate response to mitigate danger to public health and welfare. The Act specifies procedures to be followed in the event of accidental spillage as well as civil penalties and fines to be levied. Spills of Muriatic acid of 5,000 or more pounds must be reported to the National Response Center, 1-800-424-8802.

The shipment of Muriatic acid is regulated by the U.S. Department of Transportation. It is classified as a Corrosive Material, requires a Corrosive DOT label and is assigned UN 1789 as an international identification number (49 CFR § 172.101).

McGean-Rohco, Inc.

1250 Terminal Tower, Cleveland, Ohio 44113. 216/621-6425

MATERIAL SAFETY DATA SHEET

Product Name:	BASIC NICKEL CARBONATE #40120-40122		Emergency Phone No.: 216/441-4900
Plant Address:	2910 Harvard Avenue - Cleveland, Ohio 44109		Chemtrec Phone No. 800/424-9300
Prepared By:	TSCA Coordinator	Issue Date: 3/25/77	Revised Date: #3 March, 1985

INGREDIENTS AND HAZARDOUS COMPONENTS

Material	%	TLV	C.A.S. #	Suspect Carcinogen
Basic Nickel Carbonate	100	NA	12607-70-4	X

PHYSICAL DATA

Boiling Point: NA	Freezing Point: NA	Specific Gravity: 2.6	pH: NA
Vapor Pressure at 20° C: NA	Vapor Density (Air = 1): NA	% Volatiles by Volume: NA	Odor: None
Evaporation Rate (Butyl Acetate = 1) NA		Solubility in Water: Insoluble	
Appearance and Form: Green powder			

FIRE AND EXPLOSION HAZARD DATA

Flash Point: NA	Flammable Limits in Air: % By Volume Upper: NA Lower:
Test Method: NA	
Extinguishing Media: NA	RECEIVED
Special Fire Fighting Procedures: NA	DATE 11-21-85 INITIALS
Unusual Fire and Explosion Hazards: None	
DOT Classification: NA	Note: UK = Unknown NA = Not Applicable

HEALTH HAZARD DATA

Exposure and Primary Entries to Body: Primary Entry - Inhalation of Dust.

May irritate skin or eyes. Can cause "nickel itch" in sensitive persons.

ergency and First Aid Procedures: Wash skin thoroughly with soap and water. Flush eyes with water for at least 15 minutes while holding eyelids apart to insure complete water contact. If any irritation persists, see a physician.

REACTIVITY DATA

Stable ☐ Unstable Conditions to Avoid:

ompatability — Materials to Avoid: Acids will decompose the carbonate.

zardous Decomposition Products: None known.

zardous Polymerization: ☐ May Occur ☒ Will Not Occur

SPILL OR LEAK PROCEDURES

ls: Collect in the most convenient and safe manner for reclamation or disposal.

ste Disposal Methods:

May be disposed of in sealed containers in an EPA-Approved, secured landfill.

Dispose must comply with Local, State, and Federal Disposal Regulations.

SPECIAL PROTECTION INFORMATION

pirator: If necessary, use only those approved by Mine Safety and Health Administration of NIOSH. NIOSH Publication No. 80-144.

tilation: Normal mechanical OK.

ves:	Eye and Face:	Other:
Rubber	Chemical Goggles	Nor normally required

dling and Storage: Keep tightly closed.

Avoid dusting.

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION.

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(66)

ALLOYCHEM, INC.
641 Lexington Avenue
NEW YORK, NEW YORK 10022.
(212) 644-1510

Material Safety Data Sheet

(Approved by U.S. Department of Labor Essentially Similar to Form LSBS-00S-4) 7-83
(supercedes 7-79)

CHEMICAL NAME: Nickel Chloride

SYNONYMS: N/A

CHEMICAL FAMILY: Nickel Salt

FORMULA: $NiCl_2 \cdot 6H_2O$

CODE:

TRADENAME AND SYNONYMS:

I. INGREDIENTS

MATERIAL	CAS No.	%	TLV (Units)
nickel chloride	7718-54-9	>99	-Ni 0.1 mg/M^3

RECEIVED
DATE 1/5/86
INITIALS

II. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	melts at 1001°C	FREEZING POINT	N/A
SPECIFIC GRAVITY (H_2O = 1)	3.55	VAPOR PRESSURE at 20°C.	N/A
VAPOR DENSITY (air = 1)	N/A	SOLUBILITY IN WATER, % by wt. at 20°C.	complete
PER CENT VOLATILES BY VOLUME	none	EVAPORATION RATE (Butyl Acetate = 1)	N/A
APPEARANCE AND ODOR	green crystals odorless	MOLECULAR WEIGHT	237.55

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	N/A	AUTOIGNITION TEMPERATURE	N/A		
FLAMMABLE LIMITS IN AIR, % by volume		LOWER	N/A	UPPER	N/A

EXTINGUISHING MEDIA	XX Water Spray; XX Carbon Dioxide; ☐ Other Material itself is considered non-flammable.; ☐ Foam; ☐ Dry Chemical
SPECIAL FIRE FIGHTING PROCEDURES	XX Avoid Eye and Skin Contact; XX Do Not Breathe Fumes; XX Other Avoid particle inhalation.
UNUSUAL FIRE AND EXPLOSION HAZARDS	Irritating fumes may develop when product is heated.

IV. HEALTH HAZARD DATA

RECOMMENDED EXPOSURE LIMIT	Use 0.1 mg/M^3 for nickel compounds, ACGIH standard.
EFFECTS OF OVEREXPOSURE	Contact with eyes and skin may cause irritation or allergic reaction. Particle inhalation may be irritating to respiratory tract.
In case of eye contact, GET MEDICAL ATTENTION! EMERGENCY AND FIRST AID PROCEDURES	Flush with flowing water at least 15 minutes. Skin- Flush with flowing water for 15 minutes, then wash area with mild soap and water. Call a physician. Inhalation- Move exposed individual to fresh air. Call a physician. Never give fluids or induce vomiting if patient is unconscious or having convulsions

V. REACTIVITY DATA

STABILITY			
UNSTABLE	STABLE	CONDITIONS TO AVOID	Keep container tightly closed; material tends to pick up moisture from the air.
	X		

INCOMPATIBILITY (Materials to avoid) N/A	☐ Water ☐ Acids ☐ Bases ☐ Oxidizers ☐ Reducers ☐ Other
HAZARDOUS DECOMPOSITION PRODUCTS	N/A

HAZARDOUS POLYMERIZATION			
May Occur	Will Not Occur	CONDITIONS TO AVOID	N/A
	X		

VI. SPILL OR LEAK PROCEDURES

ENVIRONMENTAL IMPACT IF RELEASED OR SPILLED	May be hazardous to aquatic life if released to open waters.
CORRECTIVE ACTION TO BE TAKEN	Carefully sweep up material and place in a suitable container for disposal. Avoid creating a dusty atmosphere.
WASTE DISPOSAL METHOD	Dispose of material as solid waste in a closed container. Follow All Chemical Pollution Control Regulations.

VII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)	☐ Not normally required	☒ Other Use NIOSH approved air-supplied or high efficiency dust respirator.	
VENTILATION	LOCAL EXHAUST recommended	SPECIAL	
	MECHANICAL (general) Required	OTHER	
PROTECTIVE GLOVES ☒	EYE PROTECTION ☐ Not normally necessary	☒ Chemical workers goggles	☐ Other
OTHER PROTECTIVE EQUIPMENT	Eye wash & shower. Protective clothing.		

VIII. SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING No DOT label required.	Warning! May Cause Allergic Skin Reaction. Avoid Breathing Dust. Avoid prolonged or repeated contact with skin. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling. FIRST AID: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician. Immediately wash skin with soap and flush with plenty of water. Remove contaminated clothing and launder before re-use.
PRECAUTIONS	Keep from freezing. Industrial Use Only. Read Technical Data Bulletin about this product prior to use.
HANDLING AND STORAGE CONDITIONS	Normal warehouse handling and storage in a cool, dry area.

PRODUCT NAME: ROHCO NICKEL PURIFIER MSDS No.: 11530
REVISION: 1
PREPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/90 EFFECTIVE DATE: 05/01/97

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID: NA

CHEMICAL INCOMPATIBILITIES: NONE KNOWN

HAZARDOUS DECOMPOSITION PRODUCTS: NONE KNOWN

SECTION F. HEALTH HAZARD DATA.

