BROSSMAN WORK/QA SHORT FORM
UPJOHN MANUFACTURING COMPANY
BARCELONETA, PUERTO RICO

Work Assignment No. 797
Document No. T797-C02-EP-BKTT-1

Responsible Agency:

U.S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10278

Project Officer: Hans Vaetjen

Signature: ____________________

Project Quality Assurance Officer: Amy von Schondorf

Signature: ____________________

(264/19)NY

Performance of Remedial Response
Activities at Uncontrolled Hazardous
Waste Sites
U.S. EPA CONTRACT NO. 68-01-7331

BROSSMAN SHORT FORM
FOR THE
Upjohn Manufacturing Company
Barceloneta, Puerto Rico
WORK ASSIGNMENT NO.: 797
DOCUMENT NO.: T79-C02-EP-BKTT-1

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1-13-88
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Date

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(264/19)NY/PA

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BROSSMAN WORK/QA SHORT FORM

1. **Project Name:** Upjohn Manufacturing Company Site (TES III)

2. **Project Requested By:**

   USEPA Region II
   EPA Contract No. 68-01-7331
   Work Assignment Number: 797
   Document No. T797-C02-EP-BKTT-1

3. **Date of Request:** December 22, 1987

4. **Date of Project Initiation:** January 18, 1988

5. **Project Officer:** Hans Waetjen

6. **Quality Assurance Officer:** Amy von Schondorf

7. **Project Description:**

   A. Background:

   In September, 1982, a buried tank on the Upjohn Manufacturing Company (UMC) property leaked, releasing approximately 15,000 gallons of a mixture containing 65% carbon tetrachloride (CCl_4) and 35% acetonitrile. Shortly after the spill was detected, UMC installed a grid of monitoring wells and took soil borings to determine the extent of contamination. Contamination was detected in both the ground water and soils.

   UMC used one of the contaminated wells as an extraction well and also installed another well to treat the ground water. A vacuum extraction system was also installed to remove CCl_4 from the soil onsite. Subsequent testing revealed that while much of the CCl_4 had been removed from soil by this method, it was still present in the ground water. In order to eliminate further contamination, Upjohn has removed the leaking tank and placed a concrete cap over the spill area to prevent and control leachate production and migration.

   In 1984, UMC prepared a Draft Remedial Investigation/Feasibility Study (RI/FS), which the EPA did not feel fully defined the contaminant plume. In June of 1987, the EPA entered into an Administrative Order of Consent with UMC to perform additional RI studies to fully define the plume of contamination. In August of 1987, UMC submitted the Amended RI report. However, EPA believes the contaminant plume has still not been totally delineated and requested further sampling of private wells downgradient of the site.

   Because of a possibility that a second source of CCl_4 may exist downgradient of the site, Upjohn declined to do further sampling downgradient and, subsequently, prepared an FS based on their interpretation of the extent of the contaminant plume.

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B. Objective and Scope Statement:

The objective of this work assignment is to perform additional onsite and offsite ground water sampling in order to verify existing analytical data and to delineate the aerial extent of the CCl_4 contaminant plume.

C. Data Usage:

The data from this study will be used to verify existing data and to delineate the plume(s) of CCl_4 contamination for subsequent reevaluation of a ground water extraction and treatment alternative.

D. Monitoring Network Design and Rationale:
Locations of wells to be sampled: (see figure 1)

To accomplish the objective of this work assignment, a total of 27 wells and one spring will be sampled both on and offsite. These samples will be analyzed for volatile organics, metals, cyanide and acetonitrile.

The major volatile organic compound of concern is carbon tetrachloride (CCl_4), which will require a detection limit of 1 ppb. In addition, samples will also be analyzed for acetonitrile since this contaminant was also identified as one of the constituents that leaked into the soil from the ruptured tank. The method used for acetonitrile analysis does not specify a method detection limit and, therefore, must be determined by the laboratory. It is for this reason that acetonitrile may not be a good indicator contaminant for delineating the contaminant plume at the 1 ppb level.

E. Sampling Parameters and Their Frequency of Collection:

Ground water samples will be collected once from a total of 27 wells and one spring. Well usages are described in section 13.

The ground water samples are to be analysed through Special Analytical Services (SAS) under the Contract Laboratory Program (CLP) for volatile organics, metals, cyanide, acetonitrile and carbon tetrachloride. A total of three samples will be filtered in the field and analyzed for dissolved metals. Dissolved metals will be taken from those wells constructed of stainless steel since, historically, water from these wells revealed higher metal concentrations than water samples taken from the other wells constructed of PVC. This difference in metal concentrations may be attributable to the method of well construction and/or well development. Any influence the sediment may have on the results of the chemical analysis is viewed as biasing the sample. A 14-day verbal turnaround time will be required for all samples. Written data will be required 40 days after analysis.

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F. Sample Parameter Table:

Parameter	Number Samples	Sample Matrix	Method Reference	Sample Preservation	Holding Time (d)	Containers Per Sample (e)
1. Volatile Organics (VOA)	28	Aqueous	CLP(a)	Cool to 4°C HCl to pH <2	10 days	2 x 40 ml vials
Carbon tetrachloride (CCl_4)	28	Aqueous	(g)	Cool to 4°C	14 days	2 x 40 ml vials
2. Metals Dissolved[f] metals	28 3	Aqueous	CLP(b)	Cool to 4°C HNO_3 to pH<2	6 months, (Hg within 28 days)	1 x 1 liter poly
3. Cyanide	28	Aqueous	CLP(b)	Cool to 4°C NaOH to pH >12	14 days	1 x 1 liter poly
4. Acetonitrile	28	Aqueous	(c)	Cool to 4°C NaOH or HCl to pH 7	14 days	1 x 1 liter amber glass

- -

KEY

(a) In accordance with USEPA Contract Laboratory Program, Statement of Work: Organic Analysis. Multimedia, Multi-concentration SOW 8/87, WA-87J004 and WA-87J005.

(b) In accordance with USEPA Contract Laboratory Program, Statement of Work: Inorganic Analysis. Multimedia, Multi-Concentration SOW 785 or 786.

(c) Test Methods for Evaluating Solid Wastes; SW8-46. EPA Method 8030, Third Edition.

(d) The holding times for CLP methods are based on the CLP contractual holding times.

(e) The bottles will be provided through the Sample Bottle Repository Services. The VOA vial and glass bottles will have teflon-lined caps.

(f) For dissolved metals, filter sample before adding HNO_3

(g) In accordance with 40CFR 136 (dated July 1, 1986), EPA method 601.

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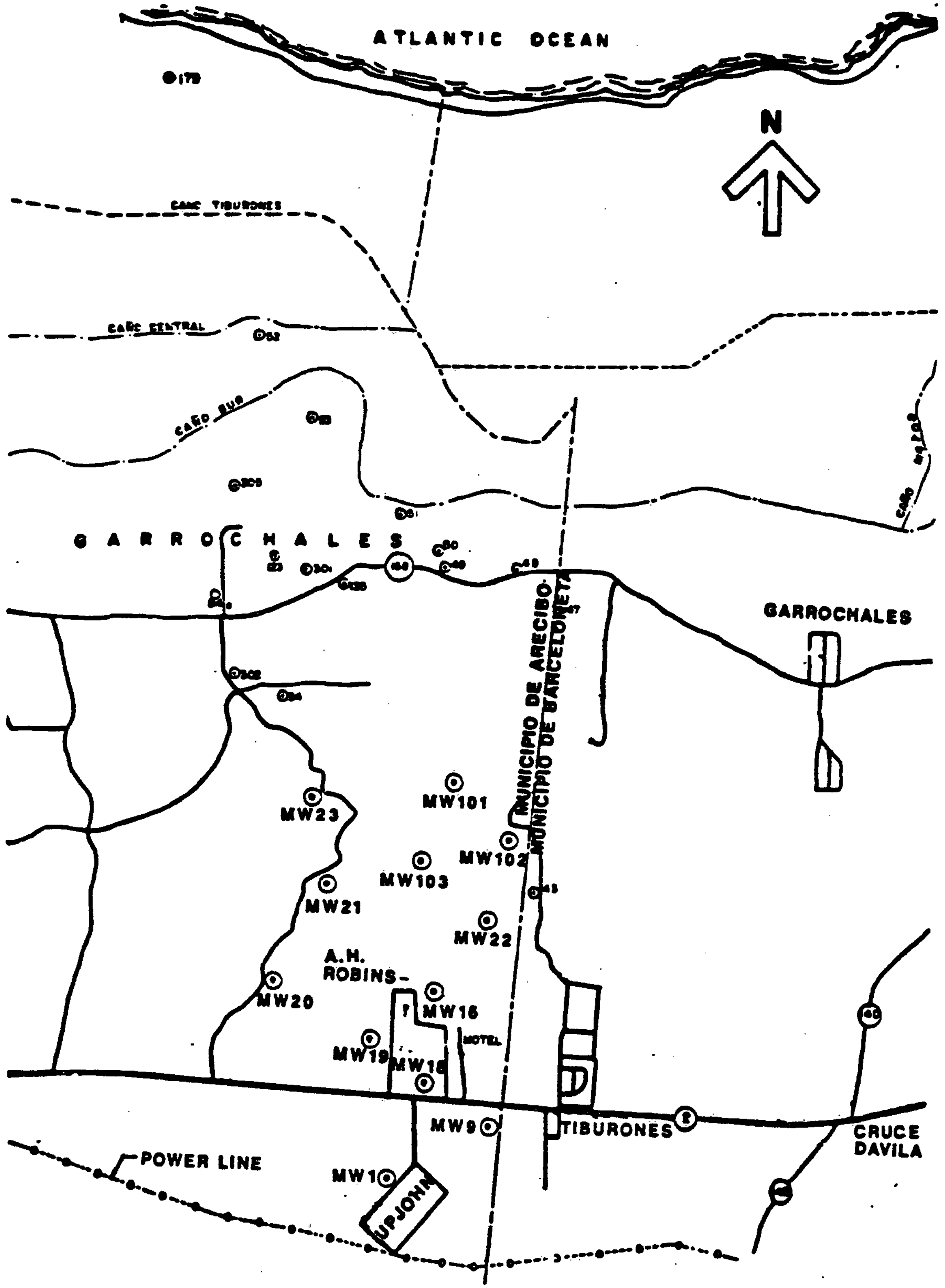

SCALE: 1:35,000

SOURCE: Geotech, 1984

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Figure 1

Proposed Groundwater Sampling Locations

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G. QA Sample Parameters:

Duplicates - Duplicate samples will be collected at a frequency of one per twenty (20) samples or less. One duplicate sample will be taken for the filtered metal analysis.

Trip Blanks - A trip blank consists of deionized, demonstrated analyte-free water sealed in 40-ml septum vials.

The trip blanks will go out into the field any time that sampling is being conducted and will be kept in close proximity to the samples that are being collected. The water for the trip blanks will be deionized, demonstrated analyte-free. The water will be obtained from Fisher Chemical or from American Scientific in New Jersey.

Trip blanks will be analyzed for volatile organics and carbon tetrachloride only. Separate trip blanks will be utilized per day for volatile organics analyses and for CCl_4 analyses. (A total of 2 per day).

Field Blanks - A field blank consists of deionized, demonstrated analyte-free water which has been used to rinse the sampling apparatus after it has been decontaminated. One field blank will be taken per day and per sampling apparatus used. The field blank will be analyzed for the same parameters that the samples are analyzed for.

H. QA Parameter Table

Type	Parameter	Samples	Matrix	Method	Preserv.	Time (d)	Sample (e)
Trips	VOAs	10	Aqueous	CLP$^{(a)}$	Cool to 4° HCl to pH<2	10 days	2 x 40 ml glass vial
	Carbon tetrachloride	10	Aqueous	$^{(g)}$	Cool to 4°C	14 days	2 x 40 ml glass vial
Field Blanks	VOAs	10	Aqueous	CLP$^{(a)}$	Cool to 4°C HCl to pH<2	10 days	2 x 40 ml glass vial
	Metals	10	Aqueous	CLP$^{(b)}$	Cool to 4°C HNO_3 to	6 mos (Hg 28-days	1 x 1 liter poly
	Dissolved Metals	3	Aqueous	CLP$^{(b)}$	pH<2		
	Cyanide	10	Aqueous	CLP$^{(b)}$	Cool to 4°C NaOH to pH>12	14 days	1 x 1 liter poly
	Acetonitrile	10	Aqueous	(c)	Cool to 4°C NaOH or HCl to pH of 7	14 days	1 x 1 liter amber glass

Type	Parameter	Samples	Matrix	Method	Preserv.	Time (d)	Sample (e)
	Carbon tetrachloride	10	Aqueous	(g)	Cool to 4°C	14 days	2 x 40 ml glass vials
Duplicates	VOAs	2	Aqueous	CLP(a)	Cool to 4°C HCl to pH<2	10 days	2 x 40 ml glass vials
	Metals	2	Aqueous	CLP(b)	Cool to 4°C HNO_3 to PH<2	6 mos. (Hg- 28 days)	1 x 1 liter poly
	Dissolved(f) Metals	1	Aqueous	CLP(b)	"	"	"
	Cyanide	2	Aqueous	CLP(b)	Cool to 4°C NaOH to pH>12	14 days	1 x 1 liter poly
	Acetonitrile	2	Aqueous	(c)	Cool to 4°C NaOH or HCl to pH of 7	14 days	1 x 1 liter amber glass
	Carbon tetrachloride	2	Aqueous	(g)	Cool to 4°C	14 days	2 x 40 ml glass vial

KEY

(a) In accordance with USEPA Contract Laboratory Program, Statement of Work: Organic Analysis. Multimedia, Multi-concentration SOW 8/87, WA-87-J004, and WA-87J005.

(b) In accordance with USEPA Contract Laboratory Program, Statement of Work: Inorganic Analysis. Multimedia, Multi-Concentration SOW 785 or 786.

(c) Test Methods for Evaluating Solid Wastes; SW8-46; EPA Method 8030, Third Edition.

(d) The holding times for CLP methods are based on the CLP contractual holding times.

(e) The bottles will be provided through the Sample Bottle Repository Services. The VOA vial and glass bottles will have teflon-lined caps.

(f) For dissolved metals, filter sample before adding HNO_3

(g) In accordance with 40CFR 136, (dated July 1, 1986), EPA method 601.

8. **Project Fiscal Information:**

Unavailable at this time.

9. **Schedule of Tasks and Products:**

The field work associated with this effort is projected to begin January 18 and is estimated to take two weeks. The total project duration is 3.5 months.

10. **Project Organization and Responsibility:**

The following is a list of key project personnel and their corresponding responsibilities:

Sampling operations -	Scott Theal/CDM
Sampling QC -	John Mihalich/CDM
Laboratory Analysis -	Contract Laboratory Program
Laboratory QC -	Contract Laboratory Program
Data processing activities -	Maria Zotto/CDM
Data processing QC -	Vikas Passi/CDM
Data quality review -	EPA Region II/CDM
Project systems audit -	Sonce Silvernale
Overall QA -	Sonce Silvernale/TES III
Overall project coordination -	Lee Guterman/CDM

11. **Data Quality Requirement and Assessments:**

TABLE I

Data Quality Requirement and Assessment

Parameters To Be Analyzed	Method of Analysis	Detection Limits	Accuracy and Precision
TCL Volatile Organics	As specified in WA-87J004/5	As specified in WA-87J004/5	As specified in WA-87J004/5
TCL metals, plus CN-	As specified in EPA CLP SOW 786	As specified in CLP SOW 786	As specified in CLP SOW 786
Carbon Tetrachloride	EPA Method 601 (40 CFR, Part 136, July 1, 1986)	1ppb	As specified in Table 3 of EPA Method 601
Acetonitrile	SW8-46, Method 8030	To be determined and reported by lab performing the analysis	Precision should be ±15%

A. Data Representativeness:

The onsite and offsite locations to be sampled were selected by EPA. These locations were selected in order to verify existing analytical data or to provide data that will be used to delineate the aerial extent of the contaminant plume. ground water samples will be collected from each location. Two duplicate samples will be collected. These samples will provide information on the representativeness of the samples collected from the same location. The samples will be collected using the procedures provided in Section 13.

B. Data Comparability:

All data will be presented in units as specified in the Contract Laboratory Program's IFBs. The data for carbon tetrachloride and acetonitrile will be presented in ug/l. The analytical data will be compared to existing analytical data (where results are available) to verify the results of previous analyses conducted at the same sampling location.

C. Data Completeness:

All data should be 95% complete; anything less than 95% complete will be evaluated on a case-by-case basis. It is expected that the CLP will provide data meeting QC acceptance criteria for 95% of the samples analyzed.

12. Sample Container Requirements

Matrix	Analysis	Containers per Sample	No. of Samples	No. of Containers	Type of Containers
Aqueous	VOAs	2	50	100	40 ml glass vials
Aqueous	Metals	1	40	40	1 liter polyethylene
	Dissolved Metals	1	7	7	1 liter polyethylene
Aqueous	Cyanide	1	40	40	1 liter polyethylene
Aqueous	Acetonitrile	1	40	40	1 liter amber glass
Aqueous	Carbon Tetrachloride	2	50	80	40 ml glass vials

13. **Sampling Procedures:**

A. Prior to taking a ground water sample, each well will be opened and allowed to vent. The water level in each well will then be measured using a measuring tape. The water in each well will be tested in the field for the following parameters:

- dissolved oxygen concentration
- temperature
- conductivity
- pH

The procedures that will be used to measure these parameters are provided in Appendix A.

B. Evacuate well to remove any stagnant water above the screen or within the borehole. Due to the restrictive conditions at the ground water wells and the high transmissivity of the aquifer, at least one well volume will be purged prior to sampling, if practicable.

C. The ground water wells will be sampled either using a spigot or by the syringe method developed by Geotech. The spring will be sampled using standard procedures for sampling surface waters, as outlined under 13 E. The procedures that will be used to measure these parameters are provided in Appendix A. The following table contains the names or I.D. number of the wells to be sampled, their present usage, and whether a spigot or the syringe method will be used to collect the sample.

Wells to be Sampled	Usage	Sampling Method
MW-1 (320′)	monitoring well	syringe
MW-9 (310′)	monitoring well	syringe
MW-16 (320′)	monitoring well	syringe
MW-18 (320′)	monitoring well	syringe
MW-19 (400′)	monitoring well	syringe
MW-20 (345′)	monitoring well	syringe
MW-21 (280′)	monitoring well	syringe
MW-22 (290′)	monitoring well	syringe
MW-23 (235′)	monitoring well	syringe
MW-101 (235′)	monitoring well	syringe
MW-102 (235′)	monitoring well	syringe
MW-103 (280′)	monitoring well	syringe
Pollera Well, #43	domestic well	spigot
Job Corps Well, #54	domestic well	syringe
DNR Well, #302	irrigation well	spigot (a)
Garrochales #3, #54a	public water supply	spigot
#47	domestic	spigot
#48	unknown	spigot
#49	domestic	spigot
#50	abandoned (b)	syringe

Wells to be Sampled	Usage	Sampling Method
#51	abandoned (b)	syringe
#52	man-made channel	grab (c)
#53	stock	syringe
#123	domestic	spigot
#135	abandoned (b)	spigot (d)
#179	stock	spigot
#301	abandoned (b)	syringe
#305	stock	spigot

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(a) The pump for this well does not work, therefore, it may not be possible to sample this well.

(b) It is not known at this time whether or not the wells have been sealed.

(c) Information obtained on #52 indicates that this is not a well, but is a spring. Samples will be collected as outlined in section 13 E.

(d) This well is believed to be locked, therefore access will be required from the PRASA.

D. Samples will be collected and shipped using the procedures described below:

i. When transferring the sample to the sample container, pour the sample down the sides of the container to minimize turbulence. The VOA samples will be the first samples collected.

ii. Fill the sample bottles for volatile organic and carbon tetrachloride analysis to overflowing and cap tightly.

iii. Invert bottle and inspect bottle for air bubbles. If air bubbles are present, refill the bottle again. Adjust the pH of the sample to <2 by carefully adding 1:1 HCl drop by drop to the required 2(40 ml) VOA sample vials. The number of drops of 1:1 HCl required should be determined on a third portion of sample water of equal volume. If acidification of the sample causes effervescence, do not preserve sample except for cooling to 4°C. This sample should be appropriately noted when present. Clean nitrile gloves must be worn when preservatives are used. Do not add HCl to the samples for carbon tetrachloride analysis.

iv. Fill the amber glass bottle 7/8 full for the acetonitrile analyses and adjust pH to 7 using HCl or NaOH.

v. Fill the sample bottles for metals and cyanide analysis 7/8 full. Add HNO_3 until a pH of less than 2 is obtained for the samples for metals analysis. Add NaOH to a pH greater than 12 for the samples for cyanide analysis.

vi. Filter samples for dissolved metals analysis prior to adding HNO_3. A 0.45u membrane cellulose ester filter is used for filtering. Decontaminate the filtration apparatus prior to the start of the activity by rinsing with 10% HNO_3 solution and deionized water. The apparatus should be cleaned between samples in the same manner.

vii. Filter sample by pouring one liter of sample through the 0.45u filter using a milapore apparatus. (Samples may be filtered by vacuum filtration or by gravity filtration.)

viii. Collect the filtrate in the flask.

ix. Transfer the filtrate to a one liter polyethylene bottle and acidify with HNO_3 to pH less than 2.

x. Samples receiving pH adjustment must be checked in the field to ensure the proper pH has been achieved. Check the pH by pouring a small amount of the sample into a separate container and checking the pH using pH paper.

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xi. Package the sample bottles in their respective coolers with ice and vermiculite. Insert traffic reports and chain-of-custody records in a plastic bag and affix bag to inside of cooler lid. Seal the cooler and take to a freight carrier for overnight shipment and delivery.

E. Procedure for Sampling Using Syringe Method:

The sampler to be used for this project will be a syringe system designed by Geotec, Caparra Heights, Puerto Rico, and made available by Upjohn Manufacturing Company (Figure 2). The following procedure was previously utilized by Geotec and will be employed during this field effort. This sampling procedure will help to ensure data comparability and will be as follows:

i. Prior to initiating sampling, obtain construction details on each well, if available, and well usage. Decide whether or not purging should be performed prior to sampling (see 13. B.).

ii. Remove well cap and allow to vent.

iii. Take water level measurements.

iv. Connect the syringe to 3/8" O.D. plastic tubing, which is used to raise or lower the piston. Since this is a bottom-filling device, the tubing will not come in contact with the water sample.

v. Maintain the piston in the "down" position, by applying a pressure of 80 psi to the upper end of the plastic tubing and closing valve "A".

vi. After applying pressure, lower the syringe into the well to the desired depth and relieve the pressure.

vii. Once the pressure is relieved, use a vacuum pump to raise the piston and allow the water to enter the syringe.

viii. After the vacuum is applied, close valve "A" to maintain the vacuum and keep the piston in the "up" position.

ix. Remove the syringe from the well manually.

x. Once above ground, disconnect the main cylinder of the syringe from the cap to remove the water sample. For this, a plunger is used to move the piston down and transfer the sample to the sample container.

xi. Collect and ship samples as described under 13. D.

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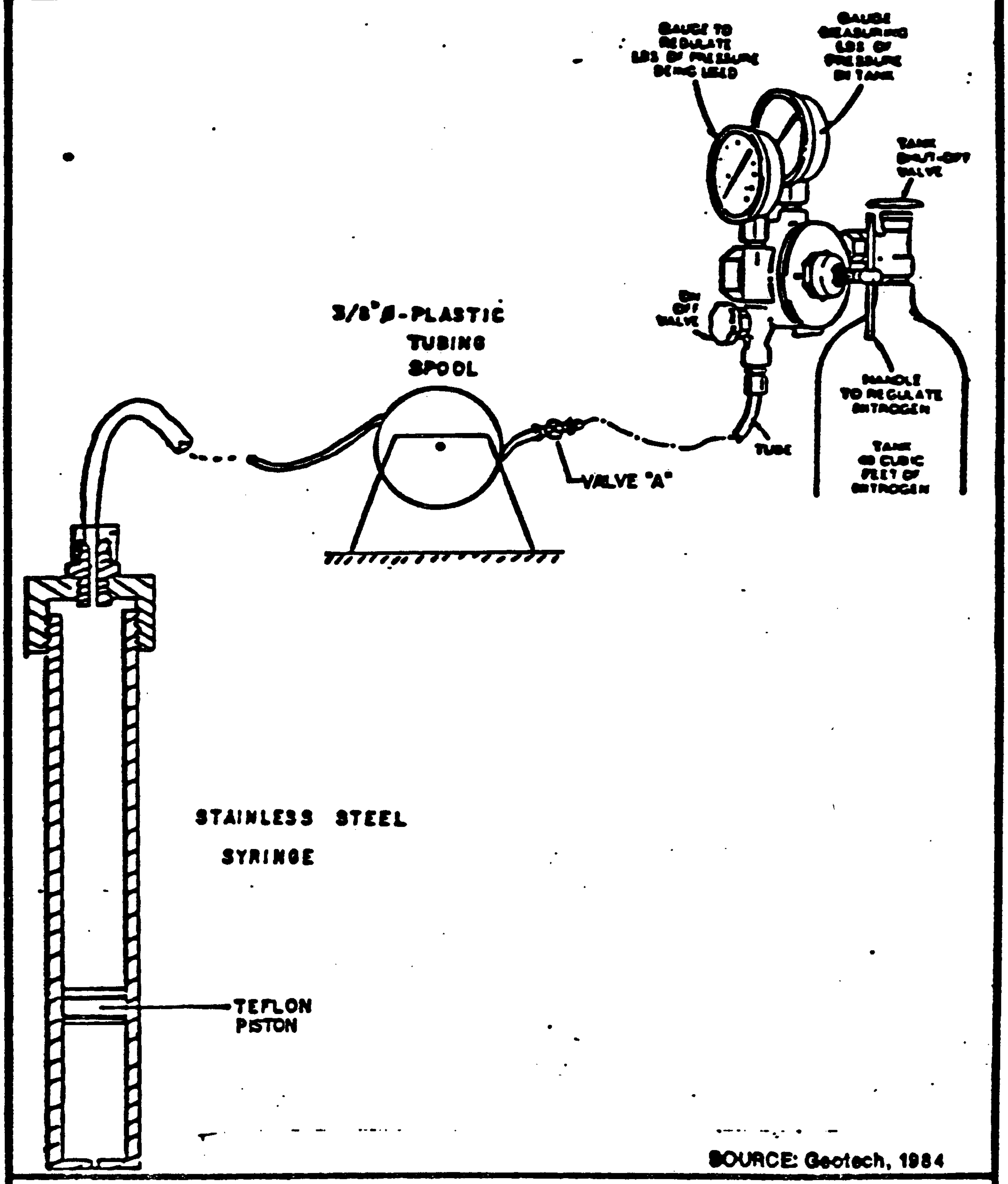

SOURCE: Geotech, 1984

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Figure 2

Schematic Of Proposed Ground Water Sampling Device

xii. Decontaminate the syringe after each sampling event by carrying out the following steps:

- Wash with Alconox or some other low phosphorus detergent
- Rinse with tap water
- Rinse with 10% HNO_3 solution
- Rinse with tap water
- Rinse with acetone
- Rinse with deionized, demonstrated analyte-free water
- Air dry
- Wrap in aluminium foil, shiny side out

F. Procedure for Sampling Using a Spigot

i. Prior to initiating sampling, obtain construction details on each well, if available, and well usage. Decide whether or not purging should be performed prior to sampling. (1)

ii. Should purging be found necessary, a garden hose will be attached to the spigot and three well casing volumes will be evacuated prior to initiation of sampling. The water evacuated from the well will be allowed to drain from the garden hose to the ground surface at a reasonable distance from the well.

iii. Attach teflon tubing, precleaned by soap and deionized water. The teflon tubing will be a minimum of 1-foot long. The purpose of the teflon tubing is to minimize aeration of the sample by the reduction of spraying at the spigot.

iv. Allow the spigot to discharge to waste for one minute and commence filling the sample containers.

v. Collect and ship samples as described under 13. D.

G. Procedure for Sampling the Spring

i. Test the spring for the following parameters: pH, conductivity, dissolved oxygen, and temperature prior to sampling.

ii. Collect grab samples near the side of the bank so as to minimize sediment disturbance.

iii. For collecting samples for volatile organics analysis, a 40 ml vial will be uncapped and will be allowed to fill with the spring water in a laminar method so as to avoid loss of volatiles through bubbling.

iv. Collect and ship samples as described under 13. D.

14. Sample Custody Procedures:

A. Traffic Reports

A Sample Traffic Report is a four page carbonless form printed with a unique sample identification number. A traffic report and its preprinted identification number will be assigned in the field for each sample collected. The preprinted identification number will be affixed to each sample container. An organic traffic report will be completed for each volatile organic sample, an inorganic traffic report will be completed for all inorganic samples, and separate SAS packing lists will be prepared for the acetonitrile and carbon tetrachloride samples. Filtered metal analysis will be designated on the inorganic traffic report or on an individual SAS packing list, depending on the lab assigned. The pink copy of the traffic reports and the yellow copy of the SAS Packing Lists must be sent to the Regional Sample Control Center (RSCC) after completion of sampling. The top copy of the traffic reports and/or the SAS Packing Lists are submitted to the Sample Management Office (SMO). The bottom two are submitted in the sample shipment to the laboratory. The information that must be completed on the traffic reports is detailed in the User's Guide to the Contract Laboratory Program, December, 1986 (Appendix B).

B. Chain-of-Custody Record

In order to maintain a record of sample collection and transfer for all samples processed, a "Chain-of-Custody Record" will be filled out for each sample type at each sampling location. The top copy of the chain-of-custody record must be secured to the inside of the shipping cooler along with the CLP sample documentation (i.e., the traffic reports). The yellow copy of the chain-of-custody record must be submitted to the RSCC upon completion of sampling. A copy of the custody record is retained for CDM's files. Shipping coolers will be secured with fiber tape and custody seals will be placed across cooler openings.

Each time the samples are transferred to another person, signatures of the person relinquishing the sample and receiving the sample, as well as the time and date, will be filled out in the appropriate spaces on the chain-of-custody record. This will complete the sample transfer process. It will be the CLP laboratory's responsibility to maintain internal log books and records that provide a custody record throughout sample preparation and analysis. In order to provide a systematic approach to tracking field samples through collection and data handling, CDM will maintain xerox copies of all traffic reports and chain-of-custody records.

C. Sample Tags

Each ground water sample collected from the site and sent to the CLP laboratories for analysis will be identified by using a sample tag. One sample tag will be completed for each sample container.

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The information that must be completed on the sample tag for samples sent to the CLP for analysis is detailed in the User's Guide to the Contract Laboratory Program, December 1986. In addition to the information provided on the sample label, the fluid level of the sample will be indicated on the sample container.

D. Field Notebooks

A final element in the documentation process will be the completion of a formal field notebook. The field notebooks will be maintained and will be stored in the CDM document control system. All entries will be made in accordance with the CDM requirements for maintaining field notebooks as detailed in the Site Investigation Procedures Manual, SOP #5621004 (Appendix B). The field notebooks will include information on field conditions, sample location, sample number, collection time and date, sample description, information on sampling, procedures and collection (e.g. volume of water purged from the well), and the analytical results of the field parameters.

E. Sample Bottles

Sample bottles are provided through the Sample Bottle Repository Program. These bottles are precleaned and QC-tested according to prescribed procedures to ensure that no contamination exists that might affect sample data results. Clean, empty bottles are shipped to users in protective cardboard cartons. The bottles are acquired directly from the Superfund Sample Bottle Repository (Eagle Pricher) by the Region II Primary Authorized Requestor (PAR), Laura Gavin.