SUMMARY OF RISKS: SARA-NA

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: NONE KNOWN

TARGET ORGANS: SKIN, EYES

PRIMARY ENTRY ROUTES: THROUGH CONTACT

ACUTE EFFECTS: WHILE THERE IS NO DATA TO SHOW ANY HARMFUL EFFECTS IT IS POSSIBLE THAT IRRITATION OF SKIN OR EYES OF OF PARTICULARY SENSITIVE INDIVIDUALS COULD OCCUR.

CHRONIC EFFECTS: NONE KNOWN

SIGNS & SYMPTOMS OF OVEREXPOSURE:

EYE CONTACT: POSSIBLE IRRITATION.

SKIN CONTACT: POSSIBLE SLIGHT IRRITATION ON EXTENDED CONTACT.

INHALATION: NONE EXPECTED.

INGESTION: EFFECTS UNKNOWN.
NOT CONSIDERED TOXIC.

McGEAN-ROHCO, INC.
MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ROHCO NICKEL PURIFIER

MSDS No.: 11530
REVISION: 1

PREPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/90 EFFECTIVE DATE: 05/01/97

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

CHEMTREC:
TELEPHONE #: 800-424-9300

2910 HARVARD AVE.
CLEVELAND OH 44105
TELEPHONE: 216-441-4900

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: CONTAINS NOTHING CONSIDERED HAZARDOUS BY STATE OR FEDERAL REGULATIONS.
CAS NUMBER: NA
EXPOSURE LIMIT: TWA: NA
SUSPECT CARCINOGEN: NO

SECTION C. PHYSICAL DATA.

APPEARANCE: LIGHT YELLOW LIQUID
ODOR: NONE
SPECIFIC GRAVITY: 1.03
pH: 4-5

EVAPORATION RATE: <BUTYL ACETATE

BOILING POINT: 100C
FREEZING POINT: UK
VAPOR PRESSURE: AS WATER
VAPOR DENSITY: AS WATER
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: 100%

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	0	0
FLAMMABILITY:	0	0
REACTIVITY:	0	0
SPECIAL:		

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: NONE

UNUSUAL FIRE OR EXPLOSION HAZARDS: NONE

PRODUCT NAME: ROHCO NICKEL PURIFIER
MSDS No.: 11530
REVISION: 1
PREPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/90 EFFECTIVE DATE: 05/01/97

EMERGENCY & FIRST AID PROCEDURES:
EYE CONTACT: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. IF ANY IRRITATION PERSISTS, SEE A PHYSCIAN.

SKIN CONTACT: WASH WITH SOAP AND WATER.

INHALATION: NA

INGESTION: IF CONSCIOUS, GIVE SEVERAL GLASSES OF WATER AND INDUCE VOMITING. GET MEDICAL ATTENTION.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: FLUSH SPILL AREA WITH WATER.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: FLUSH WITH WATER TO SEWER. FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): NONE

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:
GOGGLES: CHEMICAL GOGGLES.
GLOVES: RUBBER.
RESPIRATOR: NOT REQUIRED.

OTHER: SUFFICIENT TO PREVENT SKIN CONTACT.

PRODUCT NAME: ROHCO NICKEL PURIFIER MSDS No.: 11530
REVISION: 1
PREPARED BY: TSCA COORDINATOR ISSUE DATE:09/01/90 EFFECTIVE DATE: 05/01/97

WORKPLACE CONSIDERATIONS:
VENTILATION: NORMAL.
SAFETY STATIONS: EYE WASH.
OTHER:

SECTION I. SPECIAL PRECAUTIONS.

SPECIAL HANDLING & STORAGE PROCEDURES: NORMAL HANDLING AND STORAGE.

D.O.T. CLASS: NONE UN REGISTER: NONE
IMCO CLASS: NONE UN REGISTER: NONE

EXPLANATION OF SYMBOLS
NA = NOT APPLICABLE UK = UNKNOWN

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION, AND INVESTIGATION. WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, McGEAN-ROHCO, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

THIS MATERIAL SAFETY DATA SHEET HAS BEEN PREPARED TO COMPLY WITH TITLE 29 CODE OF FEDERAL REGULATIONS, PART 1910.1200, OSHA HAZARD COMMUNICATION STANDARD, AND TO FULFILL THE ANNUAL CHEMICAL NOTIFICATION REQUIREMENTS OF SARA TITLE III, SECTION 313.

Occupational Safety and Health Administration

OMB No. 44-R1387

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MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

CAS NO. 7786-81-84

SECTION I

MANUFACTURER'S NAME: ALLOYCHEM, INC.	EMERGENCY TELEPHONE NO.: (212) 644-1510
ADDRESS (Number, Street, City, State, and ZIP Code): 641 Lexington Avenue, New York, N.Y. 10022	
CHEMICAL NAME AND SYNONYMS: NICKEL SULFATE HEXAHYDRATE	TRADE NAME AND SYNONYMS:
CHEMICAL FAMILY: Single Nickel Salts	FORMULA: NiSO(4)6H(2)O

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
RECEIVED		
DATE 1/9/86		
INITIALS		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	n/applic.*	SPECIFIC GRAVITY (H_2O=1)	2.07
VAPOR PRESSURE (mm Hg.)	n/applic.	PERCENT, VOLATILE BY VOLUME (%)	n/applic.
VAPOR DENSITY (AIR=1)	n/applic.	EVAPORATION RATE (_____ =1)	n/applic.
SOLUBILITY IN WATER	62.5g/o 100cc0°C		
APPEARANCE AND ODOR	Green Crystals; odorless		*not applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA	NOT A FIRE OR EXPLOSION HAZARD		
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS			

(Continued on reverse side)

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
0.1 mg/m^3 as Ni (ACGIH, 1984)

EFFECTS OF OVEREXPOSURE
Eye contact causes irritation. Skin Contact causes irritation and sensitization or allergic reactions which may be accentuated by heat and humidity. Inhalation causes upper resp. irrita

EMERGENCY AND FIRST AID PROCEDURES
Eye and Skin contact: Immediately flush eyes with water at least 15 min. Call physician. Flush skin with water. Inhalation: Remove to fresh air. If breathing is difficult, give oxygen. Call physician.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE		none expected

INCOMPATABILITY *(Materials to avoid)*
not expected

HAZARDOUS DECOMPOSITION PRODUCTS
none expected

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR		

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
If not contaminated, scoop up for reuse. If contaminated, scoop or vacuum into container for disposal. Avoid dusting.

WASTE DISPOSAL METHOD
Dispose of in accordance with Federal, state and local laws.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*
A NIOSH/MSHA approved respirtator as necessary.

VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL *(General)*	OTHER

PROTECTIVE GLOVES	EYE PROTECTION
Gloves	Chemical Goggles

OTHER PROTECTIVE EQUIPMENT
Body protection as necessary to prevent skin contact.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Avoid breathing dust. Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling. Keep container closed.

OTHER PRECAUTIONS
Ventilation: General: local exhaust ventilation as necessary to control dust.

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MATERIAL SAFETY DATA SHEET

NITRIC ACID 42°, BE'

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME..... Haviland Products Company
ADDRESS (STREET,CITY,STATE,ZIP) 421 Ann St., N.W., Grand Rapids, MI 49504
PHONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER..... CHEMTREC (800) 424-9300
EFFECTIVE DATE..... 3/8/89
TRADE NAME..... NITRIC ACID 42°, BE'
CHEMICAL FAMILY..... Miscellaneous Blend

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	OSHA/PEL	ACGIH/TLV (Units)	PROD. CAS #
Nitric Acid* (67.18% by wt) **SEE NOTE UNDER "REFERENCES" AT END OF MSDS**	2ppm 8hr TWA	2ppm TWA	7697-37-2

SECTION III - PHYSICAL DATA

BOILING POINT..... 251.6°F (122°C)
FREEZING POINT ..... -25°F (-32°C)
VAPOR PRESSURE (mm Hg)..... 8 @ 20°C
VAPOR DENSITY (Air=1)..... >1.0
SOLUBILITY IN H2O..... Completely
APPEARANCE/ODOR..... Clear, Colorless to Light Brown Liquid; Pungent Acrid Odor
SPECIFIC GRAVITY (H2O=1)..... 1.41
PH..... Not Established

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT..... Not Flammable
LOWER EXPLOSIVE LIMIT (% by Volume) Not Applicable
UPPER EXPLOSIVE LIMIT (% by Volume) Not Applicable
EXTINGUISH MEDIA..... As for surrounding fires.
SPECIAL FIRE FIGHTING PROCEDURES... Wear self-contained positive pressure breathing apparatus and full personal protective equipment when material is involved in fire.
UNUSUAL FIRE HAZARD..... Nitric Acid is nonflammable; however it is a strong oxidizing agent and can react with combustible materials to cause fire.

MATERIAL SAFETY DATA SHEET

NITRIC ACID 42°, BE

SECTION V — HEALTH HAZARD DATA

CARCINOGENICITY..... None
NTP..... No
IARC..... No
OVER EXPOSURE EFFECTS..... Irritation and burns to exposed tissues, conjunctivitis, yellowing of exposed tissues, tearing, blurring vision, nausea, headache.
PRIMARY ROUTE(S) OF ENTRY..... Inhalation
FIRST AID PROCEDURES..... In case of eye contact: Flush immediately with plenty of water for at least 15 minutes and get medical attention; for skin, wash thoroughly with soap and water; wash contaminated clothing before reuse.

If inhaled: Remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Get medical attention.

Ingestion: Do not induce vomiting. Call a Physician Immediately.

EXPOSURE AGGRAVATED MEDICAL CONDITIONS Pre-existing diseases of the lungs.

SECTION VI — REACTIVITY DATA

CHEMICAL STABILITY..... Stable
CONDITIONS TO AVOID..... Not Applicable
INCOMPATIBLE MATERIALS..... Reacts vigorously with combustible or readily oxidizable materials, organic solvents, metal powders, carbides, cyanides, sulfides and alkalis.
DECOMPOSITION PRODUCTS..... Toxic nitrogen oxides.
HAZARDOUS POLYMERIZATION..... Will Not Occur
POLYMERIZATION AVOID..... Not Applicable

SECTION VII — SPILL OR LEAK PROCEDURE

FOR SPILL ..... Contain spill. Dilute carefullly with water, then neutralize with lime or soda ash. Absorb neutralized material with inert absorbent and sweep into a dry, marked container for disposal.

MATERIAL SAFETY DATA SHEET

NITRIC ACID 42°, BE'

WASTE DISPOSAL METHOD..... Dispose of spilled or waste product, contaminated soil and other contaminated materials in licensed landfill or treatment facility in accordance with all federal, state and local regulations.

SECTION VIII - SPECIAL PROTECTION

RESPIRATORY PROTECTION..... Supplied air or self contained breathing apparatus with full face piece.

VENTILATION..... To maintain below limits.

PROTECTIVE GLOVES..... Rubber or other impervious materials.

EYE PROTECTION..... Chemical splash proof goggles.

OTHER PROTECTIVE EQUIPMENT.... A safety shower and eye bath should be available. For operations where spills or splashing may occur, use an impervious body covering and boots.

HANDLING AND STORAGE..... Keep container closed when not in use. Keep away from heat, sparks and flame. Loosen closure carefully. NEVER use pressure to empty. DO NOT store near organic or other readily oxidizing material. Empty containers retain product residue and MUST NOT be washed out or used for other purposes.

SECTION IX - SPECIAL PRECAUTIONS.

HAZARD CLASS..... Oxidizer and Corrosive

DOT SHIPPING NAME..... Nitric Acid

UN NUMBER..... UN2031

REPORTABLE QUANTITY (RQ)..... 1450 lbs.

REFERENCES NITRIC42

NOTE Hazardous Component(s) subject to reporting under 40 CFR 372 (SARA Title III, Sec. 313).

MATERIAL SAFETY DATA SHEET #47000194

PRODUCT NAME: PRO-HIB 4700-B CORROSION INHIBITOR

manufactured by: PROGRESS CHEMICAL, Inc.
2875 Ottawa S.W., Grandville, MI 49418
Phone: (616) 534-6103

Revision Date: 01/20/94 Supersedes: 01/20/92 Date Printed: June 17, 1994

I. PRODUCT IDENTIFICATION:

CHEMICAL FAMILY: Alkaline cleaner
DOT SHIPPING NAME: Compound Cleaning Liquid
DOT HAZARD CLASSIFICATION: CORROSIVE MATERIAL
CAS REGISTRY #: n.a. proprietary mixture

CHEMICAL FORMULA: n.a. proprietary mixture
DOT HAZARDOUS SUBSTANCE? yes RQ: 1000 lbs.
UN NUMBER: NA1760

HAZARD RATINGS: Health 3 Fire 0 Reactivity 1 (4=Extreme, 3=High, 2=Moderate, 1=Slight, 0=Insignificant

II. INGREDIENTS

CAS# / INGREDIENT	%/Wt	TLV (ACGIH)	PEL (OSHA)	OTHER LIMITS
1310-58-3 / Potassium Hydroxide	5-7	2 mg/M^3	2 mg/M^3	Acute Oral LD50 365 mg/kg (rats)
7320-34-5 / Tetra Potassium pyrophosphate	5-10	n.e.	n.e.	Oral LD50 (rat) [illegible] mg/kg Dermal LD50 [illegible] mg/kg (rabbit)
1312-76-1 / Potassium Silicate	5-10	n.e.	n.e.	n.e.
68608-61-7 & 68608-64-0 / Mixed C8 Amphocarboxylates	3-6	n.e.	n.e.	n.e.
72368-48-9 / Carboxylic Acid, amine salt	5-10	n.e.	n.e.	n.e.
7732-18-5 / Water	>70	n.e.	n.e.	n.e.

EMERGENCY RESPONSE INFORMATION: FOR CHEMICAL EMERGENCY - Spill, Leak, Exposure, or Accident, Call 616-534-6103 or Call CHEMTREC 800-424-9300 Day or Night.

III. FIRST AID PROCEDURES

EYE CONTACT: OBJECT IS TO FLUSH MATERIAL OUT OF EYES IMMEDIATELY, THEN SEEK MEDICAL ATTENTION. Immediately flus eyes with large amounts of water for at least 15 minutes, lifting upper and lower eyelids a rotating eyeball to ensure rinsing of entire surface of eye and lids. Contact Physician Immediatel

SKIN CONTACT: Immediately flush with large quantities of water for at least 15 minutes, promptly removing contaminated clothing and shoes. Launder contaminated clothing before reuse. Decontaminate or destroy contaminated shoes. Consult Physician if irritation develops or persists.

INHALATION: Move from contaminated area to fresh air. If breathing difficult, oxygen may be administered by trained personnel. If breathing has stopped, give artificial respiration. Get Medical Attention!

INGESTION: DO NOT INDUCE VOMITING! Give victim a quart of water. If vomiting occurs, give fluids again. Never give anything by mouth to a person who is unconscious or having convulsions. Seek Medical Attention!

IV. FIRE AND EXPLOSION DATA

FLASH POINT: n.a. Noncombustible aqueous based cleaner. FLAMMABLE LIMITS IN AIR: n.a.

EXTINGUISHING MEDIA: Use media appropriate of surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES: Self contained breathing apparatus and appropriate protective clothing to prevent contact should be worn when fighting fires involving chemicals.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None.

V. SPILL OR LEAK PROCEDURES

SPILL RESPONSE: May cause slippery footing. Wear appropriate protective clothing as stated under Section VIII. "Control Measures". Clean up all spills promptly. SMALL SPILLS: Mop up or soak up with absorbent material. Flush area with water. LARGE SPILLS: Dike and pump liquid into DOT approved containers or holding tanks. Residues may be neutralized with very dilute inorganic acid then flushed with water. DO NOT flush spillage or residues which have not been neutralized or diluted to sewers or waterways. Decontaminate clothing before reuse.

DISPOSAL METHODS: If not reclaimed, small quantities may be diluted with large quantities of water then neutralized with dilute inorganic acid before flushing to industrial sewer. Large quantities should be disposed of at an approved chemical waste facility. Consult appropriate federal, state and local regulatory agency to ascertain proper disposal procedures.