F. Sample Handling, Packaging, and Shipping

When sent by common carrier, the packaging, labelling and shipping of hazardous wastes and substances is regulated by the U.S. Department of Transportation (DOT) under CFR 49. Samples obtained at uncontrolled hazardous waste sites are classified according to pollutant concentration. "Low Level" samples are generally dilute and are usually collected from areas surrounding a spill or dump site (i.e., off-site samples from soils, rivers, lakes, etc). "Medium level" samples are generally collected on-site, in areas of moderate dilution by normal environmental processes.

The samples collected at the Upjohn Manufacturing site will be handled as low level samples.

All samples will be packaged and shipped according to the following procedures detailed in the User's Guide to the Contract Laboratory Program and in CDM's SOP #'s 5622001 and 5622004 (Appendix B).

G. Sample Shipment Coordination

To enable the SMO to track the shipment of samples from the field to the laboratory and ensure timely laboratory receipt of samples, CDM will notify the SMO (phone number: (703) 684-5678) immediately following all sample shipments, and provide the following information:

- Sampler name and phone number
- Case number and/or SAS number
- Site name/code
- Exact number(s) and matrix(ces) and concentrations of samples shipped
- Laboratory(ies) samples were shipped to
- Carrier and airbill number(s) for the shipment.
- Method (e.g., overnight, two-day)
- Date of shipment
- Any irregularities or anticipated problems with the samples, including special handling instructions, or deviations from established sampling procedures
- Suspected hazards associated with the samples or site
- Status of the sampling project (e.g., final shipment, update of future shipping schedule)

Sample shipments made after 5:00 PM EST will be called into Sean Kolb, SMO, or his alternate Diane Cutler at the start of business the next day (8:00 AM EST). SMO will be notified by 3:00 PM EST Friday concerning information on sample shipments going out Friday intended for Saturday delivery/pickup.

H. Sample Trip Reports

A sample trip report is required to be completed for each site per case number and must contain all the information as shown below.

- Site name
- Sampling date
- EPA case number
- Site location
- Sample description

- Names, addresses of laboratories receiving samples and sample types going to those laboratories
- Samples dispatch data (e.g., Federal Express airbill number(s))
- Names, organization affiliation and duties onsite of sampling personnel
- Additional comments (sample types, totals, blanks etc.)
- Name of preparer and date of report
- Approval signature and date

This trip report will be sent directly to the RSCC with a copy to the TES III CLP coordinator. All blanks and duplicate pairs must be clearly indicated.

15. Calibration Procedures and Preventive Maintenance:

A. Field Equipment

Each piece of field equipment used for measuring, monitoring and analytical purposes is calibrated and maintained periodically to assure accuracy within specified limits. Calibration and maintenance procedures and the frequency at which these procedures should be applied for field equipment are detailed in CDM's REM II Site Investigation Procedure Manual. General procedures for equipment and handling are detailed in SOP 6600001 in the above referenced procedures manual.

The equipment that will be used by CDM during the field activities will include a pH meter, specific conductivity meter (includes thermometer), DO meter, an HNu, an OVA, and respirators. Therefore, for the UMC site, the relevant calibration and maintenance SOP's are as follows:

Instrument	SOP Reference
Dissolved Oxygen Meter	6617001
Specific Conductivity Meter	6617002
pH Meter	6617003
HNu Photoionization Detector	6607001
OVA Flame Ionization Detector	6607003
Respirators	6624001

The field equipment undergoes calibration and maintenance before and after every field activity. If an instrument is to be in the field for longer than two or three weeks, it shall be returned to the Region II equipment room to undergo full calibration and maintenance. Where applicable, the instrumentation is calibrated using standard solutions or standardized techniques. All calibration of field instruments is performed by qualified personnel.

A Field Equipment Status report sheet is kept for each piece of field equipment and kept in a Region II Log Book. These sheets contain the following information:

- Date of calibration and date of last maintenance
- Date pertaining to above
- Initials of person performing the calibration and/or maintenance
- Accuracy prior to and following calibration and/or maintenance
- Notations on equipment failures.

If the calibration schedule is not adequately maintained or if the accuracy, as reported in the instrument's specifications, cannot be attained, the instrument is placed on "hold" and is unavailable for use until the specifications are attained. It is the responsibility of the REM II Regional Equipment Manager to assure that all equipment is properly calibrated and maintained and that proper documentation is kept.

Because the pH, specific conductivity, and dissolved oxygen meters will be calibrated in the field during field activities, the SOPs are provided as Appendix C.

16. Documentation, Data Reduction, and Reporting:

A. Documentation

Each sample submitted for analysis will be properly documented to ensure timely, correct and complete analysis for all parameters requested and to support use of analytical data in potential enforcement actions. The following documentation will be submitted:

- Organic and inorganic sample traffic reports
- Chain of Custody Records
- SAS packing lists

In addition, a field notebook will be prepared and maintained. This field notebook will be kept as part of the project file.

B. Data Reduction and Reporting

The CLP will be responsible for preparing the analytical data packages for RAS and SAS organic and inorganic analysis and providing this information to the SMO. SMO will then send the package to the RSCC for data validation.

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Data reduction will consist of completing and summarizing the data collected during the field work. The data will be used to prepare a report summarizing the analytical results and notes taken during the UMC field work.

17. Data Validation:

Data Validation will be done through ESD-Monitoring Management Branch following Region II protocols for data validation.

18. Performance And Systems Audits

Each audit will be documented in a report which will discuss any observed deficiencies. If needed, a Corrective Action Request will be completed and sent with the audit report. Upon receipt of a satisfactory response, an Audit Completion Notice will be issued. If no deficiencies are noted, the Audit Completion Notice will be sent with the original audit report. Reports are sent to the audit file with copies to the audited entity, CDM FPC management, and to EPA.

Laboratory performance audits are the responsibility of the contract laboratory.

Independent performance audits of field sampling, preservation, shipping, and equipment cleaning procedures may be conducted by a TES III quality assurance representative during the course of the project. The audits will be performed to check for nonconformance with quality assurance requirements. Audits, if conducted, will be during actual field operations and may or may not be scheduled.

System audits may be conducted by CDM FPC QA staff during the course of the work assignment. They will be scheduled and reported as described under performance audits.

A. Internal Quality Control Checks

Internal quality control checks are designed to assure the accuracy and representativeness of field and laboratory measurements. Field measurement quality control checks will include:

- Duplicate samples
- Blank samples
- Instrument calibration
- Documentation of all field measurement activity
- Documentation of sample preservation and transport

Laboratory quality control checks are the responsibility of the contract laboratory and will include:

- Replicate analysis
- Spiked samples
- Internal standards
- Quality control samples
- Reagent checks
- Documentation of all laboratory measurement activities.

19. Corrective Action

A. Non-Laboratory Activities

A request for corrective action may be initiated by any staff member during the course of the work assignment and will be brought to the attention of the Site Manager or Project Manager. The Site or Project Manager will notify the TES III QA Director and appropriate corrective action will be initiated. The QA Director will follow up and document the satisfactory completion of the corrective action.

If a need for corrective action is identified during an audit, it will be documented and followed up as described under Performance Audits.

B. Laboratory Activities

Laboratory analyses will be performed by USEPA contract laboratories. The laboratories have EPA approved QA/QC programs in-place and functioning. QA/QC records received from the laboratories will be reviewed by the Site Manager and retained in the project files.

Control charts will used to monitor the day-to-day variations in the precision or accuracy of routine analyses and can detect trends in these variations. Construction of a control chart requires an initial data base to establish the mean and standard deviation of measurements. The data base will consist of measurements obtained from performing the complete analytical method. These control charts fall into two categories: precision control charts, and accuracy control charts. Data falling outside the upper control limit or the lower control limit of either of these charts indicates an "out-of-control" situation. Corrective actions will be taken to ascertain the cause of the out-of-control situation, as follows.

- Precision

  After the day's data has been plotted on the control chart, the data will be pooled with previous data to calculate a new mean and standard deviation for controlling the following day's

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process. In determining the new mean and standard deviation, the new data should be combined with previous found concentrations and not the mean of the previous found concentrations. Except for the data obtained from standard samples, no data may be discarded unless sufficient reason can be cited to justify the discarding process. That a point is beyond control limits is not sufficient justification to discard the point.

- Accuracy

Accuracy control charts are constructed by calculating the mean and standard deviation of the slope of the least squares regression line of a plot of found vs. target concentrations. The upper control limit (UCL) and lower control limit (LCL) will be established at three times the standard deviation (3s) above and below the central line, respectively. The slope of a line calculated from the found concentrations of QC spiked natural samples analyzed in a single day will reflect the accuracy for that day. The value of the slope will be plotted on the control chart. If the process is considered in control. Values out-of-control situation requiring corrective action. After the slope for the day's data has been determined, this value will be pooled with the slopes obtained from previous days to calculate a new mean and standard deviation to control the following day's process. Except for the data obtained from standard samples, no data may be discarded unless sufficient reason can be cited to justify the discarding process. That a point is beyond control limits is not sufficient justification to discard the point. An out-of-control situation may be indicated by:

1. A value outside the control limits.

2. A series of seven successive points on the same side of the central line.

An out-of-control analysis, as indicated by QC charts for a given day, will cause the analytical results for that day to be rejected by the laboratory Data Supervisor, who will notify the Laboratory Quality Control Coordinator (LQCC) and the Laboratory Manager. The LQCC will stop all analyses on the instrument and take the following remedial action:

1. Check the instrument calibration record and standard samples used for calibration.

2. Check all calculations for mathematical accuracy.

3. Have the instrument re-calibrated and re-checked with QC performance standards.

4. If the instrument is operating satisfactorily, have analyses of samples, duplicates, and spikes repeated.

5. If the instrument is not operating satisfactorily, label it "out-of-order" and have it repaired by instrument maintenance before re-checking and re-analyzing samples.
6. No instrument will be returned to operational status until check analyses indicate an "in control" situation.
7. All results of checks and remedial action will be fully documented.

20. Reports:

The EPA will be provided with all the data gathered during this field activity. QA reports will include the Brossman Short Form and any QA audit reports, and audit completion notices.

SITE HEALTH AND SAFETY PLAN FORM

TES III Health and Safety Program

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CAMP DRESSER & McKEE INC.

SITE NAME Upjohn Manufacturing Co.
SITE # 797
LOCATION Barceloneta, Puerto Rico
REGION II
PREPARED BY Andrea Kretchmer
DATE 11 January 1988
DOCUMENT # 1797-C02-EP-BKTT-1
FIRM Camp Dresser & McKee, Inc.
WORK ASSIGNMENT # 797
EPA CONTACT Laura Lombardo
EPA CONTACT PHONE # 212-264-2598

( ) AMENDMENT TO EXISTING APPROVED HSP
( ) DATE EXISTING APPROVED HSP

OBJECTIVES: summarize below

The objective of this work assignment is to perform additional onsite and offsite ground water sampling in order to verify existing analytical data and to delineate the areal extent of the contamination. This information will then be used for subsequent reevaluation of a ground water extraction and treatment system.

SITE TYPE: Check as many as applicable

Active	(X)	Landfill	( )	Unknown	( )
Inactive	( )	Uncontrolled	(X)	Other (specify):	
Secure	( )	Industrial	(X)		
Insecure	( )	Recovery	(X)		
Enclosed space	( )	Well Field	(X)		

SITE DESCRIPTION AND FEATURES: Summarize below. Include principal operations and unusual features (containers, buildings, dykes, power lines, terrain, etc.)

The Upjohn Manufacturing Company's pharmaceutical manufacturing plant is icoated approximately 2.5 km west of "Cruce Davila", the intersection of state roads P.R. 2 and P.R. 140. Access to the site is provided by a secondary road that intersects P.R. 2. The facility is located on an elevated, rolling plain at 85 to 150 m above mean sea level (msl). It is surrounded by small hills known as :mogote" whose tops are approximately 130 m above msl. The property is bounded to the north and west by the Puerto Rico Land Authority's (PRLA) pineapple fields, to the south by Jose E. Marquez Munoz, and to the east by PRLA and Antonio Marquez Arbona. An east-west trending power line is adjacent to the site's southern boundary. Facilities at the plant include a pharmaceutical warehouse to the east and a tank farm in the north-central portion of the site. These underground tanks are used to store process wastes under a nitrogen atmosphere. Formerly located in the center of the facility, the leaky tank has been removed and a concrete cap placed over the spill area. A grid of monitoring wells has been installed at, and north of, the site. A vacuum extraction system is also in place at the site. Upjohn is located in the northern limestone region of Puerto Rico, between two northeast-southwest trending ridges of mogotes formed by the crystalline Aymamon limestone. The Aymamon in this area is in ad advanced state of karstification and has extensive primary and secondar porosities. It is therefore a highly permeable formation. The occurrence of the water table aquifer in this cavernous, highly weathered, permeable limestone results in the unusual hydrogelogical conditions at this site. The characteristics of the ground water resemble an underground stream, making it difficult to track the contaminant plume.

SURROUNDING POPULATION: ( ) Residential (X) Industrial (X) Rural ( ) Urban ( ) Other:

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SITE HEALTH AND SAFETY PLAN FORM

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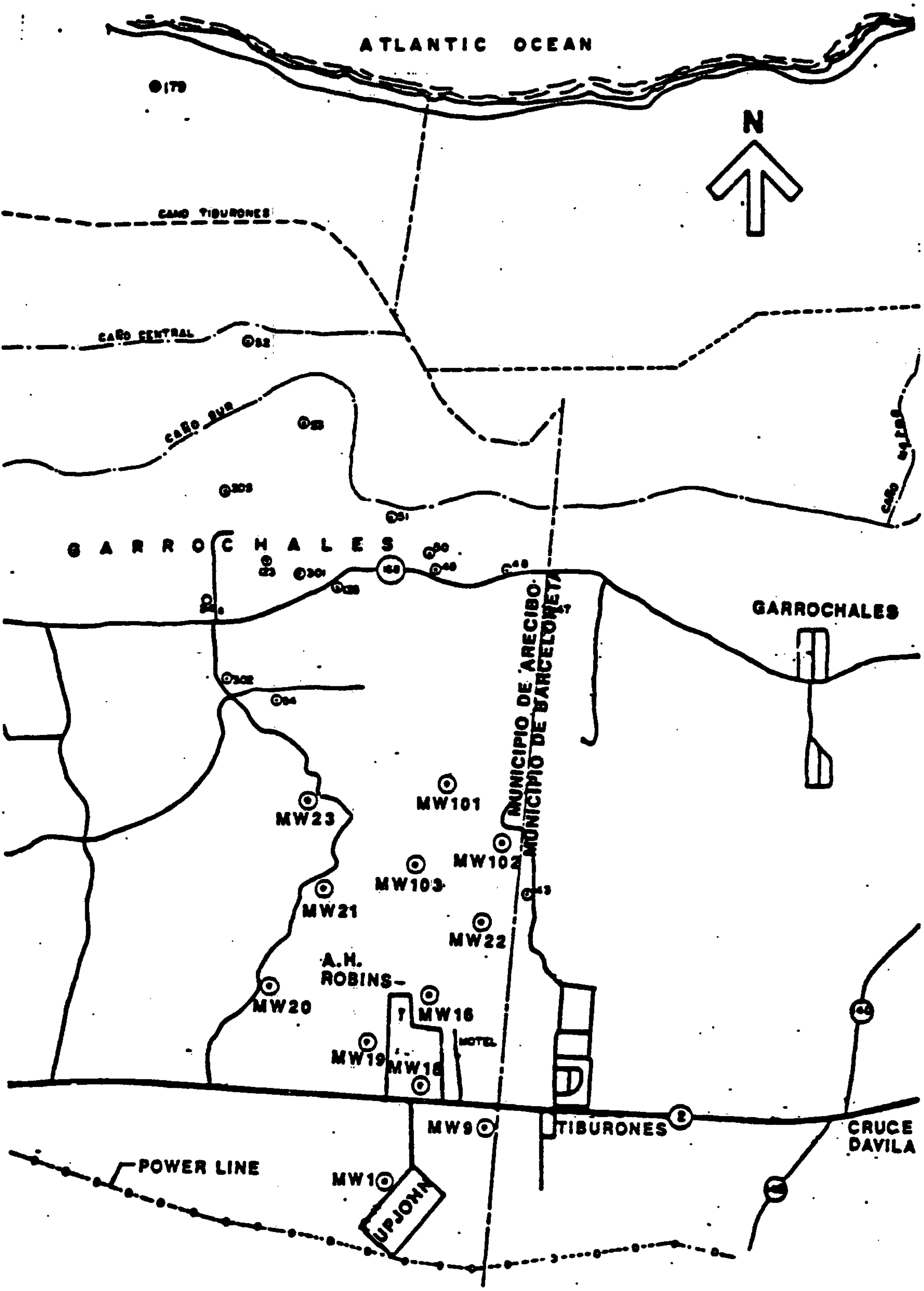
THIS PAGE RESERVED FOR SITE MAP



SCALE: 1:35,000

SOURCE: Geotech, 1984

SITE HEALTH AND SAFETY PLAN FORM **TES III Health and Safety Program**	**This document is for exclusive use of the USEPA, TES III Team Firms, and their subcontractors.**	**CAMP DRESSER & McKEE INC.**

SITE HISTORY: Summarize below. In addition to history, includr complaints from public, previous agency actions, known exposures or injuries, etc.

In September, 1982, a buried tank on the Upjohn property leaked, releasing approximately 15,000 gallons of a mixture containing 65% carbon tetrachloride (CCl_4) and 35% acetonitrile. Shortly after the spill was detected, Upjohn installed a grid of monitoring wells and took soil borings to determine the extent of contamination. Contamination was detected in both the ground water and soils. Upjohn used one of the contaminated wells as an extraction well and also installed another well to treat ground water. A vacuum extraction system was also installed to remove CCl_4 from the soil onsite. Subsequent testing revealed that much of the CCl_4 had been removed from the soil by this method. In addition, the pump and treat system has been effective in reducing the contamination in the ground water. In order to eliminate further contamination, Upjohn has removed the leaking tank and placed a concrete cap over the spill area to prevent and control leachate production and migration. In 1984, Upjohn prepared a draft RI\FS which characterized the extent of contamination in the subsoil and ground water and addressed partial remediation of the plume. However, the EPA did not feel this study fully defined the contaminant plume. The EPA, in June of 1987, entered into an Administrative Order of Consent with Upjohn to perform additional RI studies to fully define the plume of contamination. In August of 1987, Upjohn submitted the amended RI report. However, EPA believes the contaminant plume has still not been totally delineated and requested further sampling of private well down-gradient of the site.

WASTE TYPES: (X) Liquid ( ) Solid ( ) Sludge ( ) Gas ( ) Unknown ( ) Other, specify:

WASTE CHARACTERISTICS: Check as many as applicable.

( ) Corrosive	(X) Flammable	( ) Radioactive*
(X) Toxic	(X) Volatile	( ) Reactive
( ) Inert	( ) Unknown	( ) Other, specify:

* A complete background survey gives no indication that either hospital or low-level radioactive wastes have been deposited at this site. Therefore, no radiation survey is required.

HAZARDS OF CONCERN:

(X) Heat Stress, attach guidelines	( ) Noise
( ) Cold stress, attach guidelines	(X) Inorganic Chemicals
( ) Explosion, Flammable	(X) Organic Chemicals
( ) Oxygen Deficient	(X) Other, specify: Schistosomiasis, also known as snail fever: adult worms inhabit the blood vessels. To avoid this disease, personnel should not wade in any fresh water in the area.
( ) Radiological	
( ) Biological	

PRINCIPAL DISPOSAL METHODS AND PRACTICES: Summarize below

This facility stores ignitable wastes, combustible wastes, and spent halogenated solvents in drums and tanks until they are manifested and sent off to an approved disposal facility. A portion of Upjohn's waste is regenerated and returned to the facility for reuse.

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SITE HEALTH AND SAFETY PLAN FORM **TES III Health and Safety Program**	This document is for exclusive use of the USEPA, TES III Team Firms, and their subcontractors.	**CAMP DRESSER & McKEE INC.**

HAZARDOUS MATERIAL SUMMARY: Circle waste type and estimate amounts by category

CHEMICALS:
Amounts\units:

Acids

Pickling Liquors

Caustics

Pesticides

Dyes\Inks

[✓ Cyanides]

[✓ Phenols]

Halogens

PCBs

[✓ Metals]

Other, specify

SOLIDS:
Amounts\units:

Flyash

Asbestos

Milling\Mine Tailings

Ferrous Smelter

Non-Ferrous Smelter

Other, specify:

SLUDGES:
Amounts\units:

Paint Pigments

Metals\Sludges

POTW

Aluminum

Other, specify:

SOLVENTS:
Amounts\units:

[✓ Halogenated Solvents]

[✓ Non-Halogenated Solvents]

Other, specify

OILS:
Amounts\units:

Oily Wastes

Other, specify:

OTHERS:
Amounts\units:

Laboratory Pharmaceutical

Hospital

Radiological

Municipal

Other, specify

OVERALL HAZARD EVALUATION: ( ) High ( ) Medium (X) Low ( ) Unknown

JUSTIFICATION: A great deal of data has been collected at this site since 1982. Although high levels of CCl4 were originally found in the vicinity of the Upjohn facility, all concentrations of CCl4 in the ground water have remained below the TLV of 10 ppm. Task A will therefore begin in Modified Level D with continuous air air monitoring and a contingency to upgrade to Level C. Task B will begin in Level C with a contingency to downgrade to Modified Level D. If sustained readings would require upgrading, then all personnel will back off from the well and allow it to vent. Ambient air will be rechecked with the OVA and HNu before work resumes.

FIRE\EXPLOSION POTENTIAL: ( ) High ( ) Medium (X) Low ( ) Unknown

BACKGROUND REVIEW: (X) Complete ( ) Incomplete

KNOWN SITE CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION* (specify units and media)	PEL\TLV ppm or mg\m3 (specify)	IDLH ppm or mg\m3 (specify)	SYMPTONS\EFFECTS OF ACUTE EXPOSURE	PHOTO-IONIZATION POTENTIAL
Carbon Tetrachloride	6933 ppb - GW	10 ppm	300 ppm\CA	CNS depression, nau, vomit; liver, kidney damage, skin irritant, (carc)	11.47
Chloroform	123 ppb - GW	50 ppm	1000 ppm\CA	Dizz, mental dullness, naus, head, ftg, anes; hepatomegaly, eye, skin irrit; [carc]	11.42
Methylene Chloride	13.6 ppb - GW	500 ppm	5000 ppm\CA	Ftg, weak, sleep, li-head; limbs numb, tingle; nau, irrit eyes, skin; vertigo; worsen angina	11.35
Chloromethane	NA	100 ppm	10000 ppm	Dizz, nau, vomit; vis dist; stagger, slur speech; convuls, coma; liver, kidney damage; frostbite (carc)	11.28
Methane	NA	NA	NA	NE	12.98
Acetonitrile	NA	40 ppm	4000 ppm	Asphy; nau, vomit; chest pain; weak, stupor, convuls, eye irrit	10.91
Thallium	104 ppb - GW	0.1 mg\m3	20 mg\m3	Nau, diar, abdom pain; eyes, CNS, liver, lung, kidneys, GI tract, body hair - target organs	NA
Zinc	59 ppb - GW	NA	NA	NA	NA
Phenolics (Total)	0.073 ppb - GW	20 mg\m3	250 ppm	Irrit eyes, nose, throat; weak, muscle ache; liver, kidney damage; skin burn	8.50
Cyanide (Total)	<0.025 ppb - GW	5 mg\m3	50 mg\m3	Asphyxia and death; weak, head, confusion, nau, vomit; slow gasping resp; eye, skin irrit	NA
Arsenic	9.6 ppb - GW	10 ug\m3	CA	Ulceration of nas. septum; derm, GI disturbances, resp irrit, hyperpig of skin; (carc)	11.0
Mercury	1.23 ppb - GW	0.01 mg\m3	10 mg\m3	Vision, hearing; emotions, spastic, jerky, dizziness; hypersalv; lac, nau, vomit, diarr, consti, derm	4.45

* Detected from 1985 through 1987

NA = Not Available
NE = None Established
CA = Potential Human Carcinogen
U = Unknown

S = Soil
A = Air
SW = Surface Water
GW = Ground water
T = Tailings
S = Sludge
F = Flysch
D = Drums
TK = Tanks
L = Lagoon

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SITE HEALTH AND SAFETY PLAN FORM TES III Health and Safety Program	This document is for exclusive use of the USEPA, TES III Team Firms, and their subcontractors.	CAMP DRESSER & McKEE INC.

FIELD ACTIVITIES COVERED UNDER THIS PLAN

	TASK DESCRIPTION \ SPECIFIC TECHNIQUE \ SITE LOCATION	TYPE	LEVEL OF PROTECTION Primary	 Contingency	SCHEDULE
A	Ground Water Sampling (See Brossman Short Form Item 13) Wells: 20, 22, 101, 102, 103, jobCorp, 123, VaqSab, Jossmorr, Garrochales III, Cambija	[✓ Intrusive] Non-intrusive	A B C [✓ D] [✓ Modified]	A B [✓ C] D Modified	18 JAN 88 - 29 JAN 88
B	Ground Water Sampling (See Brossman Short Form Item 13) Wells: 1, 9, 16, 18, 19, 21, 23	[✓ Intrusive] Non-intrusive	A B [✓ C] D Modified	A B C [✓ D] [✓ Modified]	18 JAN 88 - 29 JAN 88
C		Intrusive Non-intrusive	A B C D Modified	A B C D Modified	
D		Intrusive Non-intrusive	A B C D Modified	A B C D Modified	

SITE PERSONNEL AND RESPONSIBILITIES (include subcontractors)

NAME	FIRM\REGION	CDM HEALTH CLEARANCE	RESPONSIBILITIES
Scott Theal	CDM\NOR	B - T	Work Assignment Manager; Sample Management
John Mihalich	CDM\FPC	B - T	Site Health and Safety Coordinator

SITE HEALTH AND SAFETY PLAN FORM

TES III Health and Safety Program

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PROTECTIVE EQUIPMENT: Specify by task. Indicate type and\or material, as necessary.

BLOCK A

TASKS: [✓ 1] 2 3 4
LEVEL: A B C [✓ D Modified]
(X) Primary ( ) Contingency

Respiratory: (X) Not needed

( ) SCBA, Airline: ____
( ) APR: ____
( ) Cartridge: ____
( ) Escape Mask: ____
( ) Other: ____

Head and Eye: ( ) Not needed

(X) Safety Glasses: ____
( ) Face Shield: ____
( ) Goggles: ____
(X) Hard Hat: ____
( ) Other: ____

Boots: ( ) Not needed

Prot. Clothing: ( ) Not needed

( ) Encapsulating Suit: ____
( ) Splash Suit: ____
( ) Apron: ____
( ) Tyvek Coverall: ____
(X) Saranex Coverall: ____
( ) Coverall:
(X) Other: Rain gear

Gloves: ( ) Not needed

(X) Undergloves: Surgical
(X) Gloves: Neoprene
( ) Overgloves: ____

( ) Other: Specify below

(X) Boots: Neoprene safety (steel toe and shank)
(X) Overboots: Butyl boot covers

BLOCK B

TASKS: 1 [✓ 2] 3 4
LEVEL: A B [✓ C] D Modified
(X) Primary ( ) Contingency

Respiratory: ( ) Not needed

( ) SCBA, Airline: ____
(X) APR: Full face
(X) Cartridge: GMCH
( ) Escape Mask: ____
( ) Other: ____

Head and Eye: ( ) Not needed

( ) Safety Glasses: ____
( ) Face Shield: ____
( ) Goggles: ____
(X) Hard Hat: ____
( ) Other: ____

Boots: ( ) Not needed

Prot. Clothing: ( ) Not needed

( ) Encapsulating Suit: ____
( ) Splash Suit: ____
( ) Apron: ____
( ) Tyvek Coverall: ____
(X) Saranex Coverall: ____
( ) Coverall:
(X) Other: Raingear

Gloves: ( ) Not needed

(X) Undergloves: Surgical
(X) Gloves: Neoprene
( ) Overgloves: ____

( ) Other: Specify below

(X) Boots: Neoprene safety (steel toe and shank)
( ) Overboots: Butyl boot covers

BLOCK C

TASKS: [✓ 1] 2 3 4
LEVEL: A B [✓ C] D Modified
( ) Primary (X) Contingency

Respiratory: ( ) Not needed

( ) SCBA, Airline: ____
(X) APR: Full face
(X) Cartridge: GMCH
( ) Escape Mask: ____
( ) Other: ____

Head and Eye: ( ) Not needed

( ) Safety Glasses: ____
( ) Face Shield: ____
( ) Goggles: ____
(X) Hard Hat: ____
( ) Other: ____

Boots: ( ) Not needed

Prot. Clothing: ( ) Not needed

( ) Encapsulating Suit: ____
( ) Splash Suit: ____
( ) Apron: ____
( ) Tyvek Coverall: ____
(X) Saranex Coverall: ____
( ) Coverall: ____
(X) Other: Raingear

Gloves: ( ) Not needed

(X) Undergloves: Surgical
(X) Gloves: Neoprene
( ) Overgloves: ____

( ) Other: Specify below

(X) Boots: Neoprene safety (steel toe and shank)
(X) Overboots: Butyl boot covers

BLOCK D

TASKS: 1 [✓ 2] 3 4
LEVEL: A B C [✓ D Modified]
( ) Primary (X) Contingency

Respiratory: (X) Not needed

( ) SCBA, Airline: ____
( ) APR: ____
( ) Cartridge: ____
( ) Escape Mask: ____
( ) Other: ____

Head and Eye: ( ) Not needed

(X) Safety Glasses: ____
( ) Face Shield: ____
( ) Goggles: ____
(X) Hard Hat: ____
( ) Other: ____

Boots: ( ) Not needed

Prot. Clothing: ( ) Not needed

( ) Encapsulating Suit: ____
( ) Splash Suit: ____
( ) Apron: ____
( ) Tyvek Coverall: ____
(X) Saranex Coverall: ____
( ) Coverall:
(X) Other: Raingear

Gloves: ( ) Not needed

(X) Undergloves: Surgical
(X) Gloves: Neoprene
( ) Overgloves: ____

( ) Other: Specify below

(X) Boots: Neoprene safety (steel toe and shank)
(X) Overboots: Butyl boot covers

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SITE HEALTH AND SAFETY PLAN FORM **TES III Health and Safety Program**	This document is for exclusive use of the USEPA, TES III Team Firms, and their subcontractors.	**CAMP DRESSER & McKEE INC.**

MONITORING EQUIPMENT: Specify by task. Indicate type, as necessary. Attach additional sheets, as necessary.