VI PHYSICAL DATA

BOILING PT.: >212 deg. F. VAPOR PRESSURE: as water VAPOR DENSITY: as water VOLATILES by Wt.: <1%

SPECIFIC GRAVITY: 1.15 pH STRAIGHT: 14.00 pH @ 1% Solution: 12.3 SOLUBILITY/WATER: 100 %

APPEARANCE AND ODOR: Blue liquid / Mild odor

VII. HEALTH HAZARD DATA

OSHA PERMISSIBLE EXPOSURE LIMIT (PEL): n.e. See Section II. "Ingredients" for individual component PEL's.
ACGIH THRESHOLD LIMIT VALUE (TLV): n.e. See Section II. "Ingredients" for individual component TLV's.
CARCINOGEN LISTING? Not containing or considered a carcinogen by OSHA, NTP, OR IARC.

PRIMARY ROUTES OF ENTRY: Skin Contact [X] Eye Contact [X] Inhalation [ ] Ingestion [ ] Skin Absorption [ ]

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None currently known.

SYMPTOMS OF OVEREXPOSURE: Acute: Causes severe burns to skin and eyes. Symptoms of skin contact will range from irritation to severe burns depending on concentrations and length of exposure. A latent period may exist between exposure and sense of irritation. Symptoms of eye contact will be more acute. This product will be destructive to eye tissue upon contact and possibly cause blindness. Breathing mists or sprays may cause irritation to upper respiratory tract. Will be corrosive to any tissues contacted if ingested.

Chronic: None currently known.

VIII. CONTROL MEASURES

VENTILATION REQUIREMENTS: Normal well ventilated work area is adequate under normal conditions.

RESPIRATORY PROTECTION: None normally required. NIOSH/MSHA approved respirator should be worn where mists or sprays are expected. Respiratory protection program should be in accordance with 29 CFR 1910.134.

PROTECTIVE GLOVES: Nitrile, neoprene or natural rubber.

EYE PROTECTION: Close fitting chemical safety goggles or face shield.

OTHER PROTECTIVE EQUIPMENT: Rubber boots, rubber apron, PVC clothing, hard hat, as conditions dictate in order to prevent personal contact with this product and its solutions. Eye wash fountain and safety shower should be in immediate work area.

HYGIENIC PRACTICES IN HANDLING AND STORAGE:

Avoid contact with skin, eyes, and clothing! Clothing, shoes or other protective gear that is soaked with this material or its solutions should always be promptly removed and not used until laundered or decontaminated. Avoid breathing mists or sprays. Do not take internally. Wash thoroughly after handling. Always have water available for First Aid. Store in properly labeled, closed containers between 50 deg. and 90 deg. F. For industrial use only! Keep product and its empty containers out of reach of children. When handling empty containers, all labeled precautions should be observed due to product residues. Do Not reuse container until it has been properly cleaned, reconditioned, and all previous labeling has been removed. Do Not reuse for food or drink.

SPECIAL PRECAUTIONS FOR REPAIR AND MAINTENANCE OF CONTAMINATED EQUIPMENT:

Remove all traces of product and its residue before working on equipment. Maintenance personnel should wear protective equipment and clothing so as to prevent personal contact and should be informed regarding necessary precautions applicable to this product.

IX. REACTIVITY DATA

STABILITY: Stable. CONDITIONS TO AVOID: Contact with materials listed below.

INCOMPATIBILITY-
MATERIALS TO AVOID: Avoid product and its solutions from coming into contact with strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS: None.

X. ADDITIONAL REGULATORY CONCERNS

SARA TITLE III – A) 311/312 Categories: Immediate (Acute) Health and Reactivity
B) 313 – Components listed in Section 313: None.
C) None of this components are listed in Section 302.

CERCLA – Contains 5.5 % by weight of Potassium Hydroxide which is listed in table 302.4 of 40 CFR 302 as a hazardous substance and of which has a reportable quantity (RQ) of 1000 lbs. Releases to air, lan or water which exceed RQ must be reported to the National Response Center, 800-424-8802.

The information in this MSDS was obtained from sources we believe reliable. However, the information is provided without any warranty, expressed o implied regarding to its correctness. The conditions or methods of handling, storage, and/or disposal of this product is beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arisin out of or in any way connected with usage, storage or disposal of this product.

Revision 01/20/94 reflects changes in Sections II.

n.a. = not applicable n.e. = not established

Prepared by: MSDS Coordinator, Progress Chemical, Inc., Box 275 Grandville, MI 49468 or During Business Hours (616) 534-6103

ftc&h

QUALITY ASSURANCE PROJECT PLAN

FOR BROWNFIELD REDEVELOPMENT PROJECTS

REVISION 1

CITY OF KALAMAZOO
Kalamazoo, Michigan

JANUARY 2001
PROJECT NO. G00506

FISHBECK, THOMPSON, CARR & HUBER, INC. Engineers • Scientists • Architects
6090 East Fulton, P.O. Box 211, Ada, MI 49301-0211 Telephone: 616-676-3824

QUALITY ASSURANCE PROJECT PLAN APPROVAL SHEET

This Quality Assurance Project Plan (QAPP) was prepared by Fishbeck, Thompson, Carr & Huber, Inc. (FTC&H) on behalf of the City of Kalamazoo, Michigan, to guide field and laboratory activities related to the City's Brownfield redevelopment projects. The QAPP was developed following the guidance presented in U.S. Environmental Protection Agency (EPA) document QA/G-5, *EPA Guidance for Quality Assurance Project Plans,* February 1998.

Approvals

EPA Project Manager **Keary Cragen**	2/2/01 **Date**
EPA QAPP Reviewer **Jan Pels**	2/2/01 **Date**
FTC&H Project Manager **Steven M. Kimm, C.P.G.**	2/23/01 **Date**
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LIST OF ABBREVIATIONS

BEA	•	Baseline Environmental Assessment
DMR	•	Discharge Monitoring Report
DQO	•	Data Quality Objective
EPA	•	U.S. Environmental Protection Agency
ESA	•	Environmental Site Assessments
FSP	•	Field Sampling Plan
FTC&H	•	Fishbeck, Thompson, Carr & Huber, Inc.
GRCC	•	Generic Residential Cleanup Criteria
HASP	•	Health and Safety Plan
KAR	•	KAR Laboratories, Inc.
LCS	•	Laboratory Control Sample
LFB	•	Laboratory Field Blank
LIMS	•	Laboratory Information Management System
MDEQ	•	Michigan Department of Environmental Quality
MS	•	Matrix Spike
MS/MSD	•	Matrix Spike/Matrix Spike Duplicate
NIST	•	National Institute of Standards and Technology
%/R	•	Percent Recovery
PM	•	Project Manager
QA	•	Quality Assurance
QC	•	Quality Control
QAPP	•	Quality Assurance Project Plan
REC	•	Recognized Environmental Condition
RL	•	Reporting Limit
RPD	•	Relative Percent Difference
SOPs	•	Standard Operating Procedures
TriMatrix	•	TriMatrix Laboratories, Inc.
VOCs	•	Volatile Organic Compounds

OVERVIEW

Under the EPA Pilot Brownfield Grant program, known and potentially contaminated sites in the City of Kalamazoo will be evaluated for the purpose of redevelopment. As part of the Pilot Program, EPA requires that a QAPP be developed to guide Phase II investigation activities. The overall objective of this QAPP is to describe the field and laboratory procedures to be followed so that data of known precision, accuracy, and completeness can be collected and documented.

1.0 PROJECT MANAGEMENT

1.1 PROJECT ORGANIZATION

This section identifies the key individuals and organizations that will participate in the City of Kalamazoo Brownfield redevelopment projects and provides a general description of their roles and responsibilities. Under the authority of the City of Kalamazoo and MDEQ, FTC&H will assess Brownfield properties in phases as necessary (Phase I ESAs, Phase II ESAs, and BEAs) and perform any necessary field sampling investigations, analyze field and laboratory data collected, and prepare reports for the City of Kalamazoo.

KAR of Kalamazoo, Michigan, and TriMatrix of Grand Rapids, Michigan, were selected to provide laboratory services for the Brownfield projects. The project-specific FSP will identify the laboratory selected for the site. Selection will be based on project target parameters, DQOs, project schedule, and laboratory availability.

The organizational structure for the Kalamazoo Brownfield redevelopment projects is shown in Figure 1.

1.1.1 MANAGEMENT

EPA Project Manager - Ms. Keary Cragen

Ms. Cragen will be responsible for Agency coordination and general oversight of the Brownfield projects.

Project Coordinator, City of Kalamazoo - Mr. Marc Hatton

Mr. Hatton, or his designee, will provide overall project oversight and will handle all correspondence on behalf of the City of Kalamazoo.

FTC&H Project Manager - Mr. Steven M. Kimm, C.P.G.

Mr. Kimm will be responsible for ensuring that project technical, financial, and scheduling objectives are successfully achieved. He will be responsible for development of site-specific FSPs and coordination and monitoring of all project activities, including activities of subcontractors to FTC&H. Mr. Kimm will also be responsible for oversight of field operations, data assessment, and preparation of project reports.

FTC&H Data Manager - Ms. Mary Crosby-Davies

Ms. Crosby-Davies will be responsible for management of field and laboratory data and development of project specific databases to be used for data evaluation and presentation.

1.1.2 QUALITY CONTROL

FTC&H Quality Assurance Manager - Ms. Mary Crosby-Davies

Ms. Crosby-Davies will be responsible for QA review of field SOPs and field documentation. She will also be responsible for ensuring that the procedures for accuracy, precision, and completeness described in this QAPP are followed for all field and laboratory activities.

KAR Project Manager - Mr. Garrett Ervin; TriMatrix Project Manager - Ms. Lisa Harvey

As laboratory project managers, Mr. Ervin and Ms. Harvey are responsible for ensuring that the technical requirements specified in this QAPP are understood by the laboratory and that all data is reported in accordance with the QA/QC specifications described.

KAR QA Officer - Ms. Pollyann Nee; TriMatrix QA Officer - Mr. Rick Wilburn

Ms. Nee and Mr. Wilburn are responsible for assuring that appropriate systems are in place within their respective laboratories to provide data which meet the QA/QC requirements defined in this QAPP. They are also responsible for data review and initiation and documentation of corrective action within the laboratory if problems arise that affect data quality.

1.1.3 FIELD RESPONSIBILITIES

FTC&H Field Manager - Mr. Steven M. Kimm, C.P.G.

As field manager, Mr. Kimm is responsible for oversight and implementation of field procedures as described in the site-specific FSPs and this QAPP. He is also responsible for ensuring that a site-specific HASP is in place and that field activities are performed by individuals who have received appropriate training prior to initiation of any work.

FTC&H Sample Coordinator - Ms. Mary Crosby-Davies

Ms. Crosby-Davies is responsible for custody of field samples released by the field team for shipment to the selected laboratory. Her responsibilities include review of the chain-of-custody form for completeness, check of sample container labeling for adherence with the project sample identification system, confirmation of the number and type of samples collected, sample packaging, and arrangement for delivery of samples to the laboratory.

1.2 PROJECT DESCRIPTION AND SCHEDULE

Brownfield properties will be investigated in phases as necessary: Phase I ESAs, Phase II ESAs, and BEAs.

1.2.1 PHASE I ESA

Phase I ESAs will be completed in accordance with ASTM Designation E: 1527-00, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.* During the Phase I ESA, inquiries as to the previous ownership and uses of a property will be made in order to identify RECs connected with the property. A REC is defined as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property." The Phase I ESA report will document the RECs identified during the assessment.

1.2.2 PHASE II ESA

When RECs are identified in a Phase I ESA, a Phase II ESA will be conducted. During a Phase II ESA, the RECs are evaluated by collecting soil and/or groundwater samples for analysis. A Phase II ESA will evaluate the presence of contamination at the subject property and, if present, the contaminant concentrations in exceedance of MDEQ Generic Cleanup Criteria and Screening Levels. The intent of

the Phase II ESAs is not to fully delineate the extent of possible contaminants but to identify conditions based on the current and past use of the property. A site-specific Phase II ESA FSP will be developed prior to initiation of any sampling activities. A description of the work to be performed and schedule for implementation will be provided in the site-specific FSP. This information will include measurements that are to be made during the course of the project, applicable technical and regulatory standards, personnel and equipment requirements, a schedule for the work to be performed, and type of reports needed.

Phase II ESAs will be conducted in accordance with ASTM Designation: *E 1903-97, Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process*. Work may include soil borings, monitoring well installation, field measurements, and sample collection and analysis including groundwater, surface water, soil, and/or waste materials.

Laboratory analyses will be performed by either KAR or TriMatrix using analytical methodologies acceptable under the MDEQ guidelines for environmental response activities under Part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Laboratory selection will be based on project target parameters, DQOs, project schedule, and laboratory availability.

Analytical data supplied by the laboratory will be compared to current MDEQ Part 201 GRCC and a Phase II report will be prepared. The Phase II report will include a summary of all field activities, documentation of sampling locations, and laboratory data. An evaluation will be made as to: (1) whether sufficient information has been collected during the investigation to show that the presence of hazardous substances or petroleum products have not impacted soil and/or groundwater on the property; or (2) whether the presence of hazardous substances or petroleum products have impacted soil and/or groundwater, and whether or not the levels detected exceed current Part 201 GRCC and qualify the property as a "facility."

1.2.3 BEA

In the event that a property is classified as a "facility" under Part 201, a BEA will be completed. A BEA is defined by the MDEQ as an "evaluation of environmental conditions which exist at a facility at the time of purchase, occupancy, or foreclosure, that reasonably defines the existing conditions and circumstance at the facility so that in the event of a subsequent release, there is a means of distinguishing the new release from existing contamination."

The scope of the BEA will be based on the future intended use of the property. Three BEAs categories have been defined by the MDEQ: Category N, Category D, and Category S. A Category N BEA will be completed when the anticipated property use will not include storage, handling, use or management of hazardous substance(s) in quantities greater than those typical of residential or office purposes. A Category D will be completed when hazardous substance(s) different from those known or likely to be present will be used in a significant quantity on the property. A Category S BEA will be completed when the hazardous substance(s) to be used on the property in a significant quantity include the same hazardous substance(s) known or likely to be present on the property, or when no limitation on hazardous substances to be used on the property in significant quantities has been specified.

Information collected during the Phase I ESA and Phase II ESA of the property will be used in development of the BEA Work Plan. Based on the intended use of property, additional field investigations may be required to fulfill requirements.

1.3 DATA QUALITY OBJECTIVES

1.3.1 DATA QUALITY OBJECTIVES PROCESS

DQOs are developed to determine the type, quantity, and quality of data needed to support the objectives of an investigation. The decision making process outlined below will be followed in development of site-specific FSPs.

A. State the problem.

Is environmental contamination present at the Brownfield property being considered for redevelopment?

B. Identify the decision.

Based on the information obtained during the Phase I ESA of the property, have RECs been identified? If so, where are the potentially contaminated areas located and what analyses will be needed in order to evaluate the soil and/or groundwater?

C. Identify inputs to the decision.

When RECs are identified in a Phase I ESA, soil and/or groundwater samples will be collected for laboratory analysis in order to evaluate the presence of contamination at the subject property and, if present, to determine if the contaminant concentrations are in exceedance of MDEQ GRCC. RECs that may potentially be encountered during the Phase II ESA include: areas of past/current landfilling or dumping, transformer areas, chemical storage areas, and areas where past or current activities may have impacted the soil or groundwater.

D. Define the study boundaries.

During the Phase II ESA, sampling activities will be limited to the subject property with sample collection in areas of suspected or expected contamination.

E. Develop a Decision Rule.

Analytical data supplied by the laboratory will be compared to current MDEQ Part 201 GRCC. An evaluation will be made as to whether sufficient information has been collected

during the investigation to determine: (1) that the use of hazardous substances or petroleum products on the property has not caused environmental contamination; or that (2) the environmental contamination caused by the use or the presence of hazardous substances or petroleum products has been confirmed and whether or not the levels detected exceed current Part 201 GRCC and qualify the property as a "facility." If the site is qualified as a "facility," a BEA will be completed. The scope of the BEA will be based on the future intended use of the property.

MDEQ Part 201 GRCC tables are presented in Appendix 4.

F. Specify limits on decision errors.

The sampling network for each property will be designed to provide sufficient evidence that the site is clean (current Part 201 GRCC are not exceeded) or evidence to document the presence of contamination above Part 201 GRCC.

G. Optimize the design for obtaining data.

The sampling design for each property will be evaluated for meeting the data quality objectives while providing the most resource-effective option.

1.3.2 CRITERIA FOR MEASUREMENT DATA

This section provides the objectives and criteria for acceptance of the data generated. These qualitative and quantitative measures of the quality of the data will be evaluated to determine whether the data can be used to satisfy the DQOs.