INSTRUMENT	TASKS	ACTION GUIDELINES	COMMENTS
Combustible Gas Indicator	[✓ A] [✓ B] C D	0 - 10% LEL: No explosion hazard 10 - 20% LEL: Potential explosion hazard; notify SHSC > 25% LEL: Explosion hazard; interrupt task\evacuate 21.0% O2: Normal oxygen < 21.0% O2: Oxygen deficient; notify SHSC > 21.0% O2: Interrupt task\evacuate	After opening the well and allowing it to vent for 5 to 10 minutes, the oxygen and combustible gas levels at the wellhead will be measured. ( ) Not needed
Radiation Survey Meter	A B C D	3 x Background: Notify SHSC > 2 mR\hr: Interrupt task\evacuate	Note: Annual exposure not to exceed 100 mrem\yr or 50 urem\hr average. ( ) Not needed
Photoionization Detector (X) 11.7 ev (X) 10.2 ev ( ) 9.8 ev ( ) ____ ev Type HNu	[✓ A] [✓ B] C D	Specify: Background: Modified Level D 0 - 5 ppm: Level C 5 - 50 ppm: Level B	Ambient air will be measured prior to field operations and periodically throughout field operations in both the breathing zone and at the wellhead. If organic concentrations exceed background, Level C will be required. ( ) Not needed
Flame Ionization Detector Type OVA-128	[✓ A] [✓ B] C D	Specify: Same as above.	( ) Not needed
Detector Tubes\ Monitox Type ____ Type ____	A B C D	Specify:	(X) Not needed
Respirable Dust Monitor Type ____ Type ____	A B C D	Specify:	(X) Not needed
Other	A B C D	Specify:	

DECONTAMINATION PROCEDURES

ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, AND SUPPORT ZONES

Personnel Decontamination

Summarize below and\or attach diagram

Minimum Level C decontamination procedures include the following stations and procedures:
- equipment drop-off
- outer garment, boots, and gloves scrub, wash, and rinse
- outer boots and gloves removal
- boots, gloves and outer garment removal
- facepiece removal.

Hands and face must be washed before leaving site. Shower as soon as practical. First aid kit will be provided onsite.

( ) Not needed

Sampling Equipment Decontamination

Summarize below and\or attach diagram

The syringe will be decontaminated after each sampling event as follows:
- wash with Alconox
- rinse with tap water
- rinse with 10% HNO_3 solution
- rinse with tap water
- rinse with acetone
- rinse with deionized, demonstrated analyte-free water.
- air dry
- wrap in aluminum foil, shiny side out,

Air monitoring equipment lull require sponge wash and rinse if in contact with surfaces onsite.

( ) Not needed

Heavy Equipment Decontamination

Summarize below and\or attach diagram

(X) Not needed

Containment and Disposal Method

Disposable equipment and\or clothing will be collected, contained, and transported offsite for sanitary disposal.

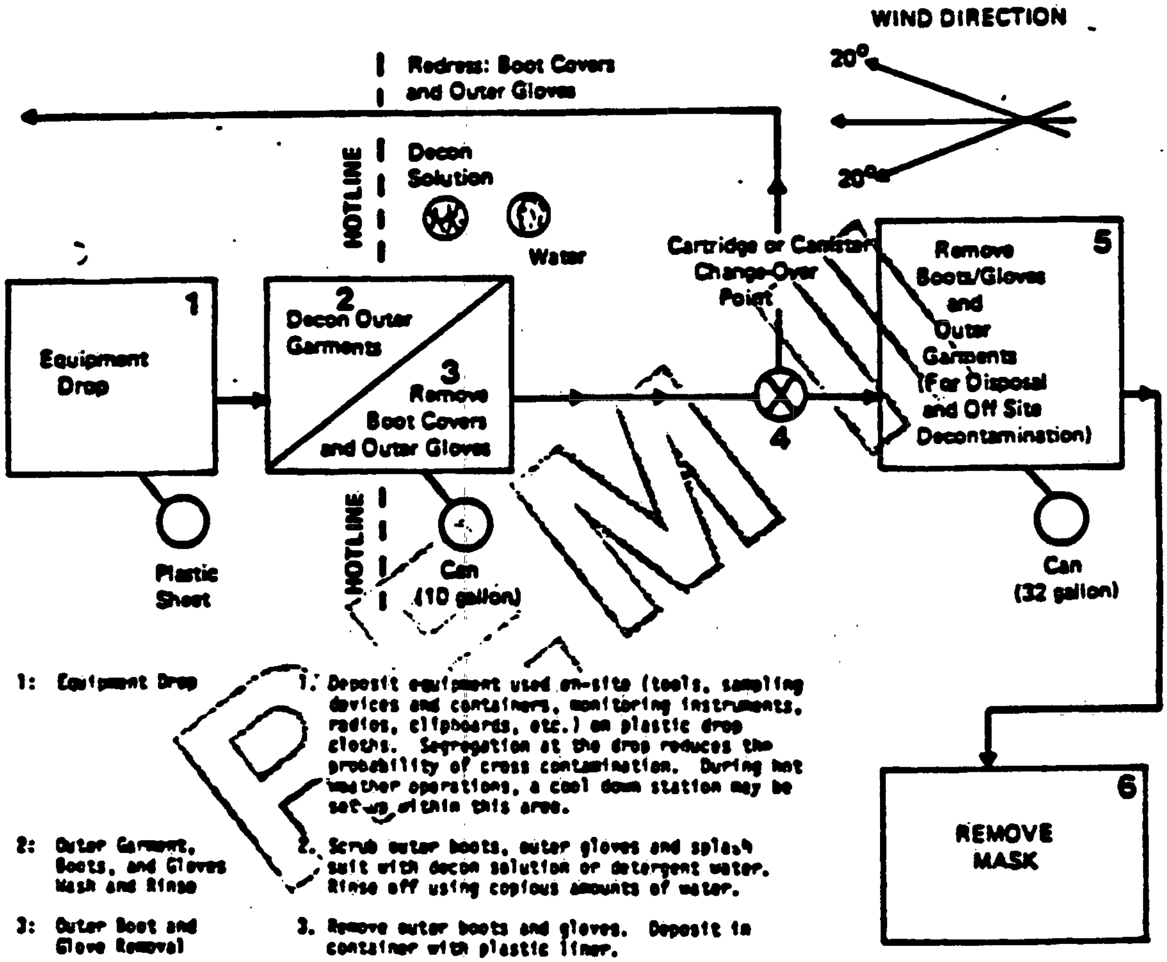
Containment and Disposal Method

Containment and Disposal Method

A designated area will be established for personnel decontamination and equipment decontamination. Personnel and equipment decontamination should be separated by no less than 10 feet. The equipment decontamination area should be downwind from the personnel decontamination area. All workers will be shown the correct procedures for decontamination and for changing from decontaminated clothing to clean clothing. The decontamination areas will be monitored using a photo-ionization detector (PID) or flame ionization detector (FID) on a periodic basis to ensure that this area does not become overly contaminated.

Minimum Level C Decontamination Procedures

From: *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH, 1985.*



Station 1: Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area.
Station 2: Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3: Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4: Canister or Mask Change	4. If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5: Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6: Face Piece Removal	6. Facepiece is removed. Avoid touching face with fingers. Facepiece deposited on plastic sheet.

SITE HEALTH AND SAFETY PLAN FORM

TES III Health and Safety Program

This document is for exclusive use of the USEPA, TES III Team Firms, and their subcontractors.

CAMP DRESSER & McKEE INC.

EMERGENCY CONTACTS

Site Water Supply	Upjohn Manufacturing Co.
Site Telephone	809-846-4900
Site Radio	
Site Other (specify)	
USEPA Environmental Response Team	201-321-6660
US Coast Guard Environmental Response Team	800-424-8802
Association of American Railroads Response Team	202-293-4048
CHEMTREC	800-424-9300

CONTINGENCY PLANS Summarize below

Level of protection will be upgraded from Modified Level D to Level C when sustained readings of 0 to 5 ppm above background are observed on the OVA or HNu.

Level of Protection will be downgraded from Level C to Modified Level D if sustained readings do not exceed background levels on the OVA or HNu.

Criteria for upgrade or evacuation include:

1. Instrument action levels;
2. Visual observations;
3. Odors;
4. Plant location information.

RHSC will be notified within 24 hours of any change in level of protection or the Health and Safety Plan.

SITE HEALTH AND SAFETY PLAN APPROVALS

RHSS Signature Gary Bielenberg for Peter Gorton Date 1/14/88

HSM Signature ______________ Date ________

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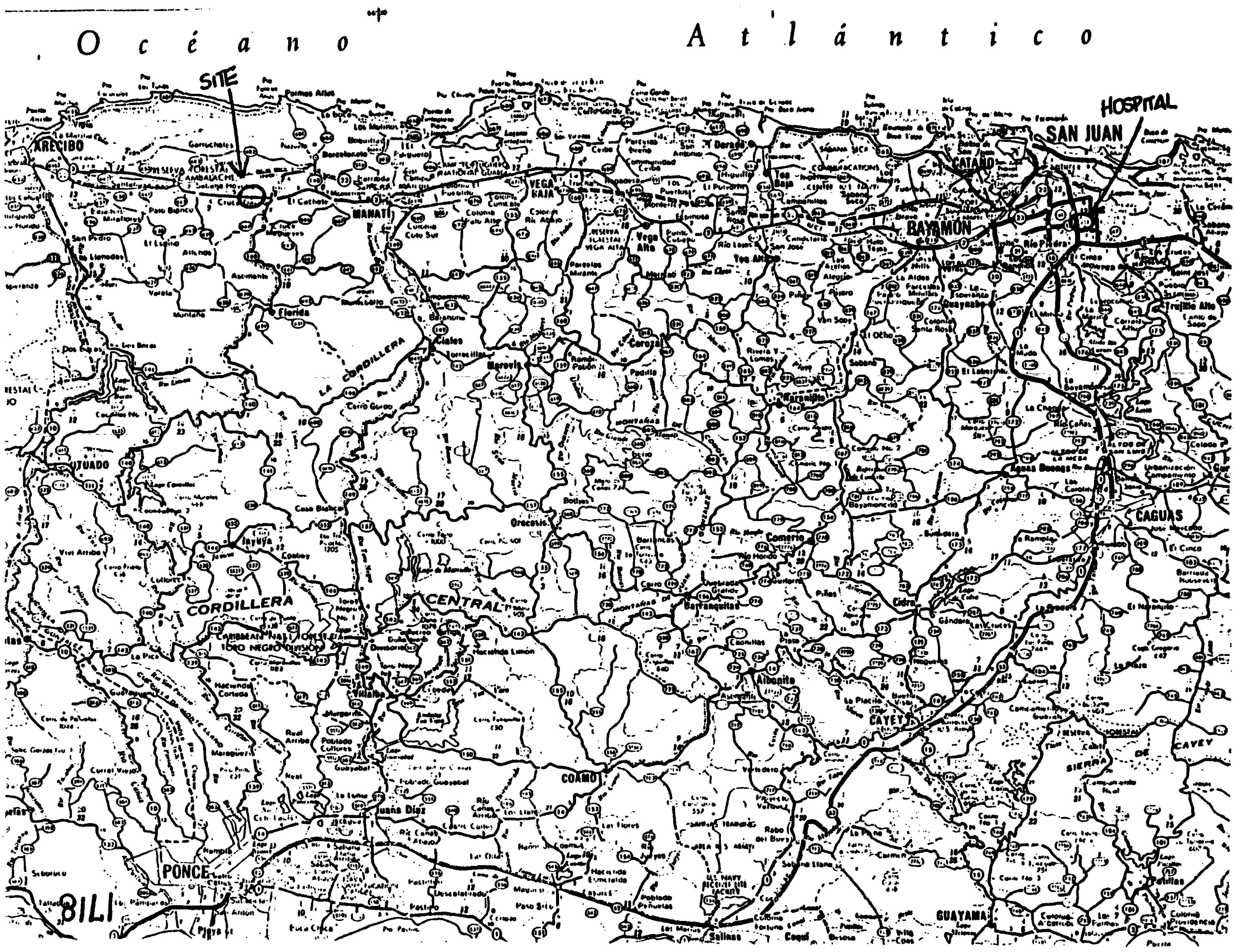
EMERGENCY CONTACTS	NAME	PHONE
CDM 24-Hour Emergency Line	NA	202-896-4138
TES III Health and Safety Manager	M. Mathamel	703-642-0544
Regional Health and Safety Supervisor	P. Gorton	201-225-7000
Project\Site Manager	L. Guterman	212-693-0370
Site Health and Safety Coordinator	J. Mihalich	212-393-9634
EPA Contact	L. Lombardo	212-264-2598
Other (specify)	S. Theal	809-791-5151 ESJ Towers, Isla Verde
State Environmental Agency	Pedro Valez	809-725-5140
State Spill Contractor	San Juan Fire Dept. Spill Team	809-722-1120
Fire Department	San Juan Fire Dept.	809-722-1120
Police Department	San Juan	809-724-4616
State Police		
Health Department	Office of Civil Defense Spill Team	809-852-4044
Poison Control Center	Centro Medico	809-754-8535

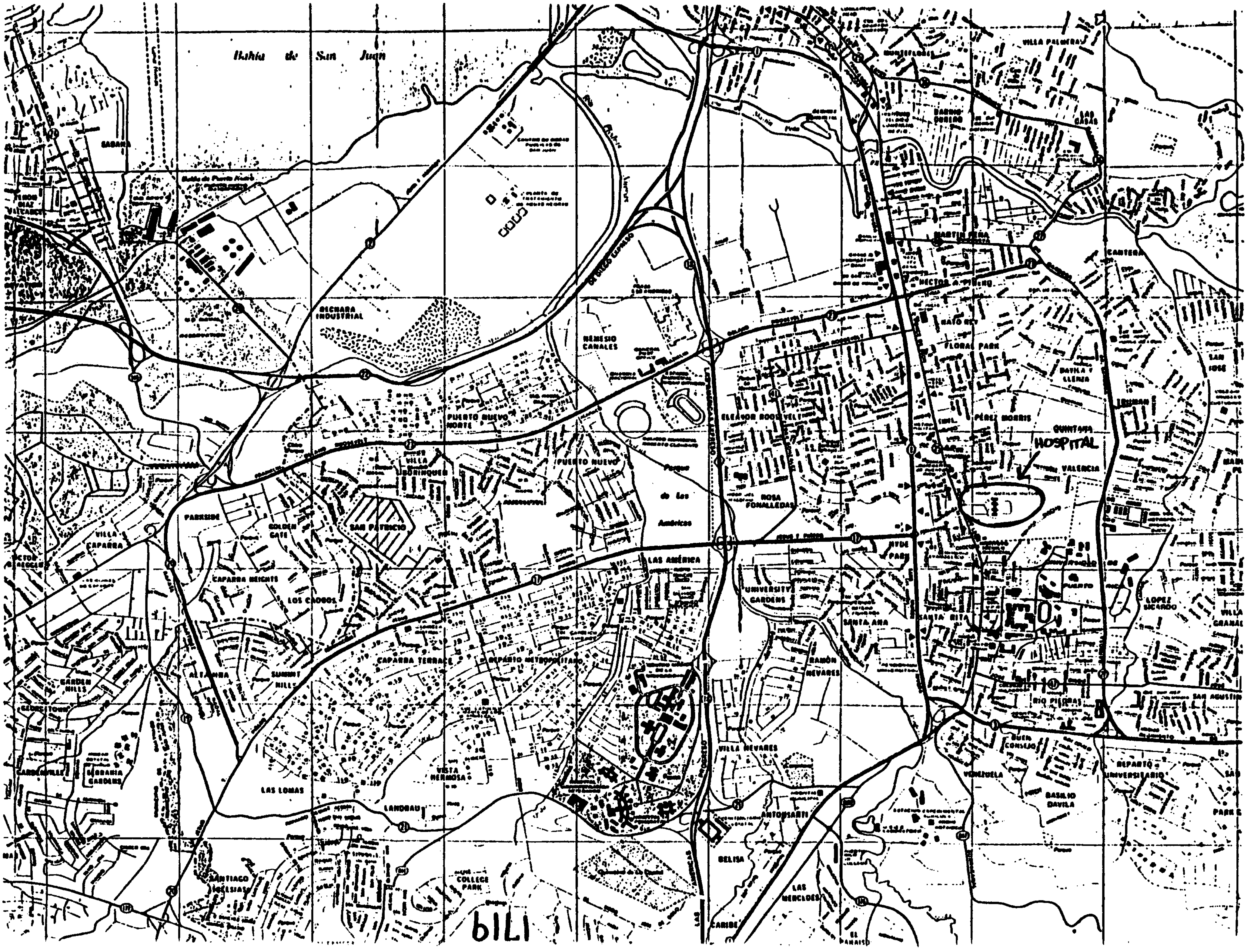
MEDICAL EMERGENCY		PHONE
Hospital Name	Hosp. Auxilio Mutuo	809-758-2000
Hospital Address		
Name of Contact at Hospital	Dr. Calisto Romero	
Name of 24-Hour Ambulance	Unimed (in Manati)	809-854- 6677

Route to Hospital: Take route 2 east (becomes route 23 - Franklin Delano Roosevelt) to route 25 south (Ponce de Leon) about 15 blocks and turn left into the hospital.

Distance to the hospital approximately 40 miles

Attach map with route to hospital


Océano Atlántico
SITE
HOSPITAL
BILI
ARECIBO
SAN JUAN
CATAÑO
BAYAMON
MANATI
VEGA BAJA
Vega Alta
Toa Baja
Toa Alta
Dorado
Barceloneta
Florida
Ciales
Morovis
Corozal
Naranjito
Guaynabo
Trujillo Alto
Aguas Buenas
CAGUAS
UTUADO
Jayuya
Orocovis
Comerío
Barranquitas
Cidra
Aibonito
CAYEY
Villalba
Juana Díaz
COAMO
PONCE
Salinas
GUAYAMA
LA CORDILLERA
CORDILLERA
CENTRAL
SIERRA DE CAYEY
CARIBBEAN NATL FOREST
TORO NEGRO DIVISION
Montaña
Asomante
Santa Isabel


Bahia de San Juan
SABANA
CHINO DIAZ VALCARCEL
BECHARA INDUSTRIAL
NEMESIO CANALES
PUERTO NUEVO NORTE
PUERTO NUEVO
VILLA BORINQUEN
ELEANOR ROOSEVELT
ROSA FONALLEDAS
Parque de los Américas
PARKSIDE
GOLDEN GATE
SAN PATRICIO
VILLA CAPARRA
CAPARRA HEIGHTS
LOS CAOBOS
LAS AMÉRICA
UNIVERSITY GARDENS
SANTA ANA
SANTA RITA
CAPARRA TERRACE
REPARTO METROPOLITANO
ALTAMIRA
SUMMIT HILLS
RAMÓN NEVARES
GARDEN HILLS
GEORGETOWN
SEBORUCO GARDENS
VILLA NEVARES
VISTA HERMOSA
LAS LOMAS
LANDRAU
ANTONSANTI
BELISA
COLLEGE PARK
SANTIAGO IGLESIAS
LAS MERCEDES
CARIBE
EL PARAISO
VILLA PALMERAS
MONTEFLORES
BARRIO OBRERO
LAS CASAS
MARTIN PEÑA
HECTOR R. PIÑERO
HATO REY
FLORAL PARK
CANTERA
DAVILA Y LLENZA
SAN JOSE
PÉREZ MORRIS
QUINTANA
TRUMAN
HOSPITAL
VALENCIA
HYDE PARK
LOPEZ SICARDO
VILLA GRANADA
RIO PIEDRAS
SAN AGUSTIN
BUEN CONSEJO
VENEZUELA
BASILIO DAVILA
REPARTO UNIVERSITARIO

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SITE HEALTH AND SAFETY PLAN FORM **TES III Health and Safety Program**	**This document is for exclusive use of the USEPA, TES III Team Firms, and their subcontractors.**	**CAMP DRESSER & McKEE INC.**

The following personnel have read and fuly understand the contents of this Health and Safety Plan and further agree to all requirements contained herein:

Name	**Affiliation**	**Date**	**Signature**

RECEIVED

MAR 21 1986

CAMP, DRESSER & McKEE
EDISON, NEW JERSEY

MEMORANDUM

TO: Distribution

FROM: M.S. Mathamel, REM II Health and Safety Manager

DATE: March 18, 1986

SUBJECT: CDM/REM II 24-HOUR EMERGENCY NUMBER

DOCUMENT NUMBER: 999-HS1-IO-CGYN-1

ACTION: Distribute To Field Personnel

The CDM/REM II 24-hour health and safety emergency number has been established to provide EMERGENCY health and safety, medical, and toxicological support and advice to REM II field personnel. Immediate medical emergencies such as exposures and injuries are to be handled via the emergency systems established for the particular site. The 24-hour number provides additional information and support.

This number is to be used for HEALTH AND SAFETY EMERGENCIES ONLY; routine matters such as health and safety clearance are to be handled through normal channels during business hours.

To access the 24-hour call system:

Dial 202-896-4138 on a TOUCH TONE PHONE. Wait until you hear three beeps. Dial in the telephone number where you can be reached, including the area code. Dial in digits only, for example, 7036420544. If you make a mistake, reset the system by dialing three *'s. Press the # key to transmit the phone number. Hang up. It is necessary to remain at the phone number that you transmitted for a period of 5 - 30 minutes to receive the return call. If there is no response in 30-minutes, re-transmit the number. -

CC:
G. Dunbar - FPC
J. Curtis - FPC
D. Doyle - FPC
S. Paquette - FPC
A. Szilagyi - FPC

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Requirements of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discrimination.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for optional penalties of up to $1,000 for each nonserious violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $10,000 for each such violation.

Criminal penalties are also provided for in the Act. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of not more than $10,000, or by imprisonment for not more than six months, or by both. Conviction of an employer after a first conviction doubles these maximum penalties.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

Such voluntary action should initially focus on the identification and elimination of hazards that could cause death, injury, or illness to employees and supervisors. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free consultative assistance, without citation or penalty, is available to employers, on request, through OSHA supported programs in most State departments of labor or health.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

- Atlanta, Georgia
- Boston, Massachusetts
- Chicago, Illinois
- Dallas, Texas
- Denver, Colorado
- Kansas City, Missouri
- New York, New York
- Philadelphia, Pennsylvania
- San Francisco, California
- Seattle, Washington

Telephone numbers for these offices, and additional area office locations, are listed in the telephone directory under the United States Department of Labor in the United States Government listing.

Washington, D.C.
1985
OSHA 2203

Bill Brock

William E. Brock, Secretary of Labor

U.S. Department of Labor
Occupational Safety and Health Administration

Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or a facsimile) in a conspicuous place where notices to employees are customarily posted.

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SECTION 9.0 HEAT AND COLD STRESS

9.1 Introduction

Stress can contribute significantly to accidents or harm workers in other ways.

The term stress denotes the physical (gravity, mechanical force, heat, cold, pathogen, injury) and psychological (fear, anxiety, crises, joy) forces that are experienced by individuals.

The body's response to stress occurs in three stages:

- Alarm reaction in which the body recognizes the stressor and the pituitary-adreno-cortical system responds by increasing the heart rate and blood sugar level, decreasing digestive activity and dilating the pupils.
- Adaptive stage in which the body repairs effect of stimulation and the stress symptoms disappear.
- Exhaustion stage in which the body can no longer adapt to stress and individual may develop emotional disturbances, and cardiovascular and renal diseases.

The most common types of stress that affect REM II field personnel are heat stress and cold stress. Current thinking is that heat and cold stress may be the most serious hazard to workers at wastes sites.

9.2 Heat Stress

Heat stress usually is a result of protective clothing decreasing natural body ventilation, although it may occur at any time work is being performed at elevated temperatures.

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to fatal. Because heat stress is one of the most common and potentially serious illnesses that hazardous waste sites, regular monitoring and other preventative measures are vital.

REM II site workers must learn to recognize and treat the various forms of heat stress.

The best approach is preventative heat stress management. In general:

- Have workers drink 16 ounces of water before beginning work, such as in the morning or after lunch. Provide disposible, 4 ounce cups, and water that is maintained at 50 - 60°F. Urge workers to drink 1 - 2 of these cups water every 20-minutes, for a total of 1 -2 gallons per day. Provide a cool, preferably air conditioned area for rest breaks. Discourage the use of alcohol in non-working hours, and discourage the intake of coffee during working hours. Monitor for signs of heat stress.
- Acclimate workers to site work conditions by slowly increasing workloads, ie., do not begin site work activities with extremely demanding activities.

- Provide cooling devices to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear which acts as a wick to help absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.
- Install mobile showers and/or hose-down facilities to reduce body temperature and cool protective clothing.
- In hot weather, conduct field activities in the early morning or evening.
- Ensure that adequate shelter is available to protect personnel against heat, as well as cold, rain, snow, etc., which can decrease physical efficiency and increase the probability of both heat and cold stress. If possible, set up the command post in the shade.
- In hot weather, rotate shifts of workers wearing impervious clothing.
- Good hygienic standards must be maintained by frequent changes of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

9.3 Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of heat regulating mechanisms of the body - the individual's temperature control system that causes sweating stops working correctly. Body temperature rises so high that brain damage and death will result if the person is not cooled quickly.

- Symptoms: Red, hot, dry skin, although person may have been sweating earlier; nausea; dizziness; confusion; extremely *high* body temperature, rapid respiratory and pulse rate; unconsciousness or coma.
- Treatment: Cool the victim quickly. If the body temperature is not brought down fast, permanent brain damage or death will result. Soak the victim in cool but not cold water, sponge the body with cool water, or pour water on the body to reduce the temperature to a safe level (102°F). Observe the victim and obtain medical help. Do not give coffee, tea or alcoholic beverages.

9.4 Heat Exhaustion

Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. This condition is much less dangerous than heat stroke, but it nonetheless must be treated.

- Symptoms: Pale, clammy, moist skin, profuse perspiration and extreme weakness. Body temperature is normal, pulse is weak and rapid, breathing is shallow. The person may have a headache, may vomit, and may be dizzy.
- Treatment: Remove the person to a cool, air conditioned place, loosen

clothing. place in a head-low position. and provide bed rest. Consult physician. especially in severe cases. The normal thirst mechanism is not sensitive enough to ensure body fluid replacement. Have patient drink 1 - 2 cups water immediately. and every 20-minutes thereafter. until symptoms subside. Total water consumption should be about 1 - 2 gallons per day.

9.5 Heat Cramps

Heat cramps are caused by perspiration that is not balanced by adequate fluid intake. Heat cramps are often the first sign of a condition that can lead to heat stroke.

- **Symptoms:** Acute painful spasms of voluntary muscles; e.g., abdomen and extremities.
- **Treatment:** Remove victim to a cool area and loosen clothing. Have patient drink 1 - 2 cups water immediately. and every 20-minutes thereafter, until symptoms subside. Total water consumption should be 1 - 2 gallons per day. Consult with physician.

9.6 Heat Rash

Heat rash is caused by continuous exposure to heat and humid air and aggravated by chafing clothes. The condition decreases ability to tolerate heat.

- **Symptoms:** Mild red rash, especially in areas of the body in contact with protective gear.
- **Treatment:** Decrease amount of time in protective gear, and provide powder to help absorb mositure and decrease chafing.

9.7 Heat Stress Monitoring and Work Cycle Management

For strenuous field activities that are part of on-going site work activities in hot weather, the following procedures shall be used to monitor the body's physiological response to heat. and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures are to be instituted when the temperature exceeds 70°F.

- **Measure Heart Rate (HR).** Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats/minute at the beginning of the next rest period. the following work cycle should be further shortened by 33%. The procedure is continued until the rate is maintained below 110 beats/minute.

- **Measure Body Temperature.** Body temperature should be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99.6° F. If it does, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the OT exceeds 99.6°F at the beginning of the next period, the following work cycle should be further shortened by 33%. The procedure is continued until the body temperature is maintained below 99.6 F.
- **Manage Work/Rest Schedule.** The following work/rest schedule shall be used as a guideline:

Adjusted Temperature (°F)	*Active Work Time (min/hr) Using Level B/C Protective Gear*
75 or less	50
80	40
85	30
90	20
95	10
100	0

Calculate the adjusted temperature:

T (adjusted) = T (actual) + (13 x fraction sunshine)

Measure the air temperature with standard thermometer. Estimate fraction of sunshine by judging what percent the sun is out: 100% sunshine = no cloud cover = 1.0; 50% sunshine = 50% cloud cover = 0.5; 0% sunshine = full cloud cover = 0.0).

Reduce or increase the work cycle according to the guidelines under heart rate and body temperature.

9.8 Cold Stress

Persons working outdoors in low temperatures, especially at or below freezing are subject to cold stress. Exposure to extreme cold for a short time causes severe injury to the surface of the body, or results in profound generalized cooling, causing death. Areas of the body which have high surface area-to-volume ratio such as fingers, toes, and ears, are the most susceptible.

Protective clothing generally does not afford protection against cold stress. In many instances, it *increases* susceptability.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

* = sampled at the depth only

well #	1982	1983	1984	1985	1986	1987	
1	286 (310)	32,360 (310)	3989 (355)	3989	242 (310)	130 (320)*	
3		8248 (430)	6933 (310)	6933	6933	6933	*
4	9 (445, 390)	133 (295)	133	12 (280, 310)	11 (295)	ND	
5	11 (400)	6381 (315)	4566 (300)	4566	4566	4566	*
6	1532 (442)	7805 (425)	4097 (300)	4097	209 (300)	96 (300)	
7	13 (310)	59 (305)	ND	ND	ND	46 (305)	
8		33,157 (315)	3441 (355)	3441	3441	3441	*
9		53 (325)	20 (300)	20	120	93 (310)*	
10		33,383 (405)	3040 (405)	48 (355)	177 (335)	15 (320)	
11		3645 (395)	1363 (310)	1363	201 (345)	107 (395)	
12		94 (395)	32 (395)	32	32	5 (310)*	
14		4 (320)	198 (320)	ND	4 ( )	ND	
15		13 (280)	9 (305, 280)	9	9	ND	
16		913 (345)	720 (345)	494 (345)	397 (330)	303 (330)	*
17		8398 (370)	7494 (395)	278 (395)	881 (300)	87 (325)	
18		4269 (335)	5747 (310)	289 (355)	529 (355)	222 (310)	*
19		737 (365)	658 (395)	25 (365)	87 (415)	84 ( )	
20		ND	2 (345)	ND	ND	4 ( )	
21		534 (275)	611 (280)	199 (280)	245 (280)	94 (280)	
22			120 (280)	81 (305)	274 (330)	72 ( )	
23		1047 (180)	1142 (180)	482 (235)	308 (235)	219 (235)	*
101						4 (235)*	
102						3 (235)*	
103						6 (232)*	
AHR		9150 (320)	4813 (-)	79 ( )	337 (310)	38 (310)	
POL	ND	ND	ND		ND	3	
Wall	ND	ND	ND	ND	ND	ND	
Job Corp	6	2	5		20	7	
123						ND	
Tibur	ND	ND	84 ( )	ND	ND	ND	
Bet	ND	ND			ND		
Rasq						ND	
UEI					409 (IN)	168 (IN)	
Vag sab.			7			3	
Jass Mor		-	26			3 (90)	
Garrochales III		ND	2	ND	2	47	
Cambija 52	5					5	
Mizpillam	ND	2	ND	ND	ND		

LCLI

TWX 510-670-3600
CUSTOMER P.O. NO. 39142.

DATE 11/14/86

MATERIAL SAFETY DATA SHEET

SECTION I - GENERAL INFORMATION

CATALOG NO 48771 (REORDER PRODUCT BY THIS NO.)
PRODUCT NAME PURGABLE HALOCARBONS KIT 601N
DATA SHEET NO R495038

CARBON TETRACHLORIDE

FORMULA CCL4 FORMULA WEIGHT 154
CAS 56-23-5 NRTECS FG4900000
SYNONYM TETRACHLOROMETHANE
MANUFACTURER SUPELCO INC. PHONE 814-359-3441
ADDRESS SUPELCO PARK, BELLEFONTE, PA 16823-0048

SECTION II - HAZARDOUS INGREDIENTS OF MIXTURES

MATERIALS - PERCENTAGE - CAS #
(FORMULA) - TLV(UNITS)
LD50 VALUE - CONDITIONS

N/A

SECTION III - PHYSICAL DATA

BOILING POINT 77 C MM MELTING POINT -23 C
VAPOR PRESSURE N/A SPECIFIC GRAVITY 1.59 C (WATER=1)
VAPOR DENSITY 91 C (AIR=1) PERCENT VOLATILE BY VOLUME N/A
WATER SOLUBILITY .5 EVAPORATION RATE N/A
APPEARANCE COLORLESS LIQUID WITH AN ETHER-LIKE ODOR

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT F FLAMMABLE LIMITS LEL UEL

EXTINGUISHING MEDIA

THIS MATERIAL IS NOT FLAMMABLE.
DETERMINED BY SUPPORTING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE.