1.3.2.1 PRECISION

Precision is a measure of the reproducibility of environmental measurements under given conditions. Field precision will be assessed through the collection and analysis of field duplicates at a rate of 1 duplicate per 10 investigative samples. Laboratory precision will be assessed through analysis of sample/sample duplicate pairs and/or analysis of MS/MSD samples.

Precision will be assessed by calculating the RPD of two duplicate analyses as follows:

$$RPD = \frac{R_1 - R_2}{(R_1 + R_2)/2} X\ 100$$

Where: R_1 and R_2 = concentration of replicate analyses 1 and 2, respectively.

This calculated RPD value is compared to values considered acceptable for this project. Laboratory precision objectives are provided in Table 1-1 and Table 1-2. These precision ranges are based on EPA criteria and/or historical KAR and TriMatrix laboratory data. Precision objectives for the field measurements are provided in Table 1-3.

1.3.2.2 ACCURACY

Accuracy is a measure of the degree of agreement between the known concentration of a sample and the measured value. Accuracy in the field will be assessed through the use of equipment and trip blanks. Equipment blanks, collected from equipment which is reused during the investigation, will be submitted for analysis at a rate of one per day. Trip blanks, consisting of organic-free reagent water in sealed and preserved vials prepared by the laboratory, will be submitted for analysis at a rate of one per VOC sample shipping container.

Laboratory accuracy will be assessed through the analysis of MS/MSD samples, LCS, and/or LFB as required by the analytical method. Accuracy is measured by calculating the %R of known levels of spike compounds from appropriate sample matrices. The %R value is calculated as follows:

$$\%R = \frac{(SSR - SR) \ X \ 100}{SA}$$

Where:	SSR	=	Spiked sample recovery amount
	SA	=	Spike added
	SR	=	Sample recovery amount

Accuracy objectives are presented in Table 1-1 and 1-2. These accuracy ranges are based on EPA criteria and/or historical KAR and TriMatrix laboratory data.

1.3.2.3 COMPLETENESS

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions. Completeness is calculated using the following equation:

$$Completeness, \% = \frac{number\ valid\ data\ obtained}{number\ reported\ measurements} \ X \ 100$$

The field completeness objective for each project will be greater than 90%. Laboratory completeness objective for each project will be greater than 90%.

1.3.2.4 REPRESENTATIVENESS

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Field representativeness will be achieved by following the procedures for sample collection and handling presented in this QAPP. Laboratory representativeness will best be achieved by following the analytical procedures presented in this QAPP and adherence to sample holding times.

1.3.2.5 COMPARABILITY

Comparability is an expression of the confidence with which a data set can be compared with another. Comparability is also dependent on similar QA objectives. Field comparability will be satisfied by following the sample collection and handling procedures presented in this QAPP. Laboratory comparability will be satisfied by following the sample preparation and analytical procedures presented in this QAPP.

1.4 DOCUMENTATION AND RECORDS

Upon completion of the investigation and data analysis, a report will be submitted to the City of Kalamazoo representatives and the MDEQ. This report will summarize the field and laboratory data collected, present the investigation findings and conclusions, and provide recommendations.

All project documentation and records generated during an investigation will be retained by FTC&H for a period of 15 years. This information will include, but is not limited to, the field notebook and logs, laboratory deliverables, correspondence, photographs, maps, and final report. At the end of the 15-year period, FTC&H project reports will be sent to the permanent file. The remainder of the project file will be destroyed.

2.0 DATA ACQUISITION

This section will provide the QA measures required to obtain data that will meet the DQOs defined for each Brownfield property including sampling design, sample collection and preservation, sample custody, analytical methods, equipment calibration/maintenance, and data management.

2.1 SAMPLING DESIGN RATIONALE

The sampling design strategy for each property will be presented in the site-specific FSP and will include procedures for location and selection of samples, sample matrices to be evaluated, and a map of anticipated sampling locations. The sampling design will factor in site conditions, data gaps, possible exposure routes, and projected site reuse.

2.2 SAMPLING METHODS

The specific field sample collection and measurement techniques to be used during an investigation will be selected based on intended use of the data, matrix type, and target parameters. Detailed procedures for anticipated sampling techniques are provided in Appendix 1, FTC&H Field SOPs. Each site-specific FSP will reference the applicable sampling protocols.

2.3 SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Project target parameters will be defined in the site-specific FSP. Table 2-1 summarizes the container size and type, chemical preservation, minimum sample volume, and holding time for common environmental analyses.

2.4 SAMPLE CUSTODY

This section describes the procedures that will be followed to ensure that samples are collected, transferred, stored, and analyzed by authorized personnel; that sample integrity is maintained during all phases of sample handling and analysis; and that an accurate written record is maintained which documents sample handling and treatment from the time of collection through laboratory analysis to disposal.

2.4.1 FIELD CUSTODY PROTOCOL

FTC&H SOP 3-02, Chain-of-Custody, is presented in Appendix 1 and can be summarized as follows:

- Only the number of aliquots needed to represent the media being sampled will be collected. To the extent possible, the quantity and types of aliquots and sample locations will be determined prior to the actual field work. As few people as possible will handle the samples.

- The field sampler is personally responsible for the care and custody of the samples collected until they are properly transferred or dispatched.

- Sample labels will be completed for each sample in waterproof ink. Samples will be labeled following the sample identification procedure described in the site-specific FSP.

- The Field Manager will determine whether proper custody procedures were followed during the field work and will decide if additional samples are required.

- A chain-of-custody record will be completed for all samples. The following information will be included on the chain-of-custody forms:

  - Sample identification

- Date and time of sampling
- Project location
- Sample matrix type
- Number of containers, preservative, and required analyses
- Signatures of persons involved in chain-of-custody, including time and date

A unique number will be assigned to each field sample collected. Sample identification will include at a minimum, a site identifier, year and month of collection, sample location, location number, sample depth (as appropriate), and sample type. For example, ABC-01-03-SB9(10)D would represent a duplicate soil sample collected at the ABC Manufacturing site in March 2001 from soil boring location #9 at a depth of 10 feet. The project-specific FSP will present the sample identification scheme to be used for that site.

When transferring possession of samples, the individuals relinquishing and receiving them will sign, date, and note the time on the form. This form documents sample custody transfer from the sampler, often through another person, to the laboratory.

- Samples will be packaged in such a way as to minimize the chance for breakage during shipment and will be dispatched as soon as possible to the laboratory for analysis. A separate custody record will accompany each shipment (e.g., one for each laboratory, one per bulk sample container shipped, driven, or otherwise transported). Shipping containers will be sealed prior to shipment to the laboratory. The method of shipment, courier name(s), and other pertinent information are entered in the appropriate sections or "remark" section on the custody record.

- All shipments will be accompanied by the chain-of-custody record identifying its contents. The original record (consisting of the top white copy and middle yellow laboratory copy) will accompany the shipment; the field copy (bottom pink copy) will be retained by the Field Manager for placement in the project file.

- If sent by mail, the package will be registered with return receipt requested. Freight bills, post office receipts, and bills of lading will be retained as part of the permanent documentation.

- If any sample or aliquot is split, this will be noted on the chain-of-custody form. This notation will include the name of the person receiving the split, the amount of sample transferred, and the data and time of the transfer.

2.4.2 LABORATORY CUSTODY PROTOCOL

The sample custody protocol for KAR is presented in Appendix 2. TriMatrix sample custody protocol is presented in Appendix 3.

2.5 ANALYTICAL METHODS

Analytical method selection will be dependent on the specific project target parameters, DQOs, and regulatory requirements. Table 2-2 summarizes the methods commonly used for sample analysis during Phase II ESAs, as well as required quantitation limits and laboratory RLs for both KAR and TriMatrix. Sample preparation methods, which include digestion, extraction, and cleanup procedures, are summarized in Table 2-3. KAR SOPs are presented in Appendix 2; TriMatrix SOPs are presented in Appendix 3.

2.6 QUALITY CONTROL REQUIREMENTS

2.6.1 FIELD QC REQUIREMENTS

Equipment blank, trip blank, and duplicate samples will be analyzed to assess the quality of the data resulting from the field sampling program.

Equipment blank samples will be submitted for analysis as a means to evaluate the effectiveness of decontamination procedures employed for reusable equipment such as sampling pumps. These blanks will be prepared by circulating organic-free deionized water through the sampling equipment following decontamination, and collecting the water for analysis. Equipment blanks will be collected at a rate of one per day.

Trip blanks, consisting of organic-free deionized water in sealed volatile organic analysis vials, will be provided by the laboratory and will be included in each shipping container containing samples for volatile organic analysis. Trip blanks will be used to evaluate whether sample contamination has been introduced during transportation and shipping. Equipment and trip blanks are relevant to groundwater/water sampling activities only.

Duplicate samples will be collected and analyzed as a check of sampling reproducibility. Field duplicates will be collected at a rate of 1 per every 10 or fewer investigative samples.

Field QC samples will be collected in the same manner as the investigative samples. Field QC sample collection is described in FTC&H SOPs 4-12 and 10-11 presented in Appendix 1.

2.6.2 LABORATORY QC REQUIREMENTS

Method blank, duplicate, LFB/LCS, and matrix spike samples will be prepared and analyzed to assess the quality of the data resulting from the laboratory analytical program.

Method blank samples will be prepared and analyzed by the laboratory to assess potential sample contamination during the analytical process. The frequency of method blank preparation is specified in the specific laboratory SOPs presented in Appendices 2 and 3.

Duplicate samples will be analyzed to check for analytical reproducibility. The frequency of laboratory duplicate preparation and analysis is specified in the SOPs presented in Appendices 2 and 3.

LFB/LCS samples will be prepared and analyzed as a primary demonstration of the ability of the laboratory to analyze samples with acceptable qualitative and quantitative accuracy. Matrix spike determinations will be performed in duplicate (MS/MSD) and will serve as an indication of the effect of sample matrix on precision and accuracy. The frequency of LFB/LCS and MS/MSD sample preparation is specified in the specific laboratory SOPs presented in Appendices 2 and 3. Typically, one LFB/LCS and MS/MSD pair will be prepared per batch (20 or fewer samples).

Laboratory QC criteria for precision and accuracy are presented in Tables 1-1 and 1-2.

2.7 INSTRUMENT/EQUIPMENT CALIBRATION AND MAINTENANCE

This section includes a description of calibration and maintenance procedures and the frequency with which these procedures will be performed for both field and laboratory equipment/instrumentation.

2.7.1 FIELD INSTRUMENTATION AND EQUIPMENT

Any field analytical instrumentation used for the Brownfield projects will be calibrated in accordance with the protocols described in the FTC&H Field SOPs in Appendix 1 prior to use. Calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of instrument calibration will be maintained in the project file and will be subject to audit by the QA Manager. Copies of the manufacturer instrument operation manuals will be maintained onsite by the Field Manager or designee.

Preventive maintenance schedules for the field analytical instrumentation are presented in the FTC&H SOPs in Appendix 1.

2.7.2 LABORATORY INSTRUMENTATION

The calibration procedures and calibration frequency for the laboratory instruments are specified in the laboratory SOPs presented in Appendices 2 and 3.

As part of each laboratory QA Plan, routine preventive maintenance is conducted to minimize equipment failure and downtime. Preventive maintenance procedures for KAR are presented in Appendix 2. TriMatrix laboratory instrumentation will be operated and maintained in accordance with the protocols presented in Appendix 3.

2.7.3 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

The purchase of reagents, solvents, gases, and sample containers is carefully controlled at each laboratory through a purchase order system designed to maintain the quality level of these materials. The managers of each laboratory operating area along with the QA Managers define the grade of material needed for each application. The area manager or designee verifies upon receipt that the incoming materials meet the specified requirements.

Incoming reagents, solvents, and gases are assigned a unique identification number for traceability in laboratory testing records. The manufacturer's lot number may be used if it meets the traceability requirements and is pre-printed on the container label. Logbooks are maintained to track the receipt, preparation, and disposition of all materials. These logbooks contain the following information: supplier, material identification number (lot number), concentration, data of receipt, and expiration date, if applicable. Certificates of analysis are required of the vendor and are maintained in the laboratory files. Each container will also be labeled with the date of receipt.

Primary reference standards and standard solutions are purchased from the NIST. Chemical reference standards are traceable to NIST standards.

All stock and working standards are labeled with the compound name, concentration, date prepared, name of preparer, and expiration date. All standards will be validated prior to use by checking the purity against a standard obtained from a different commercial source.

Sample containers are precleaned by the vendor. Certificates of analysis are required and are maintained in the laboratory files. Container certification is tracked by the LIMS.

Additional information regarding inspection and acceptance of laboratory supplies and consumables is presented in Appendices 2 and 3.

2.8 DATA MANAGEMENT

2.8.1 DATA REDUCTION, VALIDATION, AND REPORTING

2.8.1.1 FIELD DATA REDUCTION, VALIDATION, AND REPORTING PROCEDURES

The field technical team assigned to each project will be responsible for management of raw data collected during field activities. All information will be appropriately recorded on field forms or in the field notebook as dictated by the activity. Information regarding documentation of field activities is presented in Appendix 1.

Field data reduction procedures will be minimal in scope as only direct read instrumentation is likely to be employed in the field. Field measurements will be recorded in the field notebook as they are made. Any errors in the field notes will be legibly crossed out, initialed, and dated by the field member, and corrected in an area adjacent to the corrected entry.

Field data validation will include review of instrument calibration, a check for transcription errors, and review of the field logbooks by the field crew members. All field records will be reviewed by the Field Manager and/or QA Manager for accuracy, adequacy, and completeness.

Field data reporting will be conducted through transmission of field forms containing tabulated results of all measurements made in the field and documentation of field calibration activities.

2.8.1.2 Laboratory Data Reduction, Validation, and Reporting Procedures

Both laboratories employ a computerized information management system that allows for sample tracking, data storage, data reduction, and reporting. Specific procedures regarding data reduction, validation and reporting for KAR Laboratories are presented in Appendix 2. Procedures for TriMatrix are presented in Appendix 3.

Final reports generated by the laboratory will consist of the following:

A. Case Narrative

The case narrative will include a summary of:

- Analyses performed
- Any deviations from intended analytical strategy
- Laboratory batch numbers
- Number of samples and respective matrices
- Report contents
- Project name and number
- Condition of samples as received
- Discussion of whether sample holding times were met
- Discussion of any technical problems or analytical difficulties

B. Chemistry Data Package

The chemistry data package will include:

- Summary pages indicating the dates of analyses for samples and associated QC checks
- Description of any qualifiers used
- Sample preparation summary including dates and method used
- Tabulated sample results

- MS/MSD recoveries, LCS/LFB recoveries, method blank results, duplicate precision values, and system performance check compound results
- Completed chain-of-custody forms

Laboratory data will also be provided in an electronic format (MicroSoft Excel spreadsheet). The electronic data will include, at a minimum: laboratory sample number, field sample identification, collection date, parameter, CAS number, result, data flag, RL, dilution factor, and method number. Soil results will be reported on a dry weight basis.

2.8.2 DATA TRACKING, TRANSMITTAL AND STORAGE

The FTC&H PM or designee is responsible for tracking the progress of laboratory testing to ensure compliance with the project schedule. Tracking will be accomplished by direct communication with the Laboratory PM responsible for coordination of laboratory activities.

Following review of the field measurement data by the Field Manager, the information will be transferred from the field notebook into a spreadsheet format by the Data Manager. Data entry will undergo QC review by office staff to ensure accuracy. The field notebook will be retained in the project file at FTC&H.

Laboratory data will be formatted as required for the project report using the electronic data format supplied by the laboratory. Approximately 10% of the electronic data will undergo a QC review against the hard copy report for accuracy in data transfer.

3.0 PROJECT ASSESSMENT/OVERSIGHT

3.1 TECHNICAL SYSTEMS AUDITS

Technical system audits will provide an onsite qualitative check of facilities, equipment, personnel, training, procedures, and record keeping for adherence to procedures described in this QAPP.

3.1.1 FIELD SYSTEM AUDITS

3.1.1.1 INTERNAL FIELD SYSTEM AUDITS

Internal audits of field activities including sampling and field measurements may be conducted by the FTC&H QA Manager at the beginning of the site sample collection activities and periodically throughout an investigation depending on its scope.

The audits will include examination of field sampling records, field instrument operating records, sample collection, handling and packaging in compliance with the established procedures, adherence to QA procedures, chain-of-custody, etc. Follow-up audits will be conducted to correct any deficiencies identified and to verify that QA procedures are maintained throughout the field work.