XPLOSION HAZARDS D

THE FOLLOWING TOXIC VAPORS ARE FORMED WHEN THIS MATERIAL IS HEATED TO DECOMPOSITION.
PHOSGENE GAS & CHLORINE GAS

SECTION V - HEALTH HAZARD DATA

LD50 2800 MG/KG ORAL RAT TLV 10 PPM

EMERGENCY AND FIRST AID PROCEDURES
EYES
FLUSH EYES WITH WATER FOR 15 MINUTES.

SKIN
FLUSH SKIN WITH LARGE VOLUMES OF WATER.

CATALOG NO 48771 (REORDER PRODUCT BY THIS NO.)
PRODUCT NAME PURGABLE HALOCARBONS KIT 601N
DATA SHEET NO R49003S
CARBON TETRACHLORIDE

SECTION V - HEALTH HAZARD DATA

* CONTINUED *
REMOVE CONTAMINATED CLOTHING.

INHALATION
IMMEDIATELY MOVE TO FRESH AIR.
GIVE OXYGEN IF BREATHING IS LABORED
IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION

INGESTION
NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON
NEVER TRY TO MAKE AN UNCONSCIOUS PERSON VOMIT
GIVE LARGE AMOUNTS OF WATER
GIVE LARGE AMOUNTS OF MILK
PRESS FINGERS TO BACK OF TONGUE TO INDUCE VOMITING.
IMMEDIATELY CONTACT A PHYSICIAN.

EFFECTS OF OVEREXPOSURE

MAY IRRITATE EYES AND/OR SKIN
MAY BE FATAL IF INHALED
MAY BE FATAL IF SWALLOWED
NAUSEA
DIZZINESS
SUPPRESSED URINATION
LIVER DAMAGE
KIDNEY DAMAGE

SECTION VI - REACTIVITY DATA

STABILITY STABLE.

CONDITIONS TO AVOID

N/A

INCOMPATIBILITY

SODIUM, POTASSIUM, MAGNESIUM

HAZARDOUS DECOMPOSITION PRODUCTS

PHOSGENE GAS & CHLORINE GAS

HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID

N/A

1729

CATALOG NO 48771 (REORDER PRODUCT BY THIS NO.)
PRODUCT NAME PURGABLE HALOCARBONS KIT 601N
DATA SHEET NO K495035
CARBON TETRACHLORIDE

* CONTINUED *

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

TAKE UP WITH ABSORBENT MATERIAL.
VENTILATE AREA.

WASTE DISPOSAL METHOD

COMPLY WITH ALL APPLICABLE FEDERAL, STATE, OR LOCAL REGULATIONS

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFIC TYPE)

WEAR FACE MASK WITH ORGANIC VAPOR CANISTER.

PROTECTIVE GLOVES

WEAR IMPERVIOUS GLOVES.

EYE PROTECTION

WEAR FACE SHIELD.

VENTILATION

USE ONLY IN EXHAUST HOOD.

SPECIAL

N/A

OTHER PROTECTIVE EQUIPMENT

N/A

SECTION IX PRECAUTIONS

STORAGE AND HANDLING

STORE IN DRY, WELL VENTILATED AREA.

OTHER PRECAUTIONS

AVOID EYE OR SKIN CONTACT.

1730

TWX 510-670-3600
CUSTOMER P.O. NO. 39142.

DATE 11/14/86 **MATERIAL SAFETY DATA SHEET** PAGE 1

SECTION I - GENERAL INFORMATION

CATALOG NO 48771 (REORDER PRODUCT BY THIS NO.)
PRODUCT NAME PURGABLE HALOCARBONS KIT 601N
DATA SHEET NO R495050

CHLOROFORM

FORMULA CHCL3 FORMULA WEIGHT 119.50
CAS 67-66-3 RRTECS FS9100000
SYNONYM TRICHLOROMETHANE, METHYLENE TRICHLORIDE
MANUFACTURER SUPELCO INC. PHONE 814-359-3441
ADDRESS SUPELCO PARK, BELLEFONTE, PA 16823-0048

SECTION II - HAZARDOUS INGREDIENTS OF MIXTURES

MATERIALS - PERCENTAGE - CAS #
(FORMULA) - TLV(UNITS)
LD50 VALUE - CONDITIONS

N/A

SECTION III - PHYSICAL DATA

BOILING POINT 61 C MM MELTING POINT -64 C
VAPOR PRESSURE 160 C SPECIFIC GRAVITY 1.490 C (WATER=1)
VAPOR DENSITY 4.10 C (AIR=1) PERCENT VOLATILE BY VOLUME 100
WATER SOLUBILITY 0.5 EVAPORATION RATE 11.5 (BUTYL ACETATE=1)
APPEARANCE COLORLESS LIQUID WITH MILD SWEET ODOR

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT F FLAMMABLE LIMITS LEL UEL

EXTINGUISHING MEDIA

THIS MATERIAL IS NOT COMBUSTIBLE.
DETERMINED BY SUPPORTING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE.

XPLOSION HAZARDS D

THE FOLLOWING TOXIC VAPORS ARE FORMED WHEN THIS MATERIAL IS HEATED TO DECOMPOSITION.
HYDROGEN CHLORIDE, CHLORINE, OR PHOSGENE.

SECTION V - HEALTH HAZARD DATA

LD50 800 MG/KG ORAL RAT TLV 10 PPM

EMERGENCY AND FIRST AID PROCEDURES
EYES
FLUSH EYES WITH WATER FOR 15 MINUTES.
CONTACT A PHYSICIAN.

SKIN
PROMPTLY WASH SKIN WITH MILD SOAP AND LARGE VOLUMES OF WATER.

DATE 11/14/88

MATERIAL SAFETY DATA SHEET

CATALOG NO 48771 (REORDER PRODUCT BY THIS NO.)
PRODUCT NAME PURGEABLE HALOCARBONS KIT 601N
DATA SHEET NO R495050
CHLOROFORM

SECTION V - HEALTH HAZARD DATA

* CONTINUED *
REMOVE CONTAMINATED CLOTHING.

INHALATION
IMMEDIATELY MOVE TO FRESH AIR.
IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION
CONTACT A PHYSICIAN

INGESTION
NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON
NEVER TRY TO MAKE AN UNCONSCIOUS PERSON VOMIT
DO NOT INDUCE VOMITING.
GIVE LARGE AMOUNTS OF WATER
GIVE LARGE AMOUNTS OF MILK
CONTACT A PHYSICIAN.

EFFECTS OF OVEREXPOSURE

VAPOR IS NARCOTIC IN HIGH CONCENTRATIONS
HARMFUL IF INHALED
IRRITATES SKIN
BURNS SKIN
CHEST PAINS
HEADACHE
NAUSEA
DIZZINESS
GASTROINTESTINAL DISTURBANCES
LETHARGY
COMA
LIVER DAMAGE
KIDNEY DAMAGE
REPORTED ANIMAL CARCINOGEN.
CARCINOGENICITY - HUMAN SUSPECT.
TOXICITY MAY BE ENHANCED BY ETHANOL INGESTION.

SECTION VI - REACTIVITY DATA

STABILITY STABLE.

CONDITIONS TO AVOID

N/A

INCOMPATIBILITY

STRONG BASES

CATALOG NO 48771 (REORDER PRODUCT BY THIS NO.)
PRODUCT NAME PURGEABLE HALOCARBONS KIT 601M
DATA SHEET NO F495090
CHLOROFORM

SECTION VI - REACTIVITY DATA

* CONTINUED *
OXIDIZING AGENTS
OPEN FLAMES, WELDING ARCS, OR OTHER HIGH TEMPERATURE SOURCES WHICH MAY INDUCE THERMAL DECOMPOSITION. AVOID EXPOSURE TO AIR AND SUNLIGHT.

HAZARDOUS DECOMPOSITION PRODUCTS

HYDROGEN CHLORIDE, CHLORINE, OR PHOSGENE.

HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID

N/A

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

TAKE UP WITH ABSORBENT MATERIAL.
VENTILATE AREA.
ELIMINATE ALL IGNITION SOURCES.

WASTE DISPOSAL METHOD

COMPLY WITH ALL APPLICABLE FEDERAL, STATE, OR LOCAL REGULATIONS

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFIC TYPE)

WEAR FACE MASK WITH ORGANIC VAPOR CANISTER.

PROTECTIVE GLOVES

WEAR RUBBER GLOVES.

EYE PROTECTION

WEAR PROTECTIVE GLASSES.
WEAR GOGGLES.

VENTILATION

USE ONLY IN EXHAUST HOOD.

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TWX 510-670-3600
CUSTOMER P.O. NO. 59142.

DATE 11/14/86

MATERIAL SAFETY DATA SHEET

SECTION I - GENERAL INFORMATION

CATALOG NO 48771 (REORDER PRODUCT BY THIS NO.)
PRODUCT NAME PURGABLE HALOCARBONS KIT 601N
DATA SHEET NO R4959PC
METHYLENE CHLORIDE
FORMULA CH_2CL_2 FORMULA WEIGHT 85
CAS 75-09-2 NATECS PA8050000
SYNONYM DICHLOROMETHANE
MANUFACTURER SUPELCO INC. PHONE 814-359-3441
ADDRESS SUPELCO PARK, BELLEFONTE, PA 16823-0048

SECTION II - HAZARDOUS INGREDIENTS OF MIXTURES

MATERIALS - PERCENTAGE - CAS #
(FORMULA) - TLV(UNITS)
LD50 VALUE - CONDITIONS

N/A

SECTION III - PHYSICAL DATA

BOILING POINT 40 C MM MELTING POINT -97 C
VAPOR PRESSURE 349 20.0 C SPECIFIC GRAVITY 1.320 C (WATER=1)
VAPOR DENSITY 2.93 20.0 C (AIR=1) PERCENT VOLATILE BY VOLUME 100
WATER SOLUBILITY 1.6 EVAPORATION RATE 0.71 (ETHER=1)
APPEARANCE CLEAR, COLORLESS LIQUID ETHER-LIKE ODOR

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT F FLAMMABLE LIMITS LEL 12.0 UEL 19.0

EXTINGUISHING MEDIA

WATER
CO2
DRY CHEMICAL

SPECIAL FIRE FIGHTING PROCEDURES

WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE.

XPLOSION HAZARDS D

THE FOLLOWING TOXIC VAPORS ARE FORMED WHEN THIS MATERIAL IS HEATED TO DECOMPOSITION.
HYDROGEN CHLORIDE & PHOSGENE.

SECTION V - HEALTH HAZARD DATA

LD50 2524 MG/KG ORAL RAT TLV 100 PPM

EMERGENCY AND FIRST AID PROCEDURES
EYES
FLUSH EYES WITH WATER FOR 15 MINUTES.

SKIN
PROMPTLY WASH SKIN WITH MILD SOAP AND LARGE VOLUMES OF WATER.

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CATALOG NO 48771 (REORDER PRODUCT BY THIS NO.)
PRODUCT NAME PURGABLE HALOCARBONS KIT 601N
DATA SHEET NO R495090
METHYLENE CHLORIDE

SECTION V - HEALTH HAZARD DATA

* CONTINUED *
REMOVE CONTAMINATED CLOTHING.

INHALATION
IMMEDIATELY MOVE TO FRESH AIR.
GIVE OXYGEN IF BREATHING IS LABORED
IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION
CONTACT A PHYSICIAN

INGESTION
NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON
NEVER TRY TO MAKE AN UNCONSCIOUS PERSON VOMIT
DO NOT INDUCE VOMITING.
IMMEDIATELY CONTACT A PHYSICIAN.
NEVER ADMINISTER ADRENALIN FOLLOWING CH2CL2 OVEREXPOSURE. INCREASED SENSITIVITY OF THE HEART TO ADRENALIN MAY BE CAUSED BY OVEREXPOSURE TO CH2CL2.

EFFECTS OF OVEREXPOSURE

MAY BE FATAL IF INHALED
HARMFUL IF SWALLOWED
LACHRIMATION
IRRITATES SKIN
DERMATITIS
HEADACHE
DIZZINESS
NARCOSIS
LIVER DAMAGE
KIDNEY DAMAGE
CARCINOGENICITY - INDEFINITE IN ANIMALS.
IN RATS METHYLENE CHLORIDE HAS BEEN SHOWN TO PRODUCE A STATISTICALLY SIGNIFICANT INCREASE IN SALIVARY GLAND TUMORS.
RESEARCH HAS RECENTLY SHOWN THAT CH2CL2 IS METABOLIZED BY THE BODY TO CO AND CAN STRESS THE CARDIOVASCULAR SYSTEM THROUGH THE ELEVATION OF THE LEVEL OF CARBOXYHEMOGLOBIN.

SECTION VI - REACTIVITY DATA

STABILITY STABLE.

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CONDITIONS TO AVOID

LIQUID OXYGEN OR OTHER STRONG OXIDANTS MAY FORM EXPLOSIVE MIXTURES WITH METHYLENE CHLORIDE.

INCOMPATIBILITY

STRONG BASES

CATALOG NO 48771 (REORDER PRODUCT BY THIS NO.)
PRODUCT NAME PURGABLE HALOCARBONS KIT 601N
DATA SHEET NO R495090
METHYLENE CHLORIDE

SECTION VI - REACTIVITY DATA

* CONTINUED *
OXIDIZING AGENTS

HAZARDOUS DECOMPOSITION PRODUCTS

HYDROGEN CHLORIDE & PHOSGENE.

HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID

THIS MATERIAL OR ITS VAPORS WHEN IN CONTACT WITH FLAMES, HOT GLOWING SURFACES OR ELECTRIC ARCS CAN DECOMPOSE TO FORM HYDROGEN CHLORIDE GAS AND TRACES OF PHOSGENE.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

TAKE UP WITH ABSORBENT MATERIAL.
VENTILATE AREA.

WASTE DISPOSAL METHOD

COMPLY WITH ALL APPLICABLE FEDERAL, STATE, OR LOCAL REGULATIONS

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFIC TYPE)

WEAR FACE MASK WITH ORGANIC VAPOR CANISTER.
WEAR NIOSH/OSHA APPROVED RESPIRATORY PROTECTION.

PROTECTIVE GLOVES

WEAR NEOPRENE GLOVES.

EYE PROTECTION

WEAR PROTECTIVE GLASSES.

VENTILATION

USE ONLY IN WELL VENTILATED AREA.

SPECIAL

N/A

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3-(3-CHLOROMERCURI-2-METHOXY-1-PROPYL) HYDANTOIN

CAS RN: 3367291 **NIOSH #:** OV 9700000
mf: $C_7H_{11}ClHgN_2O_3$; mw: 407.24

SYN: CHLORO((3-(2,4-DIOXO-3-IMIDAZOLIDINYL)-2-METHOXY) PROPYL)MERCURY

TOXICITY DATA: 3 **CODEN:**
orl-mus LD50:358 mg/kg JMPCAS 5,168,62

Occupational Exposure to Inorganic Mercury recm std: Air: TWA 0.05 mg(Hg)/m3 NTIS**.
THR: HIGH orl. See also mercury compounds.
Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^-, NO_x and Hg.

1-(3-CHLOROMERCURI-2-METHOXY-1-PROPYL)-3-METHYLHYDANTOIN

CAS RN: 67465398 **NIOSH #:** OV 9750000
mf: $C_8H_{13}ClHgN_2O_3$; mw: 421.27

SYN: MERCURY, CHLORO((3-(2,4-DIOXO-3-METHYL-1-IMIDAZOLIDINYL)-2-METHOXY)PROPYL)MERCURY

TOXICITY DATA: 3 **CODEN:**
orl-mus LD50:298 mg/kg JMPCAS 5,168,62

Occupational Exposure to Inorganic Mercury recm std: Air: TWA 0.05 mg(Hg)/m3 NTIS**.
THR: HIGH orl. See also mercury compounds.
Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^-, Hg and NO_x.

3-(3-CHLOROMERCURI-2-METHOXY-1-PROPYL)-1-METHYLHYDANTOIN

CAS RN: 3367280 **NIOSH #:** OV 9730000
mf: $C_8H_{13}ClHgN_2O_3$; mw: 421.27

SYN: 3-(3-(CHLOROMERCURI)-2-METHOXYPROPYL)-1-METHYL HYDANTOIN

TOXICITY DATA: 3 **CODEN:**
orl-mus LD50:264 mg/kg JMPCAS 5,168,62

Occupational Exposure to Inorganic Mercury recm std: Air: TWA 0.05 mg(Hg)/m3 NTIS**.
THR: HIGH orl. See also mercury compounds.
Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^-, NO_x and Hg.

5-(3-CHLOROMERCURI-2-METHOXY-1-PROPYL)-3-METHYLHYDANTOIN

CAS RN: 3367304 **NIOSH #:** OV 9775000
mf: $C_7H_{11}ClHgN_2O_3$; mw: 407.24

SYN: CHLORO((3-(2,4-DIOXO-3-METHYL-5-IMIDAZOLIDINYL)-2-METHOXY)PROPYL)MERCURY

TOXICITY DATA: 2 **CODEN:**
orl-mus LD50:715 mg/kg JMPCAS 5,168,62

Occupational Exposure to Inorganic Mercury recm std: Air: TWA 0.05 mg(Hg)/m3 NTIS**.
THR: MOD orl. See also mercury compounds.
Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^-, NO_x and Hg.

p-CHLOROMERCURIPHENOL

CAS RN: 623074 **NIOSH #:** OW 0525000
mf: C_6H_5ClHgO; mw: 329.15

TOXICITY DATA: 3 **CODEN:**
ipr-rat LDLo:50 mg/kg NCNSA6 5,36,53

Occupational Exposure to Inorganic Mercury recm std: Air: TWA 0.05 mg(Hg)/m3 NTIS**. Reported in EPA TSCA Inventory, 1980.
THR: HIGH ipr.
Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^- and Hg.

N,N-BIS(CHLOROMERCURY I) HYDRAZINE

mf: $Cl_2H_2Hg_2N_2$; mw: 502.12
Explosive.

CHLOROMERODRIN

CAS RN: 62373 **NIOSH #:** OW 1050000
mf: $C_5H_{11}ClHgN_2O_2$; mw: 367.22

SYNS:
CHLORMERODRIN
CHLOROMERIDIN
HG-203 CHLORMERODRIN
NEOHYDRIN

TOXICITY DATA: 3-2 **CODEN:**
orl-rat LDLo:82 mg/kg JOPDAB 69,663,66
orl-mus LD50:560 mg/kg AIPTAK 149,415,64
ipr-mus LDLo:63 mg/kg CBCCT* 5,144,53

Occupational Exposure to Inorganic Mercury recm std: Air: TWA 0.05 mg(Hg)/m3 NTIS**.
THR: HIGH orl, ipr. MOD orl. See also mercury compounds.
Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^-, NO_x and Hg.

CHLOROMETHANE

CAS RN: 74-87-3 **NIOSH #:** PA 6300000
mf: CH_3Cl; mw: 50.49

Colorless gas, ethereal odor and sweet taste. d: 0.918 @ 20°/4°; mp: −97°; bp: −23.7°; flash p: below 32°F; lel = 8.1%; uel = 17%; autoign. temp: 1170°F; vap. d: 1.78. Sl sol in water, miscible with chloroform, ether, glacial acetic acid; sol in alc.

SYNS:
ARTIC
METHYL CHLORIDE
MONOCHLOROMETHANE

TOXICITY DATA: **CODEN:**
ihl-rat LC50:152000 mg/M^3/30M FAVUAI 7,35,75
ihl-mus LD50:3146 ppm/7H NIHBAZ 191,1,49
ihl-dog LCLo:14661 ppm/6H NIHBAZ 191,1,49
ihl-cat LCLo:128700 mg/M^3/4H AMBAAM 116,131,36
ihl-gpg LCLo:20000 ppm/2H FLCRAP 1,197,67

Aquatic Toxicity Rating: Tlm96:over 1000 ppm WQCHM* 3,-,74. *Toxicity Review:* TLV-TWA 5 ppm; STEL 100 ppm (skin) DTLVS* 4,268,80. OSHA Standard: Air: TWA 100 ppm; CL 200; Pk 300/5M/3H(SCP-H) FEREAC 39,23540,74. DOT: Flammable Gas, Label: Flammable Gas FEREAC 41,57018,76. "NIOSH Manual of Analytical Methods" VOL 1 201, VOL 4 S99 NIMAM*. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45,13646,80.

THR: Chloromethane has very slight irr properties and may be inhaled without noticeable discomfort. It has some narcotic action, but this effect is weaker than that of chloroform. Acute poisoning, characterized by the narcotic effect, is rare in industry. Repeated exposure to low conc causes damage to the CNS and, less frequently, to the liver, kidneys, bone marrow and cardiovascular system. Hemorrhages into the lungs, intestinal tract and dura have been reported. Sprayed on the skin, chloromethane produced anesthesia through freezing of the tissues as it evaporates. In exposures to high conc, dizziness, drowsiness, incoordination, confusion, nausea and vomiting, abdominal pains, hiccoughs, diplopia and dimness of vision are followed by delirium, convulsions and coma. Death may be immediate, but if the exposure is not fatal, recovery is usually slow, and degenerative changes in the CNS are not uncommon. The liver, kidneys and bone marrow may be affected, with resulting acute nephritis and anemia. Death may occur several days after exposure, resulting from degenerative changes in the heart, liver and especially the kidneys. In repeated exposures to lower conc there is usually fatigue, loss of appetite, muscular weakness, drowsiness and dimness of vision. After-effects are commonly the result of damage to the CNS, with visual changes and attacks of depression and other psychic disturbances being reported. Used as a food additive permitted in food for human consumption.

Fire Hazard: Very dangerous when exposed to heat, flame or powerful oxidizers.

Spontaneous Heating: No.

Explosion Hazard: Mod, when exposed to heat or flame.

Incomp: Al, Mg, K, Na, NaK, aluminium trichloride, ethylene, interhalogens, metals.

Disaster Hazard: Dangerous when heated to decomp, emits highly tox fumes of Cl^-.

To Fight Fire: Stop flow of gas; CO_2, dry chemical or water spray.

CHLOROMETHANE, MIXED WITH DICHLOROMETHANE

NIOSH #: PA 6385000

SYN: METHYL CHLORIDE-METHYLENE CHLORIDE MIXTURE (DOT)

TOXICITY DATA: CODEN:

DOT: Flammable Gas, Label: Flammable Gas FEREAC 41,57018,76.

THR: NO data. See also chloromethane and dichloromethane.

Disaster Hazard: When heated to decomp it emits tox fumes of Cl^-.

CHLOROMETHANESULFONYL CHLORIDE

CAS RN: 3518658 NIOSH #: PB 2800000

mf: $CH_2Cl_2O_2S$; mw: 148.99

SYNS:

CHLORID KYSELINY CHLORMETHANSULFONOVE (CZECH)

CHLORMETHANSULFOCHLORID (CZECH)

TOXICITY DATA: 3	CODEN:
skn-rbt 500 mg/24H SEV	28ZPAK -,198,72
eye-rbt 50 ug/24H SEV	28ZPAK -,198,72
orl-rat LD50:372 mg/kg	28ZPAK -,198,72

THR: A skn eye irr. HIGH orl.

Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^- and SO_2.

CHLOROMETHAPYRILENE

CAS RN: 148652 NIOSH #: US 7350000

mf: $C_{14}H_{18}ClN_3S$; mw: 295.86

SYNS:

2-((5-CHLORO-2-THENYL)(2-DIMETHYLAMINOETHYL)AMINO)PYRIDINE

CHLOROTHENYLPYRAMINE

N,N-DIMETHYL-N'-(2-PYRIDYL)-N'-(5-CHLORO-2-THENYL)ETHYLENEDIAMINE

NCI-C60559

TOXICITY DATA: 3	CODEN:
ipr-mus LD50:105 mg/kg	JPETAB 96,388,49

Toxicology Review: 27ZTAP 2,37,69. Selected by NTP for Carcinogenesis Bioassay as of December 1980.

THR: HIGH ipr.

Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^-, NO_x and SO_x.

2-((3-((6-CHLORO-2-METHOXY-9-ACRIDINYL)AMINO)PROPYL)AMINO)ETHANOL

CAS RN: 38915183 NIOSH #: KK 1960500

mf: $C_{19}H_{22}ClN_3O_2$; mw: 359.66

SYN: ICR 191-OH

TOXICITY DATA:	CODEN:
mec-ham:ovr 400 μmol/L	CNREA8 39,4875,79

Disaster Hazard: When heated to decomp it emits very tox fumes of NO_x and Cl^-.

2-((3-((6-CHLORO-2-METHOXY-9-ACRIDINYL)AMINO)PROPYL)ETHYLAMINOETHANOL, DIHYDROCHLORIDE

CAS RN: 63074033 NIOSH #: KK 1960510

mf: $C_{21}H_{26}ClN_3O_2 \cdot 2ClH$; mw: 460.8

SYN: ICR 170-OH

TOXICITY DATA:	CODEN:
mec-ham:ovr 1 μmol/L	CNREA8 39,4875,79

Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^-, NO_x and HCl.

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********************************************************************
      MATERIAL SAFETY DATA SHEETS ARE NOW AVAILABLE ONLINE. BEFORE
      YOU ORDER A SPECIFIC MSDS PLEASE REFER TO THE MSDS SYSTEM
      HELP SECTION FOR INFORMATION ON CHARGES.
          FOR LOCATING A SPECIFIC RECORD NUMBER FOR MSDS RETRIEVAL
      CONTACT OUR SECAUCUS N.J. OFFICE FOR A COMPLETE CROSS
      REFERENCE INDEX AND NEW USERS MANUAL (COST $95.00).
          MSDS RECORD NUMBERS ARE ALSO IN HAZARDLINE UNDER SYNONYMS
      (SYNM) - THEY BEGIN WITH OHS AND ARE FOLLOWED BY 5 NUMERIC
      CHARACTERS.

ENTER NAME, KEYWORD, SYMPTOM, STLA, NAMELIST, HELP, OR QUIT.
NAME
ENTER CHEMICAL NAME
METHANE
TYPE WHAT INFORMATION YOU REQUIRE
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND, /HELP/, OR /NONE/.
ALL

CHEMICAL NAME
  METHANE

FORMULA
  CH4

SYNONYMS
  METHYL HYDRIDE
  MARSH GAS
  FIRE DAMP
  NATURAL GAS
  GAS
  UN 1971
  UN 1972
  OHS14160

PERMISSIBLE EXPOSURE LIMIT
  NONE ESTABLISHED
  CERCLA HAZARD RATINGS -TOXICITY 0 - IGNITABILITY 3 - REACTIVITY 0 -
    PERSISTENCE 1
  AQUATIC TOXICITY RATING 0 (TLM96 >1000 PPM)
    LC - VARIOUS FISH - NOT TOXIC; ONLY ONE LABIDESTHES SICCULUS DIED

  TOXICOLOGY:  METHANE IS A SIMPLE ASPHYXIANT.

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
  NONE SPECIFIED

PHYSICAL DESCRIPTION
  COLORLESS, ODORLESS, TASTELESS GAS
  USUALLY SCENTED WITH MERCAPTAN SUBSTANCE WITH
  NOXIOUS ODOR

CHEMICAL AND PHYSICAL PROPERTIES
  MOLECULAR WEIGHT: 16.05
  BOILING POINT AT 1 ATM, F: -263 F
  SOLUBILITY IN WATER, G/100 G WATER AT 20C: SLIGHT
  FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF OC): -306 F
  VAPOR PRESSURE @ 20 C, MMHG: 40 ATM AT -86.3C
  MELTING POINT, F: -296 F
  UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 15 %
  LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 5 %
  AUTOIGNITION TEMPERATURE: 1004 F
  SPECIFIC GRAVITY: 0.5547 AT 32 F
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ROUTE OF ENTRY INTO BODY
INHALATION

SYMPTOMS
- ASPHYXIA
- DYSPNEA
- GASPING
- INCOORDINATION
- FATIGUE
- NAUSEA
- VOMITING
- PROSTRATION
- UNCONSCIOUSNESS
- CONVULSIONS
- COMATOSE
- CYANOSIS
- COLLAPSE

FIRST AID PROCEDURES FOLLOWING EXPOSURE

IF A PERSON BREATHES IN LARGE AMOUNTS OF THIS CHEMICAL, 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.

PULMONARY EDEMA - RELIEVE ANXIETY. GIVE MORPHINE SULFATE, 10 MG, TO DECREASE RATE OF RAPID, INEFFICIENT RESPIRATION. GIVE 40% OXYGEN BY FACE MASK. USE INTERMITTENT POSITIVE-PRESSURE OXYGEN RESUSCITATOR FOR SHORT PERIODS. GIVE AMINOPHYLLINE, 0.5 G, INTRAVENOUSLY, TO RELIEVE ASSOCIATED BRONCHIAL CONSTRICTION. TREAT EDEMA CAUSED BY MORPHINE OR MORPHINE ANALOGS BY GIVING NALOXONE AND OXYGEN.
(MEDICATION MUST BE GIVEN BY QUALIFIED MEDICAL PERSONNEL)
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

ORGANS
CENTRAL NERVOUS SYSTEM

STATUS OF REGULATORY ENFORCEMENT
OSHA STANDARD 29CFR1910.1200 HAZARD COMMUNICATION

REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS HAVING WORKPLACES IN THE MANUFACTURING DIVISION, STANDARD INDUSTRIAL CLASSIFICATION CODES 20 THROUGH 39, TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF HAZARD COMMUNICATION PROGRAMS INCLUDING LABELS, MATERIAL SAFETY DATA SHEETS, TRAINING, AND ACCESS TO WRITTEN RECORDS
48FR53280 11/25/83

FOLLOWING OSHA STANDARDS APPLICABLE TO SUBSTANCES LISTED 29CFR1910, OTHERWISE ADVISE:

OSHA STANDARD 29CFR1910.101	COMPRESSED GASES (GENERAL REQUIREMENTS)
OSHA STANDARD 29CFR1910.132	PERSONAL PROTECTIVE EQUIPMENT
OSHA STANDARD 29CFR1910.141	SANITATION
OSHA STANDARD 29CFR1910.151	MEDICAL SERVICES AND FIRST AID

INCOMPATIBILITIES
NITROGEN FLUORIDE
HEAT
EXPLOSIVE HAZARD AT HIGH TEMPERATURES
OXIDIZERS
OXYGEN
PEROXIDES
BROMINE TETRAFLUORIDE
CHLORINE DIOXIDE
LIQUID OXYGEN
BROMINE
CHLORINE

PERSONAL PROTECTIVE EQUIPMENT

— — —

ACGIH "GUIDELINES FOR SELECTION OF CHEMICAL PROTECTIVE CLOTHING" INDICATES THE FOLLOWING MATERIALS AND PROTECTIVE RATINGS BY INDEPENDENT VENDORS AGAINST METHANE:

EXCELLENT/GOOD:
NONE INDICATED

GOOD/FAIR:
BUTYL RUBBER
NATURAL RUBBER
NEOPRENE
NITRILE RUBBER

FAIR/GOOD:
POLYETHYLENE

GOGGLES
NONE REQUIRED

WASHING CHEMICALS FROM THE SKIN
NOT APPLICABLE

ROUTINE CHANGING OF WORK CLOTHING
NOT REQUIRED

CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION
NOT REQUIRED
SPECIFIC EMERGENCY PROVISIONS
NONE REQUIRED

RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED)

NO SPEC ADVISE
- SELF-CONTAINED BREATHING APPARATUS
- TYPE 'C' SUPPLIED-AIR RESPIRATOR

HIGH LEVELS
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE, HELMENT, OR HOOD
- TYPE 'C' SUPPLIED-AIR RESPIRATOR

FIREFIGHTING
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE

SYNS:

ANHYDROUS CHLOROBUTANOL
CHLORBUTANOL
CHLORBUTOL
CHLOROBUTANOL
TRICHLORO-T-BUTYL ALCOHOL
T-TRICHLOROBUTYL ALCOHOL
1,1,1-TRICHLORO-2-METHYL-2-PROPANOL

TOXICITY DATA: 3-2	CODEN:
skn-rbt 850 ug MLD	XEURAQ MDDC-1715
eye-rbt 9180 ug/30S MLD	XEURAQ MDDC-1715
orl-dog LDLo:238 mg/kg	AIPTAK 8,77,01
orl-rbt LDLo:213 mg/kg	AIPTAK 8,77,01
par-frg LDLo:800 mg/kg	AIPTAK 8,77,01

Toxicology Review: 27ZTAP 3,35,69. Reported in EPA TSCA Inventory, 1980.
THR: HIGH via oral route. Tox and narcotic. A food additive permitted for human consumption. See chloral hydrate, which acts similarly. A skn, eye irr.
Fire Hazard: Slight, when exposed to heat or flame.
Disaster Hazard: Dangerous. See phosgene; can react with oxidizing materials.

ACETONE DIETHYL KETAL

CAS RN: 126841 NIOSH #: AL 4900000
mf: $C_7H_{16}O_2$; mw: 132.23

SYNS:

2,2-DIETHOXYPROPANE
USAF DO-44

TOXICITY DATA: 3	CODEN:
ipr-mus LD50:125 mg/kg	NTIS** AD277-689

Reported in EPA TSCA Inventory, 1980.
THR: HIGH ipr.
Disaster Hazard: When heated to decomp it emits acrid smoke.

ACETONE DIETHYLSULFONE

CAS RN: 115242 NIOSH #: TX 3850000
mf: $C_7H_{16}O_4S_2$; mw: 228.35

d: 1.183; mp: 127°-128°; bp: 300° (sl decomp); Sol in water, alc, and ether.

SYNS:

2,2-BIS(ETHYLSULFONYL)PROPANE
DIETHYLSULFONDIMETHYLMETHANE
PROPANE-DIETHYL SULFONE
SULFONAL
SULFONMETHANE

TOXICITY DATA: 3-2-1	CODEN:
unk-man LDLo:147 mg/kg	85DCAI 2,73,70
orl-dog LDLo:800 mg/kg	12VXA5 8,1003,68
orl-rbt LDLo:3000 mg/kg	HBAMAK 4,1404,35
orl-gpg LDLo:8500 mg/kg	HBAMAK 4,1404,35

THR: HIGH unk. MOD orl. LOW orl gpg.
Disaster Hazard: When heated to decomp it emits tox fumes of SO_x.

ACETONE OIL

NIOSH #: AL 6700000

(a) Standard: light, lemon-yellow. (b) Refined: almost water white. (c) Heavy: dark, orange-yellow. bp: (a) 75°-160°, (c) 80°-225°, d: (a) 0.826-0.830, (b) 0.812, (c) 0.885-0.865.

TOXICITY DATA: CODEN:
DOT: Flammable liquid, Label: Flammable liquid FEREAC 41,57018,76.
THR: Unk. See also ketones.
Fire Hazard: Dangerous; when exposed to heat or flame.
Explosion Hazard: Mod when exposed to flame.
Disaster Hazard: Dangerous; can react vigorously with oxidizing materials.
To Fight Fire: CO_2, dry chemical.

ACETONE PEROXIDE

Liquid. The trimeric form is crystalline; mp: 97°.
THR: Unk. See also peroxides, organic.
Fire Hazard: Mod by spont chemical reaction; can react vigorously with reducing materials.
Explosion Hazard: The trimeric form is shock-sensitive and static-electricity-sensitive and may detonate.

ACETONE SEMICARBAZONE

CAS RN: 110203 NIOSH #: AL 7175000
mf: $C_4H_9N_3O$; mw: 115.16

mp: 190°-199° (decomp): sol in cold water, sl sol in cold alc; insol in ether.

TOXICITY DATA: 3	CODEN:
ivn-mus LD50:90 mg/kg	JPETAB 122,110,58

Reported in EPA TSCA Inventory, 1980.
THR: HIGH ivn.
Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

ACETONITRILE

CAS RN: 75058 NIOSH #: AL 7700000
mf: C_2H_3N; mw: 41.06

Colorless liquid, aromatic odor. mp: −45°, bp: 81.1°, flash p: 42°F(COC), d: 0.7868 @ 20°/20°, vap. d: 1.42, vap. press: 100 mm @ 27°, lel = 4.4%, uel = 16%, autoign. temp.: 975°F. Misc in water, alc, and ether.

SYNS:

ACETONITRIL (GERMAN, DUTCH)
CYANOMETHANE
CYANURE DE METHYL (FRENCH)
ETHANENITRILE
ETHYL NITRILE
METHANECARBONITRILE
METHYL CYANIDE
NCI-C60822
USAF EK-488

TOXICITY DATA: 3-2-1	CODEN:
skn-rbt 10 mg/24H	JIHTAB 30,63,48
skn-rbt 500 mg open MLD	UCDS** 3/18/65
eye-rbt 20 mg SEV	JIHTAB 30,63,48
orl-hmn TDLo:570 mg/kg CNS	APTOA6 41,340,77
orl-rat LD50:3800 mg/kg	JIHTAB 30,63,48
ihl-rat LCLo:8000 ppm/4H	JIHTAB 31,343,49
ipr-rat LD50:850 mg/kg	JOCMA7 1,634,59
scu-rat LD50:5000 mg/kg	JOCMA7 1,634,59
ivn-rat LD50:1680 mg/kg	JOCMA7 1,634,59
ipr-mus LD50:500 mg/kg	NTIS** AD277-689
scu-mus LDLo:700 mg/kg	AIPTAK 12,447,04
ihl-dog LCLo:16000 ppm/4H	JOCMA7 1,634,59
ihl-rbt LCLo:4000 ppm/4H	JOCMA7 1,634,59
skn-rbt LD50:1250 mg/kg	UCDS** 3/18/65

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scu-rbt LDLo:130 mg/kg	12VXAS 9,9,76
orl-gpg LD50:177 mg/kg	JOCMA7 1,634,59
ihl-gpg LCLo:16000 ppm/4H	JOCMA7 1,634,59
scu-frg LDLo:9100 mg/kg	AIPTAK 5,161,1899

Aquatic Toxicity Rating: TLm96:1000 ppm WQCHM* 2,-,74

TLV: Air: 40 ppm DTLVS* 4,6,80

Toxicology Review: CHREAY 48,225,51. OSHA Standard: Air: TWA 40 ppm (SCP-L) FEREAC 39, 23540,74. DOT: Flammable liquid, Label: Flammable Liquid FEREAC 41,57018,76. Occupational Exposure to Nitriles recm std: Air: TWA 34 mg/m3 NTIS** "NIOSH Manual of Analytical Methods" VOL 3 S165. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45,13646,80. EPA TSCA 8E No:05780149-File closed as of April, 1979.

THR: A hmn CNS. HIGH orl. MOD skn, ihl, scu, ipr, ivn, orl. LOW scu, ihl. A skn, eye irr. See also nitriles. Easily oxidized and unstable.

Fire Hazard: Dangerous, when exposed to heat, flame or oxidizers.

Explosion Hazard: See cyanides.

Disaster Hazard: Dangerous; when heated to decomp, emits highly toxic fumes of cyanides; will react with water, steam or acids to produce tox and flam vapors, NO_x.

To Fight Fire: Foam, CO_2, dry chemical.

Incompatible with oleum, chlorosulfonic acid, perchlorates, nitrating agents, indium, dinitrogen tetraoxide, N-fluoro compounds, (i.e., perfluorourea + acetonitrile), HNO_3, H_2SO_4, SO_3.

For further information see Methyl cyanide, Vol. 1, No. 4 of *DPIM Report*.

ACETONITRILE IMIDAZOLE-5,7,7,12,14,14-HEXAMETHYL-1,4,8,11-TETRAAZA-4,11-CYCLO TETRADECA DIENE IRON (11) PERCHLORATE:

mf: $C_{21}H_{38}Cl_2FeN_7O_8$; mw: 644.1

THR: No tox data. See also perchlorates. An unstable and explosive compound. See also iron compounds.

Disaster Hazard: When heated to decomp it emits tox fumes of NO_x, Cl^- and CN^-.

ACETONOXIME

CAS RN: 127060 NIOSH #: AL 6825000
mf: C_3H_7NO; mw: 73.11

d: 0.97; mp: 60°-61°; bp: 136.3°. Very sol in water, alc and ether. Sol in ligroin ether.

SYNS:

ACETOXIME
BETA-ISONITROSOPROPANE
2-PROPANONE OXIME

TOXICITY DATA: 2	CODEN:
ipr-mus LD50:4000 mg/kg	JPETAB 119,522,57

Reported in EPA TSCA Inventory, 1980.

THR: MOD ipr.

Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

ACETONYL CHLORIDE

CAS RN: 78955 NIOSH #: UC 0700000
mf: C_3H_5ClO; mw: 92.53

Colorless liquid, pungent odor. mp: −44.5°, bp: 119°, d: 1.162.

SYNS:

CHLORACETONE (FRENCH)
CHLOROACETONE
CHLOROPROPANONE
1-CHLORO-2-PROPANONE
MONOCHLOROACETONE

TOXICITY DATA: 3	CODEN:
sln-dmg-ihl:100 ppb/6M	PREBAJ 62B,284,46/47
sln-dmg-ihl 2L/6M	PREBAJ 62B,284,46/47
skn-mus TDLo:576 mg/kg/12W-I:ETA	CNREA8 26,12,66
ihl-hmn LCLo:605 ppm/10M	NTIS** PB214-270
orl-rat LDLo:50 mg/kg	KODAK* -,-,71
skn-rat LDLo:100 mg/kg	KODAK* -,-,71

Aquatic Toxicity Rating: TLm96:100-10 ppm WQCHM* 4,-,74. DOT: Forbidden FEREAC 41,57018,76. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45,13646,80.

THR: MUT data. An exper ETA. HIGH hmn ihl. HIGH orl, skn. A lachrymator poison gas. See chlorinated hydrocarbons, aliphatic and acetone.

Fire Hazard: Mod when exposed to heat or flame. Old material can explode.

Disaster Hazard: Dangerous; when heated to decomp emits highly tox fumes of phosgene; can react vigorously with oxidizing materials.

3-(alpha-ACETONYLFURFURYL)-4-HYDROXY-COUMARIN

CAS RN: 117522 NIOSH #: GN 4850000
mf: $C_{17}H_{14}O_5$; mw: 298.31

White powder; practically insol in water, sol in alcohols. mp: 124°.

SYNS:

COUMAFURYL
FOUMARIN
3-(1-FURYL-3-ACETYLETHYL)-4-HYDROXYCOUMARIN

TOXICITY DATA: 3	CODEN:
orl-rat LD50:25 mg/kg	FMCHA2 -,D146,80
orl-mus LD50:14700 ug/kg	FMCHA2 -,D146,80

THR: HIGH via oral and inhal routes. See also warfarin. This rodenticide is almost always used mixed with bait preparations unpalatable to hmns and it resembles warfarin in action. However, in case of accidental ingestion, induce vomiting until fluid is clear. Administer vitamin K (oral or ivn) in large doses. Call a physician immediately. It is highly toxic.

3-(alpha-ACETONYL-p-NITROBENZYL)-4-HYDROXY-COUMARIN

CAS RN: 152727 NIOSH #: GN 4900000
mf: $C_{19}H_{15}NO_6$; mw: 353.35

[illegible]-cat LD50:1550 mg/kg	TXAPA9 14,515,69
[illegible]-mus LD50:2000 mg/kg	LIFSAK 3,721,64
ipr-mus LDLo:800 mg/kg	TXAPA9 23,288,72

Toxicology Review: BCSTBS 2(4),695,74; PLMJAP 6(1),160,75; AUHPAI 4(1),5,74; 31ZNAA 2,365,73; INTEAG 15(1),7,74; CLPTAT 5,480,64; ARVPAX 5,447,65; ADVPA3 4,263,66; AJDCAI 112,99,66; ATXKA8 28,135,71.

THR: MUT data. A hmn TER. An exper TER. HIGH orl. MOD skn, orl, ipr.

Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

For further information see Vol. 1, No. 2 of *DPIM Report*.

THALLIC OXIDE

CAS RN: 1314325 NIOSH #: XG 2975000

mf: O_3Tl_2; mw: 456.74

Hexagonal black crystals, amorphous prisms. mp: 717° ±5°, bp: $-O_2$ @ 875°, d(amorphous): 9.65 @ 21°, d(hexagonal): 10.19 @ 22°.

SYNS:

THALLIUM PEROXIDE
THALLIUM SESQUIOXIDE

TOXICITY DATA: 3	CODEN:
orl-cat LD50:22 mg/kg	AIHAAP 21,399,60
ipr-cat LDLo:80 mg/kg	AIHAAP 21,399,60
orl-dog LDLo:34 mg/kg	AIHAAP 21,399,60
orl-rbt LDLo:34 mg/kg	AIHAAP 21,399,60
ipr-rbt LDLo:67 mg/kg	AIHAAP 21,399,60
scu-rbt LDLo:44 mg/kg	AIHAAP 21,399,60
orl-gpg LDLo:6 mg/kg	AIHAAP 21,399,60
ipr-gpg LDLo:34 mg/kg	AIHAAP 21,399,60

Reported in EPA TSCA Inventory, 1980.

THR: HIGH orl, ipr, ivn. A poison; see thallium compounds.

Fire Hazard: Slight, by chemical reaction. Evolves O_2 @ 875°. See thallium compounds.

Disaster Hazard: When heated to decomp it emits tox fumes of Tl.

THALLIUM

CAS RN: 7440280 NIOSH #: XG 3425000

af: Tl; aw: 204.37

Bluish-white, soft, malleable metal. mp: 303.5°, bp: 1457°, d: 11.85 @ 20°, vap. press: 1 mm @ 825°.

SYN: RAMOR

TOXICITY DATA: 3	CODEN:
unk-man LDLo:4412 ug/kg	85DCAI 2,73,70

TLV: Air: 0.1 mg/m3 DTLVS* 4,396,80. "NIOSH Manual of Analytical Methods" VOL 3 S306, VOL 5 173#. Reported in EPA TSCA Inventory, 1980.

THR: HIGH unk. See also thallium compounds.

Fire Hazard: Mod, in the form of dust, when exposed to heat or flame. See also powdered metals. Violent reaction with F_2.

Disaster Hazard: When heated to decomp it emits tox fumes of Tl.

THALLIUM ACETATE

CAS RN: 563688 NIOSH #: AJ 5425000

mf: $C_2H_3O_2 \cdot Tl$; mw: 263.42

Silk-white crystals. mp: 110°, d: 3.68. Sol in water, alc.

SYNS:

THALLIUM(1+) ACETATE
THALLIUM(I) ACETATE
THALLIUM MONOACETATE
THALLOUS ACETATE

TOXICITY DATA: 3	CODEN:
otr-ham:emb 100 umol/L	CNREA8 39,193,79
unk-hmn LDLo:26 mg/kg	AJCPAI 13,422,43
unk-chd LDLo:8 mg/kg	AJCPAI 13,422,43
orl-rat LDLo:25 mg/kg	AIHAAP 21,399,60
ipr-rat LD50:30 mg/kg	AIHAAP 21,399,60
orl-mus LD50:35 mg/kg	JFALAX 5,15,69
ipr-mus LD50:37 mg/kg	TXAPA9 49,41,79
scu-mus LDLo:500 ug/kg	EQSSDX 1,1,75
orl-dog LDLo:13 mg/kg	HBAMAK 4,1406,35
orl-rbt LDLo:25 mg/kg	AIHAAP 21,399,60
ipr-rbt LDLo:17 mg/kg	AIHAAP 21,399,60
scu-rbt LDLo:5 mg/kg	EQSSDX 1,1,75
ivn-rbt LDLo:26 mg/kg	AIHAAP 21,399,60
orl-gpg LDLo:15 mg/kg	AIHAAP 21,399,60
ipr-gpg LDLo:9 mg/kg	AIHAAP 21,399,60

Toxicology Review: 27ZTAP 3,141,69. OSHA Standard: Air: TWA 100 ug(Tl)/m3 (SCP-U) FEREAC 39, 23540,74. Reported in EPA TSCA Inventory, 1980.

THR: MUT data. HIGH unk hmn; HIGH orl, ipr, scu. See also thallium compounds. A poison.

Disaster Hazard: When heated to decomp it emits tox fumes of Tl.

THALLIUM(I) AZIDE

mf: N_3Tl; mw: 246.39

THR: No tox data. See also azides. Can explode on heavy impact or by heating.

Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

THALLIUM BROMIDE

CAS RN: 7789404 NIOSH #: XG 3850000

mf: BrTl; mw: 284.28

Yellowish-white powder. mp: 460° (approx), bp: 815°, d: 7.557, vap. press: 10 mm @ 522°.

TOXICITY DATA: 3	CODEN:
scu-mus LDLo:29 mg/kg	TPKVAL 2,94,61

Reported in EPA TSCA Inventory, 1980.

THR: HIGH scu. See also bromides and thallium compounds. A poison. Reacts violently with Na, K.

Disaster Hazard: When heated to decomp it emits very tox fumes of Br^- and Tl.

THALLIUM(I) CARBONATE (2:1)

CAS RN: 6533739 NIOSH #: XG 4000000

mf: $CO_3 \cdot 2Tl$; mw: 468.75

Monoclinic colorless crystals. mp: 273°, d: 7.11.

ZINC

1-24

```
ZINC
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
  NM

SYNONYMS
  BLUE POWDER
  C.I. 77945
  C.I. PIGMENT BLACK 16
  C.I. PIGMENT METAL 6
  EMANAY ZINC DUST
  GRANULAR ZINC
  UN 1436
  ZINC DUST
  JASAD
  ZINC POWDER
  ASARCO L 15
  OHS25230
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
EXPO

PERMISSIBLE EXPOSURE LIMIT
  NONE ESTABLISHED
  CERCLA HAZARD RATINGS - TOXICITY 1 - IGNITABILITY 2 - REACTIVITY 1 -
    PERSISTENCE 3

  TOXICOLOGY:  ZINC FUMES CAUSE METAL-FUME FEVER.  SYMPTOMS OF INHALTION
  OF ZINC OXIDE FUME ARE FEVER, CHILLS, NAUSEA AND VOMITING, MUSCULAR
  ACHES AND WEAKNESS.  FUMES FROM SOLUBLE ZINC SALTS MAY CAUSE PULMONARY
  EDEMA, WITH CYANOSIS AND DYSPNEA.
    THE THRESHOLD LIMIT VALUE FOR ZINC OXIDE FUME WAS SET TO PREVENT METAL
  FUME FEVER.
  IHL-HMN TCLO:124 MG/M3/50 MIN
TYPE WHAT INFORMATION YOU REQUIRE:
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205 4

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IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
  NONE SPECIFIED
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
DESC

  YSICAL DESCRIPTION
  BLUISH-WHITE METAL
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
PROP

CHEMICAL AND PHYSICAL PROPERTIES
  MOLECULAR WEIGHT: 65.37
  BOILING POINT AT 1 ATM, F: 1665 F
  SOLUBILITY IN WATER, G/100 G WATER AT 20C: INSOLUBLE
  FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF OC): NONFLAMABLE
  VAPOR PRESSURE @ 20 C, MMHG: 1 MM AT 909 F
  MELTING POINT, F: 787 F
  UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 500 G/CM3
  LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: NA
  AUTOIGNITION TEMPERATURE: 860 F (DUST)
  SPECIFIC GRAVITY: 7.14
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
INCO

INCOMPATIBILITIES
  THERMAL DECOMPOSITION PRODUCTS ARE HAZARDOUS AND/OR TOXIC
  ACIDS
  NITRIC ACID
  AMMONIUM SALTS
  PERFORMIC ACID
  POTASSIUM CHLORATE
  POTASSIUM NITRATE
  SELENIUM
  SODIUM PEROXIDE
  SULFUR
  TELLURIUM
  WATER
  CARBON DISULFIDE
  CHLORATES
  CHLORINE
  CHLORINE TRIFLUORIDE
  CHROMIC ANHYDRIDE
  FLUORINE
  HYDROXYLAMINE
  MAGNESIUM
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
CLOT

PERSONAL PROTECTIVE EQUIPMENT
  NO NIOSH/OSHA DATA; RECOMMEND
  PREVENT REPEATED OR PROLONGED SKIN CONTACT
    WEAR IMPERVIOUS CLOTHING
    WEAR GLOVES
    WEAR FACESHIELD (8 INCH MINIMUM)

  PLACE CONTAMINATED CLOTHING IN CLOSED CONTAINERS FOR STORAGE UNTIL
    LAUNDERED OR DISCARDED
  IF CLOTHING IS TO BE LAUNDERED, INFORM PERSON PERFORMING OPERATION OF
    CONTAMINANT'S HAZARDOUS PROPERTIES
TYPE WHAT INFORMATION YOU REQUIRE:
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PROV

SPECIFIC EMERGENCY PROVISIONS
  NO NIOSH/OSHA DATA, ADVISE:
  EYE-WASH FOUNTAIN WITHIN IMMEDIATE WORK AREA WHERE EMPLOYEES' EYES MAY
    BE EXPOSED TO SUBSTANCE
  QUICK DRENCHING FACILITIES WITHIN IMMEDIATE WORK AREA WHERE EMPLOYEES
    MAY BE EXPOSED TO SUBSTANCE
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
RESP

RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED)

HIGH LEVELS
   - DUST MASK


FIREFIGHTING
   - SELF-CONTAINED BREATHING APPARATUS
      WITH A FULL FACE-PIECE
      OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE


FIREFIGHTING
   - SELF-CONTAINED BREATHING APPARATUS
      WITH A FULL FACE-PIECE
      OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE





TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
ROUT

ROUTE OF ENTRY INTO BODY
  SKIN ABSORPTION
  SKIN OR EYE CONTACT
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
SYMP

SYMPTOMS
  SKIN IRRITATION
  THIRST
  COUGHING
  WEAKNESS
  MUSCULAR ACHE
  FEVER
  NAUSEA
  VOMITING
  ABDOMINAL CRAMPS
  DIARRHEA
  TREMORS
  HYPOTHERMIA
  CYANOSIS
  DYSPNEA
  DERMATITIS
  PNEUMONIA
  HEADACHE
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CHEMICAL NAME
   PHENOL

CHEMICAL FORMULA
   C6H6O

SYNONYMS
   CARBOLIC ACID
   MONO HYDROXY BENZENE
   NCI-C50124
   PHENYLIHYDROXIDE
   UN 1671

PERMISSIBLE EXPOSURE LIMIT
   5 PPM - 19 MG/M3 OSHA TWA - SKIN NOTATION
   5 PPM - 19 MG/M3 ACGIH TWA
   10 PPM - 38 MG/M3 ACGIH STEL
   ODOR THRESHOLD 0.05 PPM
   REPORTABLE QUANTITIES 1000 LB CWA 311(B)(4) - 1 LB PROPOSED RQ
   CERCLA HAZARD RATINGS - TOXICITY 3 - IGNITABILITY 2 - REACTIVITY 0 -
   PERSISTENCE 1 - FOR RATING DEFINITIONS, ACCESS /STAT/

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
   100 PPM(384 MG/M3)
   NIOSH/OSHA

PHYSICAL DESCRIPTION
   COLORLESS TO PINK SOLID OR A THICK LIQUID WITH A CHARACTERISTIC SWEET
   TARRY ODOR

MOLECULAR WEIGHT:  94
BOILING POINT AT 1 ATM, F:  359F
SOLUBILITY IN WATER, G/100 G WATER AT 20C:  8.4%
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF OC):  175F
VAPOR PRESSURE AT 20 C MM HG:  0.36 MM
MELTING POINT, F:  106F
UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME:  8.6%
LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME:  1.8%
MINIMUM EXPLOSIVE CONCENTRATION FOR A DUST/VAPOR I  AUTOIGN 1319F
SPECIFIC GRAVITY  1.07

INCOMPATIBILITIES
   STRONG OXIDIZERS
   CALCIUM HYPOCHLORITE

PROTECTIVE EQUIPMENT REQUIREMENTS:
   PREVENT ANY POSSIBILITY OF SKIN CONTACT
     WEAR IMPERVIOUS CLOTHING
     WEAR GLOVES
     WEAR FACESHIELD (8 INCH MINIMUM)
   PREVENT REPEATED OR PROLONGED SKIN CONTACT
   PROVIDE CONTAINER TO STORE CLOTHING UNTIL LAUNDERED OR DISCARDED
     WEAR SPLASH/DUST PROOF GOGGLES
   PLACE CONTAMINATED CLOTHING IN CLOSED CONTAINER UNTIL
     LAUNDERED OR DISCARDED
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INFORM PERSONS HANDLING CONTAMINATED CLOTHING OF HAZARDOUS
PROPERTIES OF SUBSTANCE

WEAR IMPERVIOUS BOOTS

WEAR EYE PROTECTION TO PREVENT:
PREVENT ANY POSSIBILITY OF EYE CONTACT

EMPLOYEE SHOULD WASH:
IMMEDIATELY WHEN SKIN BECOMES CONTAMINATED AND AT THE END OF
WORK SHIFT

WORK CLOTHING SHOULD BE CHANGED DAILY:
AFTER WORK SHIFT

REMOVE CLOTHING:
IMMEDIATELY IF IT IS NON-IMPERVIOUS AND BECOMES CONTAMINATED

THE FOLLOWING EQUIPMENT SHOULD BE AVAILABLE:
EYEWASH, QUICK DRENCH

RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED)

50 PPM :
- CHEMICAL CARTRIDGE RESPIRATOR
  - WITH AN ORGANIC VAPOR CARTRIDGE
  - WITH A DUST AND MIST FILTER
- SUPPLIED AIR RESPIRATOR
- SELF-CONTAINED BREATHING APPARATUS

100 PPM :
- CHEMICAL CARTRIDGE RESPIRATOR
  - WITH AN ORGANIC VAPOR CARTRIDGE
  - WITH A FULL FACEPIECE
  - WITH A DUST AND MIST FILTER
- GAS MASK
  - WITH AN ORGANIC VAPOR CANISTER
  - WITH A DUST AND MIST FILTER
- SUPPLIED AIR RESPIRATOR
  - WITH A FULL FACE-PIECE, HELMET, OR HOOD
- SELF-CONTAINED BREATHING APPARATUS
  - WITH A FULL FACEPIECE

ESCAPE :
- GAS MASK
  - WITH AN ORGANIC VAPOR CANISTER
  - WITH A HIGH-EFFICIENCY PARTICULATE FILTER
- SELF-CONTAINED BREATHING APPARATUS

FIREFIGHTING :
- SELF-CONTAINED BREATHING APPARATUS
  - WITH A FULL FACEPIECE
  - OPERATED IN PRESSURE DEMAND OR POSITIVE-PRESSURE MODE

ROUTE OF ENTRY INTO BODY
- INHALATION
- SKIN ABSORPTION
- INGESTION
- SKIN OR EYE CONTACT

SYMPTOMS:
- EYE(S) IRRITATION
- NOSE/NASAL IRRITATION
- PULMONARY/RESPIRATORY IRRITATION
- DRY THROAT
- ANOREXIA
- WEIGHT LOSS
- WEAKNESS
- MUSCLE/MUSCULAR ACHE
- DARK URINE
- CYANOSIS
- SKIN BURNS
- DERMATITIS
- NAUSEA
- VOMITING
- TREMORS
- CENTRAL NERVOUS SYSTEM DEPRESSION
- PANCREATITIS
- SPLEEN DAMAGE
- KIDNEY DAMAGE
- LIVER DAMAGE
- CARDIOVASCULAR COLLAPSE

FIRST AID

IF THIS CHEMICAL GETS INTO THE EYES, IMMEDIATELY WASH THE EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE LOWER AND UPPER LIDS. GET MEDICAL ATTENTION IMMEDIATELY. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THIS CHEMICAL.

IF THIS CHEMICAL GETS ON THE SKIN, IMMEDIATELY WASH CONTAMINATED SKIN WITH SOAP OR MILD DETERGENT & WATER. IF THIS CHEMICAL SOAKS CLOTHING, IMMEDIATELY REMOVE CLOTHING & WASH SKIN WITH SOAP OR MILD DETERGENT & WATER. GET MEDICAL ATTENTION PROMPTLY.

IF THIS CHEMICAL GETS ON SKIN, IMMEDIATELY FLUSH CONTAMINATED SKIN WITH WATER. IF THIS CHEMICAL PENETRATES CLOTHING, IMMEDIATELY REMOVE THE CLOTHING AND FLUSH THE SKIN WITH WATER. GET MEDICAL ATTENTION PROMPTLY.

WHEN THIS CHEMICAL HAS BEEN SWALLOWED, IMMEDIATELY GET MEDICAL ATTENTION. IF MEDICAL ATTENTION IS NOT IMMEDIATELY AVAILABLE, GET THE AFFECTED PERSON TO VOMIT BY HAVING HIM TOUCH THE BACK OF HIS THROAT WITH HIS FINGER OR BY GIVING HIM SYRUP OF IPECAC AS DIRECTED ON PACKAGE. THIS NON-PRESCRIPTION DRUG SHOULD BE KEPT WITH EMERGENCY MEDICAL SUPPLIES IN THE WORKPLACE AND IS AVAILABLE AT MOST DRUG COUNTERS. DO NOT MAKE AN UNCONSCIOUS PERSON VOMIT.

IF THIS PHENOLIC COMPOUND IS SWALLOWED, IMMEDIATELY ADMINISTER ACTIVATED CHARCOAL AT A DOSAGE 5 TO 10 TIMES THE ESTIMATED WEIGHT OF THE SUBSTANCE INGESTED OR AT LEAST 30 GRAMS OF ACTIVATED CHARCOAL DISSOLVED IN WATER. DILUTE STOMACH CONTENTS WITH WATER OR MILK. CASTOR OIL (30 TO 60 ML) MAY BE ADMINISTERED TO REDUCE ABSORPTION OF CHEMICAL.

SYRUP OF IPECAC - GIVE 15 ML (ONE TABLESPOON) OF SYRUP OF IPECAC FOLLOWED BY ONE-HALF GLASS OF WATER. IF EMESIS DOES NOT OCCUR IN THIRTY MINUTES, REPEAT WITH SAME DOSE. IF PATIENT MUST BE MOVED, KEEP IN HEAD-DOWN POSITION TO FACILITATE EMESIS AND PREVENT ASPIRATION OF VOMITUS. IF EMESIS DOES NOT OCCUR AFTER SYRUP OF IPECAC IS GIVEN, PERFORM GASTRIC LAVAGE TO PREVENT EMETINE POISONING. SAVE SPECIMENS OF EMESIS FOR ANALYSIS.
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

METHEMOGLOBINEMIA - GIVE 100% OXYGEN BY MASK IF PATIENT SHOWS SIGNS OF DYSPNEA OR AIR HUNGER. REMOVE POISON BY GASTRIC LAVAGE OR EMESIS FOLLOWED BY CATHARSIS. WASH SKIN THOROUGHLY WITH SOAP AND WATER.

GIVE METHYLENE BLUE, 1% SOLUTION, 0.1 ML/KG INTRAVENOUSLY OVER A 10 MINUTE PERIOD. ADMINISTRATION OF METHYLENE BLUE MAY CAUSE HYPERTENSION, NAUSEA, AND DIZZINESS. LARGER DOSES (>500 MG) WILL CAUSE VOMITING, DIARRHEA, CHEST PAIN, MENTAL CONFUSION, CYANOSIS, AND SWEATING. HEMOLYTIC ANEMIA HAS OCCURED SEVERAL DAYS AFTER ADMINISTRATION.

IF METHYLENE BLUE IS NOT AVAILABLE, GIVE ASCORBIC ACID, 1 G SLOWLY INTRAVENOUSLY.
(ANTIDOTE MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL)
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

LIVER DAMAGE - REMOVE FROM EXPOSURE TO ALL CHEMICALS AND DRUGS. MAINTAIN COMPLETE BED REST. AVOID ANESTHESIA OR SURGICAL PROCEDURES. AVOID DEHYDRATION OR OVERHYDRATION. IF VOMITING SEVERE AND ORAL FLUIDS NOT RETAINED, REPLACE VOMITUS WITH AN EQUAL QUANTITY OF 100% DEXTROSE IN NORMAL SALINE. IN RENAL FUNCTION ADEQUATE, GIVE 1 LITER OF 5% DEXTROSE OR INVERT SUGAR IN NORMAL SALINE PLUS 1-3 LITERS OF 10% DEXTROSE OR INVERT SUGAR IN DISTILLED WATER INTRAVENOUSLY EVERY TWENTY-FOUR HOURS.
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

ACUTE RENAL FAILURE - TREAT SHOCK. FOR HEMOLYTIC REACTIONS, GIVE SODIUM BICARBONATE, 5 G EVERY 1-2 HOURS AS NECESSARY TO MAINTAIN AN ALKALINE URINE.
(MEDICATION MUST BE GIVEN BE QUALIFIED MEDICAL PERSONNEL)
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

TARGET ORGANS

- LIVER
- KIDNEYS
- SKIN
- BLOOD
- CENTRAL NERVOUS SYSTEM
- MUCOUS TISSUE
- SPLEEN

STATUS OF ENFORCEMENT

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        CERCLA HAZARD RATING DEFINITIONS - 40CFR300.81
◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ TOXICITY/HEALTH ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
U = UNKNOWN
0 = NONTOXIC                              2 = MODERATELY TOXIC
1 = SLIGHTLY TOXIC                        3 = HIGHLY TOXIC
◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ IGNITABILITY/FLAMMABILITY ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
U = UNKNOWN
0 = NONFLAMMABLE/FLASHPOINT >200 F        2 = FLASHPOINT 80-140 F
1 = FLASHPOINT 140-200 F                  3 = FLASHPOINT <80 F
◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ REACTIVITY/STABILITY ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
U = UNKNOWN
0 = NONREACTIVE                           2 = REACTS VIOLENTLY
1 = REACTS NONVIOLENTLY                   3 = REACTS EXPLOSIVELY
◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ PERSISTENCE/BIODEGRADABILITY ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
U = UNKNOWN
0 = NONPERSISTENT                         2 = PERSISTENT
1 = SOMEWHAT PERSISTENT                   3 = HIGHLY PERSISTENT
◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
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CHEMICAL FORMULA
CHN

SYNONYMS CYANIDE
HYDROCYANIC ACID
PRUSSIC ACID
FORMONITRILE
AERO LIQUID HCN
CYCLONE B
HYDROCYANIC ACID, LIQUEFIED
UN 1051
NA 1051

PERMISSIBLE EXPOSURE LIMIT
10 PPM- 11 MG/M3 TWA OSHA SKIN NOTATION 10 PPM- 10 MG/M3 TWA ACGIH CEIL ODOR THRESHOLD 1 MG/M3 MUTAGEN SUSPECT REPORTABLE QUANTITIES 10 LB CWA 311(B)(4) 1 LB RCRA 3001 10 LB CERCLA CERCLA HAZARD RATING TOXICITY-3- IGNITABILITY-3- REACTIVITY-2- PERSISTENCE-0- FOR RATING DEFINITION, ACCESS /STAT/

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
50 PPM
55 MG/M3

PHYSICAL DESCRIPTION
COLORLESS OR PALE BLUE LIQUID OR GAS WITH A BITTER ALMOND ODOR

MOLECULAR WEIGHT: 27
BOILING POINT AT 1 ATM, F: 79F
SOLUBILITY IN WATER, G/100 G WATER AT 20C: MISCIBLE
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF OC): 0.0F
VAPOR PRESSURE AT 20 C MM HG: 620MM
MELTING POINT, F: 3F TO 7F
UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 40.0%
LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 5.6%
MINIMUM EXPLOSIVE CONCENTRATION FOR A DUST/VAPOR I AUTOIGN 1000F
SPECIFIC GRAVITY 0.688

INCOMPATIBILITIES
CAUSTICS
AMINES
OXYGEN
OXIDIZERS
PEROXIDES
ACETALDEHYDE
PLASTICS
ACIDS
MAY FORM EXPLOSIVE MIXTURE WITH AIR
HEAT
DECOMPOSES AT HIGH TEMPERATURES, RELEASING TOXIC AND/OR DANGEROUS GAS(ES)

POLYMERIZES AT HIGH TEMPERATURES
EXPLOSIVE, HIGH TEMPS
REACTS WITH WATER, RELEASING TOXIC AND/OR DANGEROUS GAS(ES)
STEAM
STRONG BASES

WORK CLOTHING SHOULD BE CHA[illegible]:
NO STANDARD REQUIREMENT, [illegible] CHANGING
IF THERE IS ANY POSSIBILITY THAT CLOTHING MAY BE CONTAMINATED

REMOVE CLOTHING:
IMMEDIATELY IF IT BECOMES CONTAMINATED TO AVOID
FLAMMABILITY HAZARD

THE FOLLOWING EQUIPMENT SHOULD BE AVAILABLE:
EYEWASH, QUICK DRENCH

PROTECTIVE EQUIPMENT REQUIREMENT:
PREVENT ANY POSSIBILITY OF LIQUID CONTACT
NO STANDARD REQUIREMENT, BUT ADVISE EMPLOYEE WEAR CLOTHING TO
WEAR FLAME RESISTANT CLOTHES AND VENTED GOGGLES
WEAR IMPERVIOUS CLOTHING
WEAR GLOVES
WEAR FACESHIELD (8 INCH MINIMUM)
PROVIDE CONTAINER TO STORE CLOTHING UNTIL LAUNDERED OR DISCARDED
WEAR SPLASH/DUST PROOF GOGGLES
PLACE CONTAMINATED CLOTHING IN CLOSED CONTAINER UNTIL
LAUNDERED OR DISCARDED

INFORM PERSONS HANDLING CONTAMINATED CLOTHING OF HAZARDOUS
PROPERTIES OF SUBSTANCE

STORE USED CLOTHING IN FIREPROOF CONTAINER

EMPLOYEE SHOULD WASH:
IMMEDIATELY WHEN SKIN BECOMES CONTAMINATED
WASH HANDS, ARMS, FACE, NEC [illegible] DEPARTURE FROM WORK AREA

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FIRST AID

IF THIS CHEMICAL GETS INTO [illegible] IMMEDIATELY WASH THE EYES WITH LARGE AMOUNTS OF WATER, [illegible] LIFTING THE LOWER AND UPPER LIDS. GET MEDICAL ATTENTION IMMEDIATELY. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THIS CHEMICAL.

IF THIS CHEMICAL GETS ON THE SKIN, IMMEDIATELY WASH CONTAMINATED SKIN WITH SOAP OR MILD DETERGENT & WATER. IF THIS CHEMICAL SOAKS CLOTHING, IMMEDIATELY REMOVE CLOTHING & WASH SKIN WITH SOAP OR MILD DETERGENT & WATER. GET MEDICAL ATTENTION PROMPTLY.

IF A PERSON BREATHES IN LARGE AMOUNTS OF THIS CHEMICAL, 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.

WHEN THIS CHEMICAL HAS BEEN SWALLOWED, DO NOT INDUCE VOMITING. REMOVE BY GASTRIC LAVAGE AND CATHARSIS.

VOLATILE AND GASEOUS ANESTHETICS:

EMERGENCY TREATMENT - ESTABLISH AIRWAY AND MAINTAIN RESPIRATION. REMOVE ANESTHETIC BY FORCED VENTILATION.

FURTHER TREATMENT - MAINTAIN BLOOD PRESSURE BY INTRAVENOUS SALINE OR BLOOD TRANSFUSION. MAINTAIN BODY WARMTH. MAINTAIN ADEQUATE AIRWAY BY REMOVING SECRETIONS FROM TRACHEA BY CATHETER SUCTION. PREVENT HYPOXIA. IF HYPERTHERMIA OCCURS, LOWER BODY TEMPERATURE BY APPLICATION OF WET TOWELS. FOR MALIGNANT HYPERTHERMIA, GIVE DANTROLENE SODIUM, 1 MG/KG, EVERY FIFTEEN MINUTES, INTRAVENOUSLY TO A TOTAL OF 10 MG/KG, AND PROCAINAMIDE, 15 MG/KG, INTRAVENOUSLY, OVER TEN MINUTES. GIVE ICED NORMAL SALINE INTRAVENOUSLY AT A RATE OF 1 LITER EVERY TEN MINUTES FOR THIRTY MINUTES. LAVAGE STOMACH, URINARY BLADDER, RECTUM, AND PERITONEUM WITH ICED SALINE. TREAT ACIDOSIS WITH INTRAVENOUS SODIUM BICARBONATE. MONITOR SERUM TOTAL BASE, SERUM POTASSIUM, AND ARTERIAL PH AND TREAT APPROPIATELY. MAINTAIN URINE OUTPUT AT 1-2 LITERS DAILY WITH FUROSEMIDE AND MANNITOL. AFTER FIRST DAY, GIVE DANTROLENE, 1 MG/KG ORALY DAILY, FOR THREE DAYS.

(MEDICATION MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL)

SPECIAL TREATMENT - TREAT LIVER DAMAGE.

(DREISBACH, HANDBOOK OF POI[illegible] ED.)

SYMPTOMS:

DIZZINESS
DEPRESSANT
HEADACHE
NAUSEA
FATIGUE
ANESTHESIA
IRRITATION EYE(S)
IRRITATION SKIN
HEPATIC HYPERTROPHY
DYSARTHIA
PULMONARY/RESPIRATORY CANCER

TARGET ORGANS
LIVER
KIDNEYS
HEART
EYES
SKIN

SPECIAL TESTS
CNS DEPRESS[illegible]
[illegible] IC [illegible]

PROTECTIVE EQUIPMENT REQUIREMENTS:
  PREVENT SKIN CONTACT
    WEAR IMPERVIOUS CLOTHING
    WEAR GLOVES
  WEAR FACESHIELD (8 INCH MINIMUM)
  PREVENT REPEATED OR PROLONGED SKIN CONTACT
  PROVIDE CONTAINER TO STORE CLOTHING UNTIL LAUNDERED OR DISCARDED
    WEAR SPLASH/DUST PROOF GOGGLES
  PLACE CONTAMINATED CLOTHING IN CLOSED CONTAINER UNTIL
    LAUNDERED OR DISCARDED

  INFORM PERSONS HANDLING CONTAMINATED CLOTHING OF HAZARDOUS
    PROPERTIES OF SUBSTANCE

    WEAR IMPERVIOUS BOOTS

EMPLOYEE SHOULD WASH:
  PROMPTLY WHEN SKIN BECOMES WET

WORK CLOTHING SHOULD BE CHANGED DAILY:
  NOT APPLICABLE

REMOVE CLOTHING:
  PROMPTLY IF IT IS NON-IMPERVIOUS AND CONTAMINATED

THE FOLLOWING EQUIPMENT SHOULD BE AVAILABLE:
  EYEWASH, QUICK DRENCH
  NO FOOD OR DRINK IN WORK AREA
  WATER FOUNTAIN PROHIBITED IN WORK AREA
  CLOSED SYSTEM IF SUBSTANCE TO BE USED

RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED)

  500 PPM :
    SUPPLIED AIR RESPIRATOR
    SELF-CONTAINED BREATHING APPARATUS

  1000 PPM :
    SUPPLIED AIR RESPIRATOR
      WITH A FULL FACE-PIECE, HELMET, OR HOOD
    SELF-CONTAINED BREATHING APPARATUS
      WITH A FULL FACEPIECE

  ESCAPE :
    GAS MASK
      WITH AN ORGANIC VAPOR CANISTER
    SELF-CONTAINED BREATHING APPARATUS

  FIREFIGHTING :
    SELF-CONTAINED BREATHING APPARATUS
      WITH A FULL FACEPIECE
      OPERATED IN PRESSURE DEMAND OR POSITIVE-PRESSURE MODE

ARSENIC

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```
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
SYNM

SYNONYMS
  UN 1558
  ARSENIC, SOLID
  COLLOIDAL ARSENIC
  ARSENIC BLACK
  GREY ARSENIC
  METALLIC ARSENIC
  ARSENIC, METALLIC
  ARSENICALS
  ARSENIC-75
  OHS01980
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
EXPO

PERMISSIBLE EXPOSURE LIMIT
  10 UG(AS)/M3 OSHA TWA (INORGANIC ARSENIC)
  0.2 MG/M3 ACGIH TWA
  2 UG/M3 NIOSH RECOMMENDED 15 MINUTE CEILING
  POSITIVE MUTAGEN (RTEC)
  HUMAN CARCINOGEN (IARC, NTP)
  REPORTABLE QUANTITIES - 1 LB CWA 307(A) - 1 LB CAA 112
  CERCLA HAZARD RATINGS - TOXICITY 3 - IGNITABILITY 0 - REACTIVITY 1 -
  PERSISTENCE 3

  TOXICOLOGY:  ARSENIC IS AN EYE AND MUCOUS MEMBRANE IRRITANT, PRIMARY
  SKIN IRRITANT, NEUROTOXIN, AND CARCINOGEN.
    ACUTE POISONING CAUSES GASTROINTESTINAL UPSET.  DEATH MAY RESULT FROM
  CIRCULATORY FAILURE.  IN SUB-LETHAL EXPOSURE, JAUNDICE, OLIGURIA, AND
  ANURIA MAY OCCUR.  INHALATION OF ARSENIC DUSTS MAY PRODUCE PULMONARY
  EDEMA, RESTLESSNESS, DYSPNEA, CYANOSIS, COUGH WITH FOAMY SPUTUM, AND
  RALES.
    CHRONIC INTOXICATION MAY CAUSE PERIPHERAL NEUROPATHY, AND DISORDERS OF
  THE SKIN, GASTROINTESTINAL AND CARDIOVASCULAR SYSTEMS.  ANEMIA AND
  WEIGHT LOSS MAY ALSO OCCUR.
    EVIDENCE FOR CARCINOGENICITY OF ARSENIC COMPOUNDS IN ANIMALS IS CON-
  SIDERED INDADEQUATE.  THERE IS SUFFICIENT EVIDENCE THAT SKIN CANCER IN
  HUMANS IS CAUSALLY ASSOCIATED WITH EXPOSURE TO INORGANIC COMPOUNDS IN
  DRUGS, DRINKING WATER, AND THE OCCUPATIONAL ENVIRONMENT.  THE RISK OF
  LUNG CANCER WAS INCREASED 4 TO 12 TIMES IN CERTAIN SMELTER WORKERS WHO
  INHALED HIGH LEVELS OF ARSENIC TRIOXIDE.  HOWEVER, THE INFLUENCE OF
  OTHER CONSTITUENTS OF THE WORKING ENVIRONMENT CANNOT BE EXCLUDED.  CASE
  REPORTS HAVE SUGGESTED AN ASSOCIATION BETWEEN EXPOSURE TO ARSENIC COM-
  POUNDS AND BLOOD DISEASES AND LIVER TUMORS.
    THE ACGIH THRESHOLD LIMIT VALUE WAS SET TO PREVENT SYSTEMIC POISONING.
  THE NIOSH EXPOSURE LIMIT IS RECOMMENDED TO PREVENT LUNG CANCER.
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
PROP

CHEMICAL AND PHYSICAL PROPERTIES
  MOLECULAR WEIGHT: 74.9
  BOILING POINT AT 1 ATM, F: SUBLIMES AT 1135 F
  SOLUBILITY IN WATER, G/100 G WATER AT 20C: INSOLUBLE
  FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF OC): NONFLAMMABLE
  VAPOR PRESSURE @ 20 C, MMHG: 0 MM
  MELTING POINT, F: 1503 F AT 28 ATM
  UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: NONFLAMMABLE
  LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: NONFLAMMABLE
  SPECIFIC GRAVITY: 5.727 AT 57 F
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
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INCOMPATIBILITIES
  OXIDIZERS
  BROMATES
  CHLORATES
  CHROMIUM TRIOXIDE
  SILVER NITRATE
  SODIUM PEROXIDE
  NITROGEN TRIFLUORIDE
  ACIDS
  HALOGENS (BROMINE, CHLORINE, IODINE, FLUORINE)
  ALKALI METALS (SODIUM, POTASSIUM, LITHIUM)
  ACETYLIDES
  ZINC
  PALLADIUM
  PLATINUM
  HYDROGEN GAS
  THERMAL DECOMPOSITION PRODUCTS ARE HAZARDOUS AND/OR TOXIC
  METAL IN POWDERED FORM IS EXPLOSIVE
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
CLOT .

PERSONAL PROTECTIVE EQUIPMENT
  29CFR1910.1018 INORGANIC ARSENIC
  (J) PROTECTIVE WORK CLOTHING AND EQUIPMENT
   (1) PROVISION AND USE.  WHERE THE POSSIBILITY OF SKIN OR EYE IRRITA-
  TION FROM INORGANIC ARSENIC EXISTS, AND FOR ALL WORKERS WORKING IN
  REGULATED AREAS, THE EMPLOYER SHALL PROVIDE AT NO COST TO THE EMPLOYEE
  AND ASSURE THAT EMPLOYEES USE APPROPRIATE AND CLEAN PROTECTIVE WORK
  CLOTHING AND EQUIPMENT SUCH AS, BUT NOT LIMITED TO:
   (I) COVERALLS OR SIMILAR FULL-BODY WORK CLOTHING;
   (II) GLOVES, AND SHOES OR COVERLETS;
   (III) FACE SHIELDS OR VENTED GOGGLES WHEN NECESSARY TO PREVENT EYE
  IRRITATION, WHICH COMPLY WITH THE REQUIREMENTS OF 29CFR1910.133(A)(2)-
  (A)(6); AND
   (IV) IMPERVIOUS CLOTHING FOR EMPLOYEES SUBJECT TO EXPOSURE TO ARSENIC
  TRICHLORIDE.
   (2) CLEANING AND REPLACEMENT.
   (I) THE EMPLOYER SHALL PROVIDE THE PROTECTIVE CLOTHING REQUIRED IN
  PARAGRAPH (J)(1) OF THIS SECTION IN A FRESHLY LAUNDERED AND DRY CONDI-
  TION AT LEAST WEEKLY, AND DAILY IF THE EMPLOYEE WORKS IN AREAS WHERE
  EXPOSURES ARE OVER 100 UG/M3 OF INORGANIC ARSENIC OR IN AREAS WHERE MORE
  FREQUENT WASHING IS NEEDED TO PREVENT SKIN IRRITATION.
   (II) THE EMPLOYER SHALL CLEAN, LAUNDER, OR DISPOSE OF PROTECTIVE CLOTH-
  ING REQUIRED IN PARAGRAPH (J)(1) OF THIS SECTION.
   (III) THE EMPLOYER SHALL REPAIR OR REPLACE THE PROTECTIVE CLOTHING AND
  EQUIPMENT AS NEEDED TO MAINTAIN THEIR EFFECTIVENESS.
   (IV) THE EMPLOYER SHALL ASSURE THAT ALL PROTECTIVE CLOTHING IS REMOVED
  AT THE COMPLETION OF A WORK SHIFT ONLY IN CHANGE ROOMS PRESCRIBED IN
  PARAGRAPH (M)(1) OF THIS SECTION.
   (V) THE EMPLOYER SHALL ASSURE THAT CONTAMINATED PROTECTIVE CLOTHING
  TO BE CLEANED, LAUNDERED, OR DISPOSED OF, IS PLACED IN A CLOSED CONTAIN-
  ER IN THE CHANGE-ROOM WHICH PREVENTS DISPERSION OF INORGANIC ARSENIC
  OUTSIDE THE CONTAINER.
   (VI) THE EMPLOYER SHALL INFORM IN WRITING ANY PERSON WHO CLEANS OR
  LAUNDERS CLOTHING REQUIRED BY THIS SECTION, OF THE POTENTIALLY HARMFUL
  EFFECTS INCLUDING THE CARCINOGENIC EFFECTS OF EXPOSURE TO INORGANIC
  ARSENIC.
   (VII) THE EMPLOYER SHALL ASSURE THAT THE CONTAINERS OF CONTAMINATED
  PROTECTIVE CLOTHING AND EQUIPMENT IN THE WORKPLACE OR WHICH ARE TO BE
  REMOVED FROM THE WORKPLACE ARE LABELLED AS FOLLOWS:

    CAUTION:  CLOTHING CONTAMINATED WITH INORGANIC ARSENIC; DO NOT REMOVE
  DUST BY BLOWING OR SHAKING.  DISPOSE OF INORGANIC ARSENIC CONTAMINATED
  WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE OR FEDERAL
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20 MG(AS)/M3
   - SUPPLIED-AIR RESPIRATOR
      WITH A FULL FACE-PIECE, HELMENT, OR HOOD
      OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE


FIREFIGHTING
   - SELF-CONTAINED BREATHING APPARATUS
      WITH A FULL FACE-PIECE
      OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE

TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
ROUT

ROUTE OF ENTRY INTO BODY
  INHALATION
  SKIN ABSORPTION
  INGESTION
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
SYMP

SYMPTOMS
  NAUSEA
  VOMITING
  ABDOMINAL PAIN
  CONSTIPATION
  DIARRHEA
  JAUNDICE
  ALOPECIA
  DERMATITIS
  SKIN PIGMENTATION
  NAUSEA
  HEPATIC CARCINOMA
  FASCICULATION
  ATAXIA
  INCOORDINATION
  CONFUSION
  PAMER & PLANTAR HYPERKERATOSIS
  NASAL SEPTUM PERFORATION
  PERIPHERAL NEUROPATHY
  CENTRAL NERVOUS SYSTEM DEPRESSION
  CORNEAL NECROSIS
  CIRRHOSIS
  LACRIMATION
  HEMATURIA
  ALBUMINURIA
  CONJUNCTIVITIS
  BONE MARROW DEPRESSION
  COLLAPSE
  SHOCK
  TACHYCARDIA
  COMATOSE
  ECZEMA
  CYANOSIS
  POLYNEUROPATHY
  OPTIC NEURITIS
  ANESTHESIA
  PARESTHESIA
  SKIN CANCER
  SALIVATION
  ANEMIA
  WEIGHT LOSS
  PROTEINURIA
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   [illegible]
   NEPHRITIS
   APLASTIC ANEMIA
   CARDIAC FAILURE
   HYPOTENSION
   CONVULSIONS
   ANURIA
   LUNG CANCER
   SKIN CANCER
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
FIRA

FIRST AID PROCEDURES FOLLOWING EXPOSURE
  IF THIS CHEMICAL GETS INTO THE EYES, IMMEDIATELY WASH THE EYES
  WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE LOWER AND
  UPPER LIDS.  GET MEDICAL ATTENTION IMMEDIATELY.  CONTACT LENSES
  SHOULD NOT BE WORN WHEN WORKING WITH THIS CHEMICAL.

  IF THIS CHEMICAL GETS ON THE SKIN, IMMEDIATELY WASH CONTAMINATED
  SKIN WITH SOAP OR MILD DETERGENT & WATER.  IF THIS CHEMICAL
  SOAKS CLOTHING, IMMEDIATELY REMOVE CLOTHING & WASH SKIN WITH
  SOAP OR MILD DETERGENT & WATER.  GET MEDICAL ATTENTION PROMPTLY.

  IF A PERSON BREATHES IN LARGE AMOUNTS OF THIS CHEMICAL, 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.

  INGESTED ARSENIC:
  EMERGENCY TREATMENT - REMOVE BY GASTRIC LAVAGE OR EMESIS.
  FOLLOW WITH SALINE CATHARTIC.
  ANTIDOTE - GIVE DIMERCAPROL FOR TWO DAYS, THEN PENICILAMINE.
  DISCONTINUE WHEN URINE ARSENIC FALLS BELOW 50 UG/24 HOURS.
  (ANTIDOTES MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL)
  FURTHER TREATMENT - GIVE 5% GLUCOSE IN NORMAL SALINE INTRA-
  VENOUSLY TO TREAT DEHYDRATION. TREAT SHOCK, PULMONARY EDEMA,
  ANURIA, AND LIVER DAMAGE. FOR SEVERE POISONING, USE HEMO-
  DIALYSIS AFTER DIMERCAPROL THERAPY.
  (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

  CIRCULATORY FAILURE/SHOCK - PLACE PATIENT IN SUPINE POSITION
  WITH FEET ELEVATED. ESTABLISH AND MAINTAIN AN ADEQUATE AIRWAY.
  MAINTAIN BODY WARMTH BY APPLICATION OF BLANKENTS, BUT DO NOT
  APPLY EXTERNAL HEAT. RELIEVE PAIN WITH MORPHINE SULFATE, 10
  MG/70 KG SUBCUTANEOUSLY OR INTRAVENOUSLY, FOR OTHERWISE UNCON-
  TROLLABLE PAIN. DO NOT GIVE MORPHINE TO CHILDREN UNDER 5 YEARS
  OF AGE OR TO UNCONSCIOUS OR STUPOROUS PATIENTS. PATIENTS WITH
  DEPRESSED RESPIRATION SHOULD NOT BE GIVEN MORPHINE UNLESS PER-
  SONNEL AND EQUIPMENT TO MAINTAIN RESPIRATION  ARE IMMEDIATELY
  AVAILABLE. RESTORE AND MAINTAIN ADEQUATE BLOOD VOLUME. GET
  FURTHER MEDICAL TREATMENT IMMEDIATELY.
  (MEDICATION MUST BE GIVEN BY QUALIFIED MEDICAL PERSONNEL)
  (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

  PULMONARY EDEMA - RELIEVE ANXIETY. GIVE MORPHINE SULFATE, 10 MG,
  TO DECREASE RATE OF RAPID, INEFFICIENT RESPIRATION. GIVE 40%
  OXYGEN BY FACE MASK. USE INTERMITTENT POSITIVE-PRESSURE OXYGEN
  RESUSCITATOR FOR SHORT PERIODS. GIVE AMINOPHYLLINE, 0.5 G, IN-
  TRAVENOUSLY, TO RELIEVE ASSOCIATED BRONCHIAL CONSTRICTION. TREAT
  EDEMA CAUSED BY MORPHINE OR MORPHINE ANALOGS BY GIVING NALOXONE
  AND OXYGEN.
  (MEDICATION MUST BE GIVEN BY QUALIFIED MEDICAL PERSONNEL)
  (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

  ACUTE RENAL FAILURE - TREAT SHOCK. FOR HEMOLYTIC REACTIONS,
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GIVE SODIUM BICARBONATE,
MAINTAIN AN ALKALINE URINE.
(MEDICATION MUST BE GIVEN BE QUALIFIED MEDICAL PERSONNEL)
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

  LIVER DAMAGE - REMOVE FROM EXPOSURE TO ALL CHEMICALS AND
  DRUGS. MAINTAIN COMPLETE BED REST. AVOID ANESTHESIA OR
  SURGICAL PROCEDURES. AVOID DEHYDRATION OR OVERHYDRATION.
  IF VOMITING SEVERE AND ORAL FLUIDS NOT RETAINED, REPLACE
  VOMITUS WITH AN EQUAL QUANTITY OF 100% DEXTROSE IN NORMAL
  SALINE. IN RENAL FUNCTION ADEQUATE, GIVE 1 LITER OF 5%
  DEXTROSE OR INVERT SUGAR IN NORMAL SALINE PLUS 1-3 LITERS
  OF 10% DEXTROSE OR INVERT SUGAR IN DISTILLED WATER INTRA-
  VENOUSLY EVERY TWENTY-FOUR HOURS.
  (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

  GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO
  PASSING OF STOMACH TUBE. LAY PATIENT ON ONE SIDE, WITH
  HEAD LOWER THAN WAIST. IMMOBILIZE A STRUGGLING PATIENT
  WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUBE FROM
  MOUTH TO EPIGASTRIUM, MARK TUBE WITH INDELIBLE MARKING
  OR TAPE. REMOVE DENTURES AND OTHER FOREIGN OBJECTS FROM
  MOUTH. OPEN MOUTH, USE GAG IF NECESSARY. EXTEND HEAD BY
  LIFTING THE CHIN. PASS TUBE OVER TONGUE AND TOWARD BACK
  OF THROAT WITHOUT EXTENDING HEAD OR NECK. IF OBSTRUCTION
  IS MET BEFORE THE MARK ON TUBE REACHES LEVELS OF TEETH,
  DO NOT FORCE, BUT REMOVE TUBE AND REPEAT PROCEDURE UNTIL
  TUBE PASSES TO MARK. PLACE END OF TUBE IN GLASS OF WATER.
  IF TUBE IS OBSTRUCTED WHEN INTRODUCED ABOUT HALFWAY TO THE
  MARK, IT MAY HAVE ENTERED TRACHEA.
      AFTER TUBE IS PLACED IN STOMACH, ASPIRATE FIRST TO
  REMOVE STOMACH CONTENTS BY IRRIGATION SYRINGE. SAVE STOMACH
  CONTENTS FOR EXAMINATION, AND REPEAT INTRODUCTION AND
  WITHDRAWAL OF 100-300 ML WARM WATER UNTIL AT LEAST 3 LITERS
  OF CLEAR RETURN ARE OBTAINED. USE ACTIVATED CHARCOAL AT
  BEGINNING OF LAVAGE TO AID IN POISON INACTIVATION. LEAVE
  50 GRAMS OF CHARCOAL SUSPENDED IN WATER IN THE STOMACH.
  IF INTRODUCTION AND REMOVAL OF LAVAGE FLUID BY GRAVITY
  REQUIRES MORE THAN FIVE MINUTES, ASSIST WITH ASEPTO SYR-
  INGE. PREVENT ASPIRATION WITH CUFFED ENDOTRACHEAL TUBE.
  AVOID GIVING LARGE QUANTITIES OF WATER.
      MASSAGE OF EPIGASTRIUM WHILE STOMACH TUBE IS BEING
  ASPIRATED MAY AID IN POISON REMOVAL.
      IF PATIENT COMATOSE, INTUBATE TRACHEA WITH CUFFED ENDO-
  TRACHEAL TUBE. SUCCINYLCHLORINE MAY BE ADMINISTERED BY QUAL-
  IFIED MEDICAL PERSONNEL TO EASE INSERTION OF TRACHEAL CATH-
  ETER PRIOR TO PASSAGE OF STOMACH TUBE.
  (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)


TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
ORGA

ORGANS
  RESPIRATORY SYSTEM
  SKIN
  EYES
  REPRODUCTIVE SYSTEM
  CENTRAL NERVOUS SYSTEM
  MUCOUS MEMBRANES
  KIDNEYS
  LIVER
  BLOOD
  PERIPHERAL NERVOUS SYSTEM
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
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MERCURY

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ENTER-NAME, KEYWORD, SYMPTOM, STLA, NAMELIST, HELP, OR QUIT
NAME
ENTER CHEMICAL NAME
MERCURY
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
[illegible].

CHEMICAL NAME
  MERCURY
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
SYNM.

SYNONYMS
  METALLIC MERCURY
  INORGANIC MERCURY
  MERCURY, METALLIC
  MERCURY, INORGANIC
  QUICKSILVER
  NA 2809
  COLLOIDOL MERCURY
  NCI-C60399
  QUICK SILVER
  QUECKSILBER
  OHS14020
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
EXPO

PERMISSIBLE EXPOSURE LIMIT
  0.1 MG/M3 OSHA CEILING
  50 UG/M3 ACGIH TWA
  150 UG/M3 ACGIH STEL
  0.05 MG(HG)/M3 NIOSH RECOMMENDED TWA
  INDEFINITE ANIMAL CARCINOGEN (RTEC)
  REPORTABLE QUANTITIES - 1 LB CWA 307(A) - 1 LB CWA 112
    1 LB RCRA 3001 - 1 LB PROPOSED
  CERCLA HAZARD RATINGS - TOXICITY 3 - IGNITABILITY 0 - REACTIVITY 2 -
    PERSISTENCE 3

  TOXICOLOGY:  MERCURY IS A PRIMARY SKIN IRRITANT, SKIN SENSITIZER,
  NEPHROTOXIN AND NEUROTOXIN.
    ACUTE POISONING FOLLOWING INGESTION CAUSES METALLIC TASTE, THIRST,
  ABDOMINAL PAIN, VOMITING AND BLOODY DIARRHEA.  DEATH MAY OCCUR FROM
  UREMIA.  INHALATION OF VAPOR RESULTS IN DYSPNEA, COUGH, FEVER, NAUSEA,
  VOMITING, DIARRHEA, STOMATITIS, SALIVATION AND METALLIC TASTE.  PULMON-
  ARY DISTURBANCES MAY FOLLOW.  ANURIA MAY OCCUR.
    CHRONIC INGESTION CAUSES SKIN DISORDERS, SALIVATION, DIARRHEA, ANEMIA,
  LEUKOPENIA, LIVER AND KIDNEY DAMAGE.  INHALATION MAY RESULT IN TREMORS,
  SALIVATION, STOMATITIS, LOSSENING OF THE TEETH, BLUE GUM LINE,
  PERIPHERAL NEUROPATHY, NEPHRITIS, DIARRHEA, ANXIETY, HEADACHE, WEIGHT
  LOSS, ANOREXIA, AND PSYCHIC DISTURBANCES.
    THE THRESHOLD LIMIT VALUE WAS SET TO PREVENT CHRONIC POISONING.
  IHL-WMN TCLO:150 UG/M3/46 DAYS
  IHL-RBT LCLO: 29 MG/M3/30 HR
 YPE WHAT INFORMATION YOU REQUIRE:
 LL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
PROP

CHEMICAL AND PHYSICAL PROPERTIES
  MOLECULAR WEIGHT: 201
  BOILING POINT AT 1 ATM, F: 674 F
  SOLUBILITY IN WATER, G/100 G WATER AT 20C: INSOLUBLE
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  VAPOR PRESSURE @ 20 C, MMHG: 0.0012 MM
  MELTING POINT, F: -38 F
  LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: NOT APPLICABLE
  SPECIFIC GRAVITY: 13.5939
  VAPOR DENSITY (AIR=1): 7.0
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
  :O

INCOMPATIBILITIES
  ACETYLENE GAS
  AMMONIA
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
CLOT .

PERSONAL PROTECTIVE EQUIPMENT
  FOLLOWING INFORMATION FROM NIOSH/OSHA 'OCCUPATIONAL HEALTH GUIDELINES
   FOR CHEMICAL HAZARDS':

  PREVENT SKIN CONTACT, WHERE SKIN CONTACT MAY OCCUR
    WEAR IMPERVIOUS CLOTHING
    WEAR GLOVES
    WEAR FACESHIELD (8 INCH MINIMUM)

  PLACE CONTAMINATED CLOTHING IN CLOSED CONTAINERS FOR STORAGE UNTIL
    LAUNDERED OR DISCARDED
  IF CLOTHING IS TO BE LAUNDERED, INFORM PERSON PERFORMING OPERATION OF
    CONTAMINANT'S HAZARDOUS PROPERTIES
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
RESP .

[illegible]SPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITIED)

1 MG/M3
   - SUPPLIED-AIR RESPIRATOR
   - SELF-CONTAINED BREATHING APPARATUS


5 MG/M3
   - SUPPLIED-AIR RESPIRATOR
      WITH A FULL FACE-PIECE
   - SELF-CONTAINED BREATHING APPARATUS
      WITH A FULL FACE-PIECE


28 MG/M3
   - TYPE 'C' SUPPLIED-AIR RESPIRATOR
   - SUPPLIED-AIR RESPIRATOR
      OPERATED IN PRESSURE-DEMAND, POSITIVE-PRESSURE, OR CONTINUOUS-FLOW
       MODE


ESCAPE
   - GAS MASK
      WITH AN ORGANIC VAPOR CANISTER
      (CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER)
   - SELF-CONTAINED BREATHING APPARATUS


28 MG/M3
   - TYPE 'C' SUPPLIED-AIR RESPIRATOR
      OPERATED IN PRESSURE-DEMAND, POSITIVE-PRESSURE, OR CONTINUOUS-FLOW
       MODE
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ESCAPE
  - GAS MASK
      WITH A CANISTER
      PROVIDING PROTECTION AGAINST SPECIFIC COMPOUND OF CONCERN
      (FRONT- OR BACK-MOUNTED)


TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
ROUT

ROUTE OF ENTRY INTO BODY
  INHALATION
  INGESTION
  SKIN OR EYE CONTACT
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
SYMP

SYMPTOMS
  COUGHING
  DYSPNEA
  DERMATITIS
  SALIVATION
  LACRIMATION
  THIRST
  METALLIC TASTE
  NAUSEA
  VOMITING
  GASTROINTESTINAL PAIN
  RESPIRATORY EDEMA
  PNEUMONIA
  BRONCHITIS
  ACIDOSIS
  LEUKOPENIA
  HEMATURIA
  PROTEINURIA
  DIARRHEA
  BLOODY STOOLS
  GINGIVAL LEAD LINE
  CENTRAL NERVOUS SYSTEM DEPRESSION
  DYSARTHIA
  HEADACHE
  FATIGUE
  WEAKNESS
  IRRITABILITY
  INSOMNIA
  DIZZINESS
  INCOORDINATION
  NERVOUSNESS
  MENTAL DEPRESSION
  HALLUCINATIONS
  STOMATITIS
  PARESTHESIA
  ANEMIA
  ANOREXIA
  WEIGHT LOSS
  TREMORS
  CONVULSIONS
  CARDIAC DEPRESSION
  PHOTOPHOBIA
  NEPHRITIS
  UREMIA
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  ANURIA
  LIVER DAMAGE
  HEMATURIA
  KIDNEY DAMAGE
  NUMBNESS EXTREMITIES
TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
 FA

FIRST AID PROCEDURES FOLLOWING EXPOSURE
  IF THIS CHEMICAL GETS INTO THE EYES, IMMEDIATELY WASH THE EYES
  WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE LOWER AND
  UPPER LIDS.  GET MEDICAL ATTENTION IMMEDIATELY.  CONTACT LENSES
  SHOULD NOT BE WORN WHEN WORKING WITH THIS CHEMICAL.

  IF THIS CHEMICAL GETS ON THE SKIN, IMMEDIATELY WASH CONTAMINATED
  SKIN WITH SOAP OR MILD DETERGENT & WATER.  IF THIS CHEMICAL
  SOAKS CLOTHING, IMMEDIATELY REMOVE CLOTHING & WASH SKIN WITH
  SOAP OR MILD DETERGENT & WATER.  GET MEDICAL ATTENTION PROMPTLY.

  IF A PERSON BREATHES IN LARGE AMOUNTS OF THIS CHEMICAL, 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.

  INGESTED MERCURY:
  AEMERGENCY TREATMENT - REMOVE BY GASTRIC LAVAGE WITH TAP
  WATER OR BY EMESIS AND CATHARSIS.
  ANTIDOTE - GIVE DIMERCAPROL. HEMODIALYSIS SPEEDS REMOVAL
  OF MERCURY-DIMERCAPROL COMPLEX. PENICILLAMINE IS ALSO
  EFFECTIVE. PENICILLAMINE/DIMERCAPROL TREATMENT IS INEFFEC-
  TIVE FOR NEUROLOGIC EFFECTS OF ALKYL MERCURY COMPOUNDS. THE
  USE OF N-ACETYL-D,L-PENICILLAMINE IS EFFECTIVE FOR ALKYL
  MERCURY IN EXPERIMENTAL ANIMALS. CONTINUE WITH CHELATION
  TREATMENT UNTIL URINE MERCURY FALLS BELOW 50 UG/24 HOURS.
  FURTHER TREATMENT - TREAT ANURIA AND SHOCK. TREAT STENOTIC
  LESIONS OF GASTROINTESTINAL TRACT AFTER ENDOSCOPY. RUSTAM
  SUGGESTS NEOSTIGMINE, 15-22.5 MG, AND ATROPINE, 2-3 MG
  DAILY IN DIVIDED DOSES, INCREASES MUSCLE STRENGTH IN LATER
  STAGES OF ALKYL MERCURY POISONING.
  (ANTIDOTES MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL)
  (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

  GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO
  PASSING OF STOMACH TUBE. LAY PATIENT ON ONE SIDE, WITH
  HEAD LOWER THAN WAIST. IMMOBILIZE A STRUGGLING PATIENT
  WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUBE FROM
  MOUTH TO EPIGASTRIUM, MARK TUBE WITH INDELIBLE MARKING
  OR TAPE. REMOVE DENTURES AND OTHER FOREIGN OBJECTS FROM
  MOUTH. OPEN MOUTH, USE GAG IF NECESSARY. EXTEND HEAD BY
  LIFTING THE CHIN. PASS TUBE OVER TONGUE AND TOWARD BACK
  OF THROAT WITHOUT EXTENDING HEAD OR NECK. IF OBSTRUCTION
  IS MET BEFORE THE MARK ON TUBE REACHES LEVELS OF TEETH,
  DO NOT FORCE, BUT REMOVE TUBE AND REPEAT PROCEDURE UNTIL
  TUBE PASSES TO MARK. PLACE END OF TUBE IN GLASS OF WATER.
  IF TUBE IS OBSTRUCTED WHEN INTRODUCED ABOUT HALFWAY TO THE
  MARK, IT MAY HAVE ENTERED TRACHEA.
      AFTER TUBE IS PLACED IN STOMACH, ASPIRATE FIRST TO
  REMOVE STOMACH CONTENTS BY IRRIGATION SYRINGE. SAVE STOMACH
  CONTENTS FOR EXAMINATION, AND REPEAT INTRODUCTION AND
  WITHDRAWAL OF 100-300 ML WARM WATER UNTIL AT LEAST 3 LITERS
  OF CLEAR RETURN ARE OBTAINED. USE ACTIVATED CHARCOAL AT
  BEGINNING OF LAVAGE TO AID IN POISON INACTIVATION. LEAVE
  50 GRAMS OF CHARCOAL SUSPENDED IN WATER IN THE STOMACH.
  IF INTRODUCTION AND REMOVAL OF LAVAGE FLUID BY GRAVITY
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INGE. PREVENT ASPIRATION WITH CUFFED ENDOTRACHEAL TUBE.
AVOID GIVING LARGE QUANTITIES OF WATER.
    MASSAGE OF EPIGASTRIUM WHILE STOMACH TUBE IS BEING
ASPIRATED MAY AID IN POISON REMOVAL.
    IF PATIENT COMATOSE, INTUBATE TRACHEA WITH CUFFED ENDO-
TRACHEAL TUBE. SUCCINYLCHLORINE MAY BE ADMINISTERED BY QUAL-
IFIED MEDICAL PERSONNEL TO EASE INSERTION OF TRACHEAL CATH-
TER PRIOR TO PASSAGE OF STOMACH TUBE.
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

CATHARSIS - GIVE 30 GRAMS OF SODIUM SULFATE DISSOLVED
IN A GLASS OF WATER OR 15-60 ML OF FLEET'S PHOSPHO-SODA
DILUTED 1:4. CATHARTIC EFFECT SHOULD OCCUR WITHIN 30-60
MINUTES.
    - DO NOT USE CATHARSIS IN PATIENT SHOWING ELECTROLYTE
IMBALANCE.
    - DO NOT GIVE MAGNESIUM-CONTAINING CATHARTICS TO PATIENT
WITH RENAL DISEASE OR THOSE EXPOSED TO NEPHROTOXINS, OR TO
PATIENT WITH POSSIBLE MYOGLOBINURIA OR HEMOGLOBINURIA.
    - HYPERTONIC CATHARTICS AND ENEMAS ARE HAZARDOUS IN THE
PRESENCE OF IMPAIRED RENAL FUNCTION.
    - DO NOT GIVE CATHARTIC FOR TREATMENT OF INGESTED COR-
ROSIVE.
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

ACUTE RENAL FAILURE - TREAT SHOCK. FOR HEMOLYTIC REACTIONS,
GIVE SODIUM BICARONATE, 5 G EVERY 1-2 HOURS AS NECESSARY TO
MAINTAIN AN ALKALINE URINE.
(MEDICATION MUST BE GIVEN BE QUALIFIED MEDICAL PERSONNEL)
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

CIRCULATORY FAILURE/SHOCK - PLACE PATIENT IN SUPINE POSITION
WITH FEET ELEVATED. ESTABLISH AND MAINTAIN AN ADEQUATE AIRWAY.
MAINTAIN BODY WARMTH BY APPLICATION OF BLANKENTS, BUT DO NOT
APPLY EXTERNAL HEAT. RELIEVE PAIN WITH MORPHINE SULFATE, 10
MG/70 KG SUBCUTANEOUSLY OR INTRAVENOUSLY, FOR OTHERWISE UNCON-
TROLLABLE PAIN. DO NOT GIVE MORPHINE TO CHILDREN UNDER 5 YEARS
OF AGE OR TO UNCONSCIOUS OR STUPOROUS PATIENTS. PATIENTS WITH
DEPRESSED RESPIRATION SHOULD NOT BE GIVEN MORPHINE UNLESS PER-
SONNEL AND EQUIPMENT TO MAINTAIN RESPIRATION  ARE IMMEDIATELY
AVAILABLE. RESTORE AND MAINTAIN ADEQUATE BLOOD VOLUME. GET
FURTHER MEDICAL TREATMENT IMMEDIATELY.
(MEDICATION MUST BE GIVEN BY QUALIFIED MEDICAL PERSONNEL)
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)


TYPE WHAT INFORMATION YOU REQUIRE:
/ALL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
ORGA

ORGANS
  SKIN
  EYES
  RESPIRATORY SYSTEM
  KIDNEYS
  LIVER
  CENTRAL NERVOUS SYSTEM
PE WHAT INFORMATION YOU REQUIRE:
LL/, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), /HELP/, OR /NONE/.
NONE
ENTER NAME, KEYWORD, SYMPTOM, STLA, NAMELIST, HELP, OR QUIT
NAME
ENTER CHEMICAL NAME
ARSENIC
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* - Sampled at the depth only.

← Depth to be sampled

Well #	CCl_4	1982	1983✓	1984✓	1985✓	1986	1987	
1		286 (310)	32,360 (310)	3989 (355)	3989	242 (310)	130 (320)	320*
3			8848 (430)	6983 (310)	6933	6933	6933	
4		9 (445, 390)	133 (295)	133	12 (280, 310)	11 (295)	ND	
5		11 (400)	6381 (315)	4566 (300)	4566	4566	4566	
6		1532 (442)	7805 (425)	4097 (300)	4097	209 (300)	96 (300)	
7		13 (310)	59 (305)	ND	ND	ND	46 (305)	
8			33,157 (315)	3441 (355)	13	4	4	
9			53 (325)	20 (300)	20	20	93 (310)*	310
10			33,383 (405)	3040 (405)	48 (355)	77 (335)	15 (320)	
11			3645 (395)	1363 (310)	1363	201 (345)	107 (395)	
12			94 (395)	32 (395)	32	32	5 (310)*	
14			4 (320)	198 (320)	ND	4 ( )	ND	
15			13 (280)	9 (305, 280)	9	9	ND	
16			913 (345)	720 (345)	494 (345)	397 (330)	~~303 (330)~~ 400	320
17			8398 (370)	7494 (395)	278 (395)	881 (300)	87 (325)	
18			4269 (335)	5747 (310)	289 (355)	529 (355)	222 (310)	320
19			737 (365)	658 (395)	25 (365)	87 (415)	84 ( )	400
20			ND	2 (345)	ND	ND	4 ( )	345
21			534 (275)	611 (280)	199 (280)	245 (280)	94 (280)	280
22				120 (280)	81 (305)	274 (330)	72 ( )	290
23			1047 (180)	1142 (180)	482 (235)	308 (235)	219 (235)	235
101							~~4 ([illegible])~~ 5	
102							3 (235)*	235
103							6	280
AHR			3150 (320)	4813 (-)	79 ( )	337 (310)	38 (310)	
POL		ND	ND	ND	ND	ND	3	
Wall		ND	ND	ND	ND	ND	ND	
Job Corp		6	2	5	5	20	7	
123							ND	
Tibur		ND	ND	84 ( )	ND	ND	ND	
Bet		ND	ND		ND?	ND	ND?	
Rosa							ND	
UEI						409 (IN)	~~168 (310)~~ 230	
Vag Sab.				7	7	7	3	
Jass Mor			-	26	26	26	3 (90)?	
Garrochales III			ND	2	ND	2	47	
Cambija 52		5					5	
Mizgullam		ND L9L1	2	ND	ND		ND	

PROCEDURE FOR USE AND MAINTENANCE OF FIELD NOTEBOOKS

1.0 INTRODUCTION

Field notebooks provide means for recording all data collecting activities performed at a site. As such, entries should be as descriptive and detailed as possible, so that a particular situation could be reconstructed without reliance on the collector's memory.

2.0 NOTEBOOK USE

Field notebooks shall be bound, 4 x 7 to 8 x 10.5 inch books with consecutively numbered pages. Notebooks shall be permanently assigned to field personnel, but are to be stored in site project files when not in use. Each notebook is identified by a document control number which indicates:

<u>ZJX</u> - FN - <u>XXXX</u> - XX

(Site Number - Field Notebook - Owner Identification - Sequence Number)

The cover of each notebook contains the following information:

- Person or Organization to whom the book is assigned
- Book Number
- Site Name and Number
- Start Date
- End Date

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Entries into the logbook may contain a variety of information. At the beginning of each entry the following information is recorded; the date, start time, weather, all field personnel present, level of personal protection being used on-site, and the signature of the person making the entry should be noted.

All measurements made and samples collected are recorded. All entries should be made in pen. No erasures are permitted. If an incorrect entry is made, the data will be crossed out with a single strike mark and initialled. Entries should be organized into easily understandable tables if possible. A sample format is shown in Exhibit 1.

At each station where a sample is collected or a measurement made, a detailed description of the location of the station, which includes compass and rangefinder measurements, are recorded. The film roll number and number of photographs taken at the station are also noted.

All equipment used to make measurements is identified, including the date on which the equipment was calibrated.

Samples are to be collected following sampling procedures described in this manual. The equipment used to collect samples should be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume and number of containers. In addition, the identification of the container number into which the sample is placed in the field is recorded. Sample numbers are assigned prior to going on-site. Duplicates, which receive an entirely separate sample number, are noted under sample description. Significant field notebook entries (samples collected, significant observations) must be countersigned by another member of the project team.

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EXHIBIT 1
TYPICAL FIELD NOTEBOOK ENTRY FORMAT

START TIME DATE

WEATHER:

FIELD PERSONNEL:

LEVEL OF PERSONAL PROTECTION:

RECORDER'S SIGNATURE:

EQUIPMENT (NAME/CONTROL NO.):

CALIBRATION DATE:

Station No./Location Description:

Film Roll Number: Photograph Numbers:

Station No. Parameter (Units)

Typical Field Notebook Entry Format (Cont.)

Date
Start Time

Sampling Equipment: ______________________

No.	Time	Sample Description	Depth	Number	Volume	Chest No.	Comments

PROCEDURE FOR DETERMINATION OF DISSOLVED OXYGEN, YSI MODEL 57 DISSOLVED OXYGEN METER

1.0 INTRODUCTION

The YSI Model 57 Dissolved Oxygen Meter is intended for dissolved oxygen and temperature measurement in water and wastewater applications, but is also suitable for use in certain other liquids. Dissolved oxygen is indicated in mg/l on 0-5, 0-10, and 0-20 mg/l scales. Temperature is indicated in 0°C on a -5°C to 45°C scale. The dissolved oxygen ranges are automatically temperature compensated for solubility of oxygen in water and permeability of the probe membrane, and manually salinity compensated.

The probe has Clark-type, membrane-covered polargraphic sensors with built in thermistors for temperature measurement and compensation. A thin permeable membrane stretched over the sensor isolates the sensor elements from the environment, but allows oxygen and other gases to enter. When a polarizing voltage is applied across the sensor, oxygen that has passed through the membrane reacts at the cathode, causing a current to flow. The membrane passes current at a rate proportional to the pressure difference across it. Since oxygen is rapidly consumed at the cathode, it can be assumed that oxygen pressure inside the membrane is zero. Hence, the force causing the oxygen to diffuse through the membrane is proportional to the absolute pressure of oxygen outside the membrane. If oxygen pressure increases, more oxygen diffuses through the membrane and more current flows through the sensor. A lower pressure results in less current. The current is registered on the O_2 meter to reflect dissolved O_2 levels.

2.0 SPECIFICATIONS

2.1 Instrument

1. Oxygen Measurement

Ranges: 0-5, 0-10, and 0-20 mg/l

Accuracy: ± 1% of full scale at calibration temperature

Readability: 0.025 mg/l on 0.5 scale; 0.05 mg/l on 0-10 scale; 0.1 mg/l on 0-20 scale.

2. Temperature Measurement

Range: -5'C to +45'C

Accuracy: ± 0.5'C plus probe which is ± 0.1'C

Readability: 0.25'C

3. Temperature Compensation

± 1% of D.O. reading for measurements made within ± 5'C of calibration temperature.

± 3% of D.O. reading over entire range of -5 to 45'C probe temperature.

4. System Response Time

90% in 10 seconds at constant temperature of 30'C with YSI 5775 membrane.

5. Operating Temperature Range

-5' to +45'C. Large ambient temperature changes will result in 2% loss of accuracy unless red line and zero are reset.

6. Recorder Output

0 to 114 - 136 mV. Recorder should have 50,000 ohms minimum input impedance.

7. Power Supply

Two disposable "C" size carbon zinc batteries (Eveready 935C or equal) providing approximately 1,000 hours of operation.

1. Inspect the connector and O ring for cleanliness and condition. Clean if dirty, replace O ring if frayed or damaged.
2. Push the electrical connector into the probe body, rotating it until the two halfs mate. A light coating of vaseline or silicone grease on the "O" ring will make reassembly easier. Air trapped between the connector halves may cause them to spring apart slightly; this is normal.
3. Hand tighten the retaining nut.
   Note: the connectors are not intended for frequent disconnecting. Therefore, it is best to keep the probe connected to the cable.

3.3 Preparing the Instrument

3.3.1 The instrument must be placed in its intended operating position - vertical, tilted back, or on its back - before it is prepared for use and calibrated. Readjustments may be necessary when the instrument operating position is changed.

3.3.2 To Prepare the Instruments

1. With the switch in the off position, adjust the meter pointer to zero with the screw in the center of the meter panel. Readjustments may be necessary if the instrument position is changed.
2. Move switch to RED LINE and adjust RED LINE knob until the meter aligns with the red mark at 31°C position. If the needle will not reach the red line, the battery will have to be replaced.
3. Move switch to zero and adjust zero knob until meter aligns with zero mark.
4. Attach the prepared probe cable to the probe connector on the instrument body and adjust the retaining ring finger tight.

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5. Before calibrating, allow 15 minutes for optimum probe stabilization. Repolarize (steps 1 to 4) whenever the instrument has been off or the probe has been disconnected.

3.4 Field Calibration

3.4.1 Calibration Methods

Three calibrations methods are available to calibrate the instrument: Winkler Titration, Saturated Water, and Air. However, because Winkler Titration and Saturated Water calibration require either calibration items or calibration times that may be prohibitive for hazardous waste site conditions, only the Air method is represented here. A description of the Winkler Titration calibration methods are presented in calibration and maintenance Procedure 6617001.

3.4.2 Air Calibration

1. Place probe in moist air. This is done by wrapping the probe loosely with a damp cloth. Care must be taken so that the cloth does not touch the membrane. Wait approximately 10 minutes for temperature stabilization.
2. Adjust knob to TEMPERATURE and read valve. Refer to Table 1 and determine calibration value.
3. Determine altitude or atmospheric correction factor from Table 2.
4. Multiply the calibration value from Table 1 by the connection factor from Table 2. This will provide a corrected calibration value.
5. Adjust the main knob to the appropriate setting for the converted calibration value and set the Salinity knob to 0.

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U.S. ENVIRONMENTAL PROTECTION AGENCY HWI Sample Management Office
P.O. Box [illegible]

ORGANICS TRAFFIC REPORT

Sample Number
AA 001

① Case Number: 5859

Sample Site Name/Code:
DRUM SITE
SMALL TOWN, ME
#01

② SAMPLE CONCENTRATION
(Check One)
☒ Low Concentration
☐ Medium Concentration

③ SAMPLE MATRIX
(Check One)
☒ Water
☐ Soil/Sediment

④ Ship To:
ANAL. LAB
100 MAIN ST.
ANYTOWN, MA
12345
Attn: GC MSSPEC

Transfer
Ship To:

⑤ Regional Office: I

Sampling Personnel:
JOE SAMPLER
(Name)
617/555-1212
(Phone)

Sampling Date:
11/2 - 11/4/86
(Begin) (End)

⑥ For each sample collected specify number of containers used and mark volume level on each bottle.

	Number of Containers	Approximate Total Volume
Water (Extractable)	1	80 oz
Water (VOA)	2	80 ml
Soil/Sediment (Extractable)		
Soil/Sediment (VOA)		
Other		

⑩ Analysis Lab:
Rec'd by:
Date Rec'd:
Sample Condition on Receipt (e.g. broken, no ice, Chain-of-Custody, etc.)

⑦ Shipping Information

FEDERAL EXPRESS
Name of Carrier

11/4/86
Date Shipped:

1234567890
Airbill Number:

⑧ Sample Description

☐ Surface Water
☒ Ground Water
☐ Leachate
☐ Mixed Media
☐ Solids
☐ Other (specify)

⑨ Sample Location
WELL MW-1
GKL6R012

⑪ Special Handling Instructions:
(e.g., safety precautions, hazardous nature)

- PEST/PCB/VOA ONLY
- MATCHES INORGANIC SAMPLE MAA001

LAB FILE COPY

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TABLE 1 - SOLUBILITY OF OXYGEN IN FRESH WATER

Temperature °C	mg/l Dissolved Oxygen	Temperature °C	mg/l Dissolved Oxygen
0	14.60	23	8.56
1	14.19	24	8.40
2	13.81	25	8.24
3	13.44	26	8.09
4	13.09	27	7.95
5	12.75	28	7.81
6	12.43	29	7.67
7	12.12	30	7.54
8	11.83	31	7.41
9	11.55	32	7.28
10	11.27	33	7.16
11	11.01	34	7.05
12	10.76	35	6.93
13	10.52	36	6.82
14	10.29	37	6.71
15	10.07	38	6.61
16	9.85	39	6.51
17	9.65	40	6.41
18	9.45	41	6.31
19	9.26	42	6.22
20	9.07	43	6.13
21	8.90	44	6.04
22	8.72	45	5.95

Source: Derived from 15th Edition "Standard Materials for the Examination of Water and Wastewater."

TABLE 2 - ALTITUDE CORRECTION FACTOR

Atmospheric Pressure mmHg	or	Equivalent Altitude Ft.	=	Correction Factor
775		540		1.02
760		0		1.00
745		542		.98
730		1094		.96
714		1688		.94
699		2274		.92
684		2864		.90
669		3466		.88
654		4082		.86
638		4756		.84
623		5403		.82
608		6065		.80
593		6744		.78
578		7440		.76
562		8204		.74
547		8939		.72
532		9694		.70
517		10472		.68
502		11273		.66

Source: Derived from 15th Edition "Standard Materials for the Examination of Water and Wastewater."

OPERATION PROCEDURE YSI MODEL 33
S-C-T METER (SALINITY, CONDUCTIVITY, TEMPERATURE)

1.0 INTRODUCTION

The YSI Model 33 is a portable battery powered, transitorized instrument used to measure salinity, conductivity, and temperature in surface, ground water, and waste streams. Conductivity is expressed as micromhos/centimeter (umhos/cm; note: the "umhos/cm" on the meter is abreviated "umho"). These are measurements of the electrical conductance the sample would show if measured between opposite faces of a 1 cm cube. Salinity is the number of grams of salt per kilogram of sample (0/00 = parts per thousand). This measurement assumes the sample contains a "standard" sea water salt mixture. The sample temperature is measured in degrees Celsius.

Salinity measurements are manually temperature compensated by direct dial. Conductivity measurements are not temperature compensated; however, a temperature function is provided on the instrument to aid with calculation of corrections. Also, when just temperature and conductivity are known, it is possible to calculate salinity, and when only temperature and salinity are known, it is possible to calculate conductivity.

2.0 Specifications

2.1 Conductivity

Ranges: 0-500, 0-5,000, and 0-50,000 umhos/cm with YSI 3300 Series Probes.
Accuracy: ± 2.5% max. error at 500, 5,000, and 50,000 plus probe. ± 3.0% max. error at 250, 2,500 and 25,000 plus probe.
Readability: 2.5 umhos/cm on 500 umho/cm range
25 umhos/cm on 5,000 umho/cm range
250 umhos/cm on 50,000 umho/cm range

OPERATION PROCEDURE FOR HAAKEBUCHLER pH STICK

1.0 INTRODUCTION

The HaakeBuchler pH Stick is a portable pH monitoring instrument for determining pH in surface and ground waters, waste streams and other water quality applications. The pH Stick consists of a plastic bodied, gel filled, combination electrode and a miniaturized precision meter with liquid crystal display (LCD). The electrode incorporates a temperature sensor which provides automatic compensation for electrode temperature effects from 0 to 45°C.

2.0 SPECIFICATIONS

Instrument - None specified by the manufacturer.

Batteries - Uses seven V312HM mercury type (or equivalent) cells; 7.75 mm diameter; 3.50mm thickness; minimal voltage per cell of 1.35 volts.

3.0 OPERATION

3.1 Field Calibration

The instrument requires field calibration prior to each use. Distilled water, buffer solution (pH 7) and pH 4 solution are required for the field calibration. All solutions must be at the same temperature. This reduces time to stabilize and improves accuracy.

To calibrate the instrument:

1. Remove the protective sheath and rinse the electrode in distilled water.
2. Place the electrode in the pH 7 buffer solution, depress the white operation button below the LCD display, and allow the reading to stabilize.
3. Adjust the pH 7 control using the tool on the end of the protective sheath. The pH 7 control is the upper most white control on the right side of the instrument. Adjust the pH control until the meter reads pH 7.
4. Rinse the electrode in distilled water.
5. Place the electrode in pH 4 solution, depress the white operation button, and allow the reading to stabilize.
6. Adjust the slope control (white control below pH 7 control on right side of instrument) until the meter reads the correct value of the pH 4 solution.
7. Rinse probe in distilled water.
8. Repeat steps 2 through 7.
9. Record calibration in field log or on appropriate form.

3.2 pH Measurements

To take pH measurements:

1. Remove protective sheath (if on) and rinse electrode in distilled water.
2. Place electrode in water sample, depress white control button, wait for reading to stabilize, and record reading in field log book or on appropriate form.
3. Rinse electrode in distilled water between each measurement and after the last sample is measured.

APPENDIX B

SAMPLE CLASSIFICATION, HANDLING AND SHIPMENT

1.0 INTRODUCTION

The protocols for the classification, handling, and shipment of samples collected on and adjacent to uncontrolled hazardous waste sites are presented in this procedure. Steps in the procedure should be followed to ensure the integrity of the samples, as well as protecting the welfare of the persons involved in the shipment, the shipper, and receiver of the samples. When sent by common carrier, the packaging, labeling and shipping of hazardous wastes and substances is regulated by the U.S. Department of Transportation (DOT; 49 CFR).

2.0 SAMPLE CLASSIFICATION

Samples obtained at uncontrolled hazardous waste sites are classified as either environmental samples or hazardous samples. Environmental samples are those which contain low levels of contaminants and require implementation of limited precautionary procedures. Hazardous samples are those which could possibly contain dangerous levels of contaminants. Hazardous samples must be packaged and labeled according to procedures specified by the U.S. DOT, or the state DOT, whichever is more stringent.

2.1 Environmental Samples

Environmental samples are those samples <u>known</u> not to contain dangerously high levels of contaminants. If any doubt exists as to the extent of contamination, samples should be treated as hazardous.

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Environmental samples are collected in an appropriate container allowing approximately 10 percent air space (ullage) so that the container is not full at 130' F. If a head space is not desired for a particular analysis (i.e., volatile organic analyses), the container should be placed inside another container, to provide the desired head space. The sealed and labeled container is then placed inside a ziplock polyethylene bag which is also sealed. The sealed package is then placed inside a shipping container, packed so as to prevent breakage. No precautionary notices are required on the package exterior.

2.2 Hazardous Samples

Samples not designated as environmental samples or which are known to contain hazardous materials must be considered hazardous. DOT has established a prioritized system of transportation categories which depends on the degree of hazardousness of the material. The relevant portion of this listing is shown in Table 1.

Initially, all samples should be surveyed for radiation. If radiation levels are below 0.5 millirens per hour at the surface of the package material, the sample is not shipped as radioactive. If the radiation level exceeds 0.5 millirens per hour, the sample is shipped as radioactive. The Code of Federal Regulations Title 49, sub part I, should be consulted to provide proper shipping containment for shipping of a radioactive sample.

Poison "A" is the next category on the DOT list. Poison "A" substances (listed in Table 2) are defined by DOT as extremely dangerous poisonous gases or liquids of such toxicity that a very small amount of gas, or vapor of the liquid, mixed with air is life threatening. Many of the Poison "A" materials are gases or

TABLE 1 DOT HAZARDOUS MATERIALS CLASSIFICATION

1. Radioactive Material
2. Poison "A"
3. Flammable Gas
4. Non-flammable gas
5. Flammable liquid
6. Oxidizer
7. Flammable Solid
8. Corrosive Material (liquid)
9. Poison B
10. Corrosive Material (solid)
11. Irritating Materials
12. Combustible liquid (in containers having capacity exceeding 110 gallons)
13. ORM-B
14. ORM-A
15. Combustible liquid (in containers having capacity of 110 gallons or less)
16. ORM-E

TABLE 2 CLASS "A" POISONS AND THEIR PHYSICAL STATE AT ROOM TEMPERATURES

Compound	Physical State
arsine	gas
bromoacetone	liquid
chloropicrin & methyl chloride mixture	gas
chloropicrin & non-flammable, non-liquified compressed gas mixture	gas
cyanogen chloride	gas at temperature greater than 13.1 degrees C
cyanogen gas	gas
gas identification set	
gelatin dynamite (H.E. Germaine)	-
grenade (with poison "A" gas charge)	-
hexaethyl tetraphospate & compressed gas mixture	gas
hydroyanic acid (prussic) solution)	liquid
hydrocyanic acid, liquified	gas
insecticide liquified gas, containing poison "A" or poison "B" material	gas
methyldichloroarsine	liquid
nitric oxide	gas
nitrogen peroxide	gas
nitrogen tetroxide	gas
nitrogen dioxide, liquid	gas
parathion & compressed gas mixture	gas
phosgene (diphosgene)	liquid

compressed gases and would not be found in drum type containers. Liquid poison "A"'s would probably be found in closed containers which provides a "worst case" situation. Not all samples found in drums should be labeled Poison "A". Based upon the informaton available, a judgement must be made as to the hazard class of the sample. If the sample is suspected or determined to fall within the Poison "A" classification, packaging procedures specified by DOT should be followed as specified in 49 CFR, Part 173.326-328.

The next two classifications in the DOT series are "flammable" or "non-flammable" gases. Few, if any, gas samples are expected to be collected at uncontrolled hazardous waste sites. Use this category only when shipping containerized gases or gas samples.

The next category to be considered is "flammable liquids". Hazardous samples in liquid form, unless known to fall into a lower category, will be handled, packaged and shipped at this level of concern. However, lesser categories will generally not be considered because flashpoint testing required to drop to a lower level is difficult and possibly dangerous in the field. It is more practical to handle samples at the "flammable" level than to undertake field determination of the flash point.

Solids samples known or suspected to be flammable are shipped as flammable solids. Non-flammable solids may be shipped as Poison "B", corrosive, or irritant materials based on characteristics of the sample and DOT regulations.

Small quantities (i.e., less than 5 pounds of a solid and one pint of liquid in a single package) of hazardous waste samples can be shipped under the Other Regulated Material (ORM) category. If the material is known, the ORM-A or ORM-B classification may be used. 49 CFR 173 parts K and L list the ORM A and ORM B

Materials. If the material is unknown or not listed under parts K and L, the ORM-E category may be used. The ORM-E category is for hazardous waste liquids and solids, not otherwise specified.

The following steps apply to handling flammable liquid and solid samples.

3.0 SAMPLE PACKAGING

Samples are collected in glass containers with non-metallic, teflon-lined screw caps. Sufficient ullage (approximately 10 percent by volume) is allowed so that the container is not liquid-full at 130 degrees Fahrenheit. If an air space in the inner most container cannot be tolerated in order to maintain sample integrity, the sample shall be placed within a second container to provide the required air space.

In collecting a solid material, the container plus contents shall not exceed 1 pound net weight. Large quantities of material, up to 1 gallon, may be collected if the flash point of the sample can be determined to be 73 degrees Fahrenheit or higher. If this is the case, this information should be marked on the outside container (carton, etc.), but only a single (1 gallon or less) bottle may be packed in an outside container with 10 percent air space. The shipping papers are required to state that the "flash point" is 73 degrees or higher.

Seal the sample container and place each in a separate 2-mil thick (or thicker) ziplock polyethylene bag. The sample identification tag should be positioned to enable it to be read through the bag.

Each sealed bag shall be placed inside an appropriate sized metal can or other DOT approved container with enough noncombustible, absorbent, cushioning material (e.g., bentonite, vermiculite or diatomaceous earth) to prevent breakage and provide for absorption of liquid; one bag per can. Pressure close the can and use clips, tape or other positive means to hold the lid securely, tightly, and effectively.

The metal cans or other DOT-approved container, or a single 1-gallon bottle shall be placed into a strong outside container, such as a metal picnic cooler or an approved fiberboard box and surrounded with noncombustible, absorbing packaging material for stability during transport.

4.0 MARKING AND LABELING

Abbreviations are used only where specified by DOT. The following information shall be placed on each metal can, other DOT-approved container, or 1-gallon bottle. Appropriate labels are supplied by the Regional Equipment Manager.

The label should contain the laboratory name and address and appropriate DOT hazardous shipment category. As a conservative approach "Flammable Liquid N.O.S. UN1922" can be used for most liquids and "Flammable Solid N.O.S. UN1325" for most solids. If you know for certain that the sample is not a flammable liquid or solid, then another category in the DOT hierarchy should be used. Not other specified (N.O.S.) is used when the sample is not identified. Identify the sample by name and UN identifier when known.

The following DOT labels shall be placed on the outside of the can (or bottle), depending on contents.

"Cargo Aircraft Only" (Danger Peligro) - "Flammable Liquid", "Flammable Solid", "Dangerous When Wet" or "Corrosive".

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If the cans are placed in an exterior container, both the container and inside can (or bottle) must have the same markings and labels as above.

"LABORATORY SAMPLES" and "THIS SIDE UP" or "THIS END UP" should also be marked on the top and/or front side of the outside container, and upward pointing arrows should be placed on all 4 sides of the exterior container.

5.0 SHIPPING PAPERS

Abbreviations shall be used only where specified below. The bill of lading supplied by the carrier should be completed and the certification statement signed (if not provided by the carrier, standard industry form shall be used) with the following information in the order listed. One form may be used for more than one exterior container.

> "Flammable Liquid, n.o.s. UN1993" or "Flammable Solid, n.o.s. UN1325", "Cargo Aircraft Only", "Limited Quantity" or "Ltd. Qty.", "Laboratory Samples", "Net Weight ______" or "Net Volume ______" of hazardous contents, by item, if more than one metal can is inside of exterior container.

The net weight or net volume must be placed just before or just after the "Flammable Liquid, n.o.s." or "Flammable Solid, n.o.s." description.

A complete chain-of-custody record, enclosed in an envelope is included in the sample container.

Containers must be loaded or otherwise sealed.

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6.0 TRANSPORTATION

All samples should be shipped by Federal Express. "Cargo Only" aircraft may be used, but hazardous samples shall not be transported by any carrier which also carries passengers.

Hazardous or environmental samples may be transported by CDM personnel in private vehicles.

SAMPLE CONTAINER LABELING PROCEDURES

1.0 INTRODUCTION

The protocols for labeling of all samples collected at REM II sites are presented in this procedures.

2.0 SAMPLE CONTAINER LABELING

All samples must be identified with a self-adhesive Chain of Custody Label which shall be attached directly to the outside of the container. Sample labels must be completed with a waterproof pen. An example of the sample label is shown in Figure 1. The information recorded on the sample label includes the following:

- Sample Container Prepared by - Initials of laboratory personnel who cleaned and/or added preservatives and attached label.
- Sample Identification Codes - This is the code described in Procedure 5622002. The code will be placed on the label based on specifics presented in the Sampling Plan section of the Project Operations Plan.
- Site Name - Two or three word site identifier
- Date - A six digit number indicating the month, day and year of collection
- Time - A four digit number indicating the military time of collection.

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FIGURE 1. EXAMPLE OF CHAIN-OF-CUSTODY SAMPLE LABEL

CHAIN-OF-CUSTODY SAMPLE LABEL

SAMPLE CONTAINER PREPARED BY ____________________

SAMPLE IDENTIFICATION CODE

SITE NAME ____________________

PRESERVATIVE ____________________

DATE __________ TIME __________

PARAMETER TO BE ANALYZED:

__________ __________

__________ __________

__________ __________

__________ __________

TEMP (°F) ______________

SAMPLED BY ______________

REFERENCE ______________

SPECIAL INSTRUCTIONS/CAUTIONS:

____

LABORATORY NO. __________

- Temperature (°F) - The approximate temperature at which the sample was collected.
- Sample By - Initials of person(s) who collected the sample.
- Reference - The procedure number of the sampling protocol followed in collecting the sample.
- Special Instructions/Cautions - Are noted in this area. Split samples are labeled with identical information and "split" is noted in the special instructions/cautions box. Duplicates are given entirely separate identification numbers and are not identified on the sample label.
- Preservative - If a preservative is added to the sample container it is noted. If no preservative is added, enter "none".
- Parameter to be Analyzed - Specific parameters or general groups of parameters.
- Laboratory Number - Sample identification number used by the laboratory analyzing the sample.

As each sample is collected, a record is made in the field notebook and the sample is placed in a numbered container. The chests are brought to the decontamination area (Zone II) where, if necessary, the samples are separated for shipping to the analytical laboratories specified in the Project Operations Plan. Chain-of-Custody records (F6260) are filled out for all samples as described in the following section.

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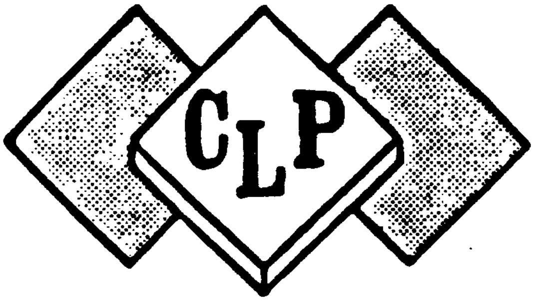
Sample label information is filled in to the extent possible prior to field sampling.

For samples requiring decontamination, the self adhesive chain-of-custody label must be completely covered with clear mylar tape prior to sampling.

[illegible] [illegible]

EPA

User's Guide to the Contract Laboratory Program



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D. Sample Packaging and Shipment

1. Packaging Requirements

Samples processed through the CLP must be packaged for shipment in compliance with current U.S. Department of Transportation (DOT) and commercial carrier regulations. All required government and commercial carrier shipping papers must be filled out and shipment classifications made according to current DOT regulations. (Consult Appendix E for shipping references.)

Traffic Reports, Dioxin Shipment Records, SAS Packing Lists, Chain-of-Custody Records, and any other shipping/sample documentation accompanying the shipment, must be enclosed in a waterproof plastic bag and taped to the underside of the cooler lid.

Coolers must be sealed with custody seals in such a manner that the custody seal would be broken if the cooler were opened.

Shipping coolers must have clearly visible return address labels on the outside. Shipping coolers that are labeled in this manner will be returned to the sampler by the laboratory within 14 days following laboratory sample receipt.

Inside the cooler, sample containers must be enclosed in clear plastic bags through which sample tags and labels are visible. Dioxin samples as well as water and soil samples suspected to be of medium or high concentration or those suspected to contain dioxin must be enclosed in a metal can with a clipped or sealable lid (paint cans are normally used for this purpose) and surrounded by packing material such as vermiculite. The outer metal can must be labeled with the number of the sample contained inside.

Water samples for low or medium level organics analysis and low level inorganics analysis <u>must</u> be shipped cooled to 4°C with ice. <u>No ice</u> is to be used in shipping: inorganic low level soil samples or

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medium/high level water samples; or organic high level water or soil samples; or dioxin samples. Ice is not required in shipping soil samples, but may be utilized at the option of the sampler. All cyanide samples; however, must be shipped cooled to 4°C.

Low and medium level water samples for inorganic analysis require chemical preservation (reference Chapter II, Section B, for preservation techniques).

Waterproof, metal ice chests or coolers are the only acceptable type of sample shipping container. Shipping containers should be packed with non-combustible, absorbent packing material (vermiculite is recommended) surrounding the plastic-enclosed, labeled sample bottles (or labeled metal cans containing samples) to avoid sample breakage in transport. Sufficient packing material should be used so that sample containers will not make contact during shipment. Earth or ice should <u>never</u> be used to pack samples. Earth is a contaminant, and ice melts resulting in container breakage. Ice should be in sealed plastic bags to prevent melting ice from soaking packing material which, when soaked, makes handling of samples difficult in the lab.

Unless otherwise instructed through SMO in advance, the laboratory disposes of unused sample volume, sample bottles and packing materials 60 days following data submission.

A summary of correct sample packaging is illustrated in Appendix C.

2. Shipping Instructions

Samples for organics analysis must be shipped "Priority One/Overnight." If shipment requires more than a 24-hour period, sample holding times can be exceeded compromising the integrity of the sample analyses.

Samples for inorganics analysis should be held until sampling for the Case is complete and shipped "Standard Air" for two-day delivery. In the RAS

Inorganic program, three days is the recommended period for collection of a Case of samples.

All samples should be shipped through a reliable commercial carrier, such as Federal Express, Emery, Purolator, or equivalent. Sampling offices are responsible for sample shipping charges.

The NEIC/Denver and the ERT/Cincinnati hazardous waste site manuals (references provided in Appendix E), provide extensive information on EPA-approved sample packaging and shipment techniques. In addition, general questions concerning sample packaging and shipment may be directed to SMO.

3. Shipment Coordination

To enable SMO to track the shipment of samples from the field to the laboratory and ensure timely laboratory receipt of samples, the sampler must notify SMO of all sample shipments on the day of shipment. At that time, the sampler should provide the following information:

- Sampler name and phone number.
- Case Number and/or SAS Number of the project.
- Site name/code.
- Batch numbers (dioxin only)
- Exact number(s), matrix(ces) and concentration(s) of samples shipped.
- Laboratory(ies) samples were shipped to.
- Carrier name and airbill number(s) for the shipment.
- Method of shipment (e.g., overnight, two-day).
- Date of shipment.
- Suspected hazards associated with the samples or site.
- Any irregularities or anticipated problems with the samples, including special handling instructions, or deviations from established sampling procedures.
- Status of the sampling project (e.g., final shipment, update of future shipping schedule).

Sample shipments made after 3:00 PM EST should be called in to SMO at the start of business the next day (8:00 AM EST). SMO must be notified by 3:00 PM EST Friday concerning information on sample shipments going out Friday intended for Saturday delivery/pickup. CLP laboratories remain open to receive or pick-up Saturday shipments only upon advance notification by SMO and only when shipment information has been provided to SMO by the sampler.

The success of sample shipment coordination depends on the proper use and handling of the sample tracking forms and on timely and complete communication among the RSCC, samplers, SMO, and laboratories. Any postponements or cancellations, changes in the number or type of samples to be collected or shipping dates must be communicated to SMO as soon as this information is known, to facilitate this process. Appendix C contains a checklist for coordinating sample shipment.

U.S. ENVIRONMENTAL PROTECTION AGENCY HWI Sample Management Office
P.O. Box 818 Alexandria VA 22313 703/557-2490 FTS 557-2490

INORGANICS TRAFFIC REPORT

Sample Number
MAA 001

① Case Number: 5169
Sample Site Name/Code:
DRUM SITE
SMALLTOWN, ME
#01

SAMPLE CONCENTRATION
(Check One)
X Low Concentration
___ Medium Concentration

SAMPLE MATRIX
(Check One)
X Water
___ Soil/Sediment

Ship To:
METALS LAB
100 MAIN STREET
ANYTOWN, CA 54321
Attn: AA FERNAS
Transfer
Ship To:

Sampling Office: I
Sampling Personnel:
(Name) JOAN SAMPLER
(Phone) 617/555-1212
Sampling Date:
(Begin) 11/2 (End) 11/4/86

Shipping Information:
Name Of Carrier:
FEDERAL EXPRESS
Date Shipped: 11/4/86
Airbill Number: 1234568790

ANALYTES LAB:
Recd by: ___
Date Recd: ___

Sample Condition
On Receipt:
(eg. broken, leakage, chain of custody, etc.)

Sample Description:
(Check One)
___ Surface Water
X Ground Water
___ Leachate
___ Mixed Media
___ Solids
___ Other ___ (specify)
MATCHES ORGANIC SAMPLE NO. AA001

Mark Volume Level
On Sample Bottle
Check Analysis required
X Total Metals
X Cyanide

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

SAS Number
1000-A

SPECIAL ANALYTICAL SERVICE
PACKING LIST

Sampling Office: Region I

Sampling Contact: JIM SAMPLER (name)

617/555-1212 (phone)

Sampling Date(s): 11/3 - 11/4/86

Date Shipped: 11/4/86

Site Code: #01

Ship To:
SAS LAB
100 MAIN STREET
ANYTOWN, CO
98765

Attn: TP SELVEKS

For Lab Use Only

Date Samples Rec'd:

Received By:

Sample Numbers	Sample Description i.e., Analysis, Matrix, Concentration	Sample Condition on Receipt at Lab
1. 1000A-01	LOW CONC. WATER - 2,4-D; 2,4,5-TP	
2. 1000A-02	" "	
3. 1000A-03	" "	
4. 1000A-04	" "	
5. 1000A-05	" "	
6. 1000A-06	" "	
7. 1000A-07	" "	
8. 1000A-08	" "	
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		
		For Lab Use Only

White - SMO Copy, Yellow - Region Copy, Pink - Lab Copy for return to SMO, Gold - Lab Copy

APPENDIX C

CALIBRATION AND MAINTENANCE PROCEDURE
YSI MODEL 57 DISSOLVED OXYGEN METER

1.0 INTRODUCTION

This procedure presents the steps required to calibrate and maintain the YSI Model 57 Dissolved Oxygen Meter. A description of the instruments function and specifications are presented in Procedure 5617001 and are not repeated here.

2.0 CARE OF THE PROBE (YSI 5739 D.O. PROBE)

2.1 Probe and Cable Description

The YSI 5739 probe is designed for use with the 5740 detachable cable. For user convenience, the probe is equipped with a disconnecting cable to facilitate changing cable lengths and replacing damaged cables or probes. The probe and cable assembly are held together by a threaded retaining nut. The connection is not designed for casual disconnection and should only be disconnected when necessary.

2.2 Cable Connection

To disconnect the cable, unscrew the retaining nut and slide it down the cable to expose the connector. Pull gently on the cable and connector until the connector comes away from the probe body.

To reassemble, inspect the connector and "O" ring for cleanliness. If the "O" ring is frayed or damaged, remove it by squeezing it into the groove causing it to bulge, then roll it out of the groove and off the connector. Replace the "O" ring by rolling a new one into place on the probe. Push the connector on the cable into the probe body, rotating it until the two halves

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mate. A light coating of vaseline or silicone grease on the "O" ring will make reassemble easier. Air trapped between the connector halves may cause them to spring apart slightly; this is normal. Hand tighten the retaining nut onto the probe.

2.3 Pressure Compensation

The vent on the side of the probe is part of a unique pressure compensation system that helps assure accurate readings at great depths of water. The quanity of air bubbles trapped under the membrane determines how serious the pressure error will be. The system is designed to accomodate a small amount of trapped air and still function properly, but the amount should be kept to a minimum.

The compensation system normally does not require servicing and should not be taken apart. However, if electrolyte is leaking through the diaphragm or if there is an obvious puncture, the diaphragm must be replaced. Using a coin, unscrew the retaining plug and remove the washer and diaphragm. Flush any salt crystals from the reservoir with distilled water. Install the new diaphragm (convoluted side in). Replace the washer and screw in the retaining plug.

2.4 Preparing the Probe (Electrolyte Replacement)

The following steps should be used to fill or replace electrolyte. The instrument should be filled when received from factory, or refilled whenever the membrane needs replacement, bubbles appear in the probe or when electrolyte evaporates.

1. If not already done, prepare electrolyte solution by dissolving the KCl crystals in the O_2 probe solution dropper

bottle with distilled water. Fill the bottle to the top and wait until the crystals are thoroughly dissolved.

If factory supplied electrolyte is not available, it can be prepared by making a saturated reagent grade KCl solution with distilled water. Slowly add KCl crystals to approximately 30 ml of distilled water until crystals stop dissolving. Decant 25 ml of the solution into second vial. Add 25 ml of distilled water to decanted solution reducing its concentration by one-half. Adding two drops of Kodak Photo Flo per 100 ml of solution assures good wetting of the sensor, but is not absolutely essential. Place finished solution into the O_2 probe solution bottle or similar container.

2. Unscrew the sensor guard from the probe and then remove the "O" ring and membrane. Thoroughly rinse the sensor with KCl solution.

3. Fill the probe with electrolyte by:

   a. Grasping the probe in your left hand with the pressure compensation vent to the right and the probe opening at the top.

   b. Fill the sensor body with electrolyte by pumping the diaphragm with the eraser end of a pencil or similar soft, blunt tool.

   c. Continue filling and pumping until no more air bubbles appear.

4. To replace the membrane:

   a. Secure a membrane to the sensor by pressing it near the top of the sensor with your thumb.

   b. Add additional solution until a large meniscus completely covers the gold cathode. Handle membrane material with care, keeping it clean and dust free; touching it only at the ends.

   c. With the thumb and forefinger of your other hand, grasp the free end of the membrane.

   d. Using a continuous motion, stretch the membrane up, over, and down the other side of the sensor. Stretching forms the membrane to the contour of the probe.

- e. Secure the membrane under the forefinger of the hand holding the probe.
- f. Roll the "O" ring over the end of the probe. There should be no wrinkles in the membrane or trapped air bubbles. Some wrinkles may be removed by lightly tugging on the edges of the membrane below the "O" ring.
- g. Trim off excess membrane with scissors and a sharp knife. Check that the stainless steel temperature sensor is not covered by excess membrane.

5. Shake off excess KCl.

6. Replace the sensor guard.

7. A bottomless plastic bottle is provided with the probe for probe storage. If not already done, place a moist towel or sponge on the bottle and insert probe in open end. This keeps the electrolyte from evaporating.

8. Place a calibration label on the probe indicating date of electrolyte/membrane replacement.

9. Complete equipment log form (F6101) to indicate adjustments and repairs made.

2.5 Probe Maintenance

1. Membranes

   Membranes should be replaced after every two to four weeks of usage. The membrane will last indefinitely if not used. However, if the electrolyte evaporates and an excessive amount of bubbles form under the membrane, or the membrane becomes damaged, thoroughly flush the reservoir with KCl and install a new membrane (see steps 2.4).

2. Gold Cathode

   - a. The gold cathode should always be bright and untarnished. To clean, wipe with a clean lint free cloth or hard paper. Never use any form of chemical or abrasive material. Rinse the sensor several times with KCl, refill, and install in new membrane (see steps 2.4).
   - b. Some gases contaminate the sensor, evidenced by discoloration of the gold. If the tarnish cannot be

removed by vigorous wiping with a soft cloth, lab wipe, on hard paper, return the probe to the factory for service.

c. If the probe has been operated for extended periods with a loose or wrinkled membrane, the gold cathode may become plated with silver. In this event, the probe should be returned to the factory for refinishing.

3.0 INSTRUMENT CALIBRATION

3.1 Probe Calibration

The instrument must be calibrated in the field prior to each field use because changes in temperature and altitude affect instrument response. However, a laboratory calibration should be performed following replacement of electrolyte and membrane as a check of proper instrument response. A modified Winkler Titration Technique will be used for laboratory calibration. To calibrate the instrument:

1. Draw an approximately 1500 ml sample from a common source. Divide the sample equally into four samples.
2. Determine the oxygen in three samples using the Winkler Titration Technique and average the three values. If one of the three values differs from the others by 0.5 mg/l, then discard that value and average the other two.
3. Place the D.O. probe in the fourth sample and stir.
4. Set the salinity control to zero or to the appropriate salinity value of the sample.
5. Switch the D.O. meter to the desired mg/l range.
6. Allow the probe to remain in the water sample for a minimum of two minutes before adjusting the <u>CALIBRATE</u> knob.
7. Adjust the <u>CALIBRATE</u> knob to the average value as determined in step 2.

8. Leave probe in sample for an additional two minutes to verify the stability of the observed reading. Readjust the knob as necessary.

9. Record calibration activity in equipment log form (F6101).

3.2 Temperature Probe Calibration

1. Place meter knob in temperature position.

2. Submerge probe and NBS-traceable thermometer in water that is in temperature range of instrument.

3. Wait at least 10 minutes for temperature stabilization.

4. Read temperature of instrument reading and compare to that of the NBS-traceable thermometer. Record both values in equipment log form (F6101).

5. Temperature readings for instrument and thermometer should be within ±1°C. If not, that instrument should be removed from use and the probe replaced, or return the instrument to the manufacturer if the instrument cannot be calibrated with a new probe.

4.0 POWER SUPPLY AND BATTERIES

The instrument is powered by two "C" size carbon zinc cells located inside the instrument on the meter end. The instrument does not have a low battery indicator, but the batteries should be replaced when the Red Line knob is at its extreme adjustment, or at least annually. The amount of remaining adjustment is an indication of the battery condition.

The batteries are replaced by removing the screws on the rear cover of the instrument and removing the two batteries at the end of the instrument near the meter. When installing the new batteries, the plus (+) end fits into the battery holder.

5.0 INSTRUMENT TROUBLESHOOTING

1. Erratic or inconsistent readings can be caused by a defective membrane or air bubbles in the electrolyte. Replace membrane and electrolyte to correct problem.
2. Water in the connector plugs can cause erratic readings. Check plugs for water and dry if found wet.
3. H2S, SO2, halogens, neon, NO, and CO are interferring gases. If you suspect erroneous readings, it may be necessary to determine if these are the cause.

CALIBRATION AND MAINTENANCE PROCEDURE
YSI MODEL 33 S-C-T METER

1.0 INTRODUCTION

This procedure presents steps to calibrate and maintain the YSI Model 33 S-C-T meter. Operation principles, procedures, and equipment specifications are presented in Procedure 5617002 and are not repeated here.

2.0 CALIBRATION

2.1 Temperature

2.1.1 Temperature Knob Setting

It is possible for the temperature knob to become loose or slip from its normal position. In an emergency, the dial can be repositioned. It must be emphasized that this is an emergency procedure only and that the instrument should be returned to the factory for proper recalibration - at the earliest opportunity.

To recalibrate the temperature setting:

1. Red line instrument and then place probe in sample of known conductivity.
2. Read and record the temperature and conductivity of the solution using appropriate settings. Leave probe in solution.
3. Determine the salinity of the solution by running a line vertically on Figure 1 until it intersects the appropriate 'C line. From this intersection, extend a line horizontally to the left edge of the graph (Figure 1). This determines the salinity of the sample.

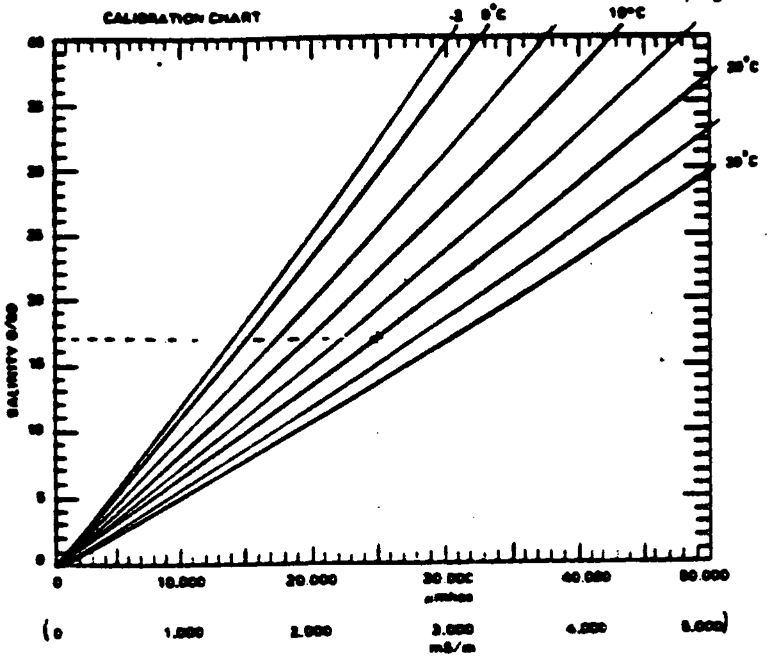

Figure 1. Calibration Chart for Resetting Temperature Knob

4. Remove the °C knob switch to SALINITY, and turn the control shaft until the meter needle indicates