3.1.1.2 EXTERNAL FIELD SYSTEM AUDITS

External field audits may be conducted by the EPA or MDEQ at any time during the field operations. These audits may or may not be announced, and are at the discretion of the EPA and MDEQ. An external audit may include review of sampling procedures, equipment decontamination procedures, FSP and HASP documents, and chain-of-custody.

3.1.2 LABORATORY SYSTEM AUDITS

3.1.2.1 INTERNAL LABORATORY SYSTEM AUDITS

Internal audits are conducted by the laboratory QA Officer or designee to verify that the laboratory system is functioning within the limits established in the QA Plan. The laboratory system audit includes, but is not limited to: sampling handling and control, sample analysis, records processing, laboratory support systems (analytical equipment, water system, air handling system, reagent/chemical supplies) and documentation (notebooks, benchsheets, run logs, project files).

3.1.2.2 EXTERNAL LABORATORY SYSTEM AUDIT

An external audit may be conducted by the MDEQ at least once prior to the initiation of the sampling and analysis activities. These audits may or may not be announced and are at the discretion of the MDEQ. External laboratory audits will include, but not be limited to, review of laboratory analytical procedures, laboratory onsite audits, and/or submittal of performance evaluation samples to the laboratory for analysis.

An external onsite audit may include review of sample receipt procedures, custody procedures, log-in procedures, and sample tracking procedures; review of instrument calibration records; review of QA procedures, log books, and sample preparation procedures; and analytical SOP and instrument reviews.

During an external laboratory audit, one or more data packages from sample delivery groups recently analyzed by the laboratory may be reviewed. This review may include, but is not limited to:

- Comparison of data to the SOP or method
- Verification of initial and continuing calibrations within control limits
- Verification of surrogate recoveries and instrument tuning results where applicable
- Control standard recoveries
- Review of run logs with run times
- Review of MS recoveries and QC check samples
- Review of sample preparation and analysis logs for adherence to hold times

3.2 PERFORMANCE EVALUATION AUDITS

Performance audits provide a quantitative measure of the quality of field sample collection and laboratory analyses.

3.2.1 FIELD PERFORMANCE AUDITS

3.2.1.1 INTERNAL FIELD PERFORMANCE AUDITS

Periodic review of field notebooks and field equipment calibration records will be conducted by the FTC&H QA Manager. Prior to release of samples to the laboratory, the FTC&H Sample Coordinator will review all sample documentation including labels and chain-of-custody form for accuracy and completeness. Corrective action will be initiated to address any deficiencies or deviations from accepted procedures.

3.2.1.2 EXTERNAL FIELD PERFORMANCE AUDITS

The quality of the field sampling program will be evaluated through laboratory analysis of equipment blanks, trip blanks, and sample duplicates. Field QC data will be reviewed by the FTC&H PM and Data Manager and any anomalies will be investigated for compliance with SOPs.

3.2.2 LABORATORY PERFORMANCE AUDITS

3.2.2.1 INTERNAL LABORATORY PERFORMANCE AUDITS

Daily evaluation of internal performance occurs at the bench through the analysis of laboratory control samples and laboratory fortified blank samples. When analyzed in duplicate, these determinations provide a measure of both precision and accuracy and overall performance of the measurement system.

3.2.2.2 EXTERNAL LABORATORY PERFORMANCE AUDITS

Each laboratory routinely participates in single-blind performance audits as a check of the laboratory performance. Single-blind performance samples are analyzed by both laboratories through the EPA Water Supply and Water Pollution studies. KAR also participates in Analytical Products Group "Laboratory of Excellence" benchmarking system, a quarterly evaluation program. In addition to the single-blind studies noted, TriMatrix participates in the national environmental laboratory performance evaluation program administered by Analytical Stand, Inc., which is a double-blind, round robin statistically-based program. Results of the most current performance evaluations for each laboratory are presented in Appendices 2 and 3.

Onsite performance audits of both laboratories are conducted by the NSF as part of the State of Michigan drinking water certification program. Additionally, both laboratories participate in audits conducted by client organizations or regulatory agencies as requested.

3.3 CORRECTIVE ACTION

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out-of-quality-control-performance which can affect data quality. Corrective action can occur during field activities, laboratory analyses, and data assessment. All corrective action proposed and implemented will be documented in the project report.

3.3.1 FIELD CORRECTIVE ACTION

Corrective action in the field may be required when the sample network is changed (i.e., more samples, unable to sample at a specified location, sampling at a location other than those specified in the FSP, etc.), or sampling procedures and/or field analytical procedures require modification due to unexpected conditions. The field team members will be responsible for reporting all suspected technical or QA nonconformance or suspected deficiencies of any activity to the Field Manager or designee. The Field Manager will be responsible for assessing the problems and will confer with the QA Manager regarding the potential for the situation to impact the data quality.

If appropriate, the Field Manager will ensure that no additional work that is dependent on the nonconforming activity is performed until corrective actions are completed. Corrective action for field measurements may include reanalysis, instrument recalibration, check of instrument calibration, instrument replacement, or cessation of work if necessary.

Corrective actions will be implemented and documented in the field notebook. No corrective action will be initiated without prior communication of findings through the proper channels.

3.3.2 Laboratory Corrective Action

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, low/high pH readings, and potentially high concentration samples may be identified during the sample log-in or just prior to analysis. Following consultation with analysts and section leaders, the laboratory QA officer may need to implement corrective action. The KAR corrective action protocol presented in Appendix 2 specifies conditions that may automatically trigger corrective action. Corrective action protocol for TriMatrix is presented in Appendix 3.

3.3.3 Corrective Action During Data Validation and Data Assessment

The need for corrective action may occur during either data validation or data assessment and may include resampling by the field team or reinjection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the required QA objectives (e.g., the holding time for samples is not exceeded), etc. When the FTC&H QA Manager identifies a corrective action situation, the PM will be responsible for approving the implementation of corrective action, including resampling, during data assessment. All corrective actions of this type will be documented by the QA Manager.

4.0 DATA VALIDATION AND USABILITY

4.1 DATA VALIDATION

Field and laboratory data will be validated by the FTC&H QA Manager using the performance criteria for precision, accuracy, completeness, representativeness, and comparability outlined in Section 1.3.2 and the referenced SOPs.

All analyses will be evaluated for completion within the specified hold time. Blank samples will be evaluated for contamination and the effect of any contamination on the validity of the data will be determined. Completeness checks will be administered on all data to determine whether the deliverables specified in the QAPP are present.

KAR procedures for internal laboratory validation are included in Appendix 2. TriMatrix procedures for internal laboratory validation are included in Appendix 3.

4.2 RECONCILIATION WITH DATA QUALITY OBJECTIVES

The field and laboratory data collected during each investigation will be used to evaluate the nature and extent of contamination at the site. Only data generated in association with QC results meeting the specified data quality objectives will be considered usable for decision making purposes.

The data obtained will be qualitatively and quantitatively assessed by the QA Manager, and results will be presented and discussed in the project report. Factors that will be considered in the data assessment will include but not be limited to:

- Were the samples obtained using the methods and SOPs proposed in the QAPP?
- Were all analyses performed in accordance with the SOPs presented in the QAPP?
- Were samples obtained from all proposed sampling locations and depths?

- Do analytical results exhibit elevated detection limits due to matrix interference or elevated contaminant concentrations?
- Were all data validated as indicated in the QAPP?
- Were any data found unusable ("R" qualified) based on the data validation results?
- Are there data sets which are usable for limited purposes ("J" qualified) based on the data validation results?
- What affect do applied qualifiers have on the ability to implement the project Decision Rules?
- Can valid conclusions be drawn for the area under investigation?
- Have all corrective action issues been resolved?
- Were the project-specific Decision Rules used as proposed during the field activities?

5.0 REFERENCES

EPA, *Handbook for Analytical Quality Control in Water and Wastewater Laboratories*, 600/4-79-019, revised March 1979.

EPA, *NEIC Policies and Procedures of the EPA,* 330/9-78-001-R, revised May 1986.

EPA, *EPA Guidance for Quality Assurance Project Plans*, QA/G-5, February 1998.

EPA, *Quality Assurance Guidance for Conducting Brownfields Site Assessments*, EPA 540-R-98-038, September 1998.

ASTM Designation E:1527-00, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.*

ASTM Designation E:1903-97, *Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process.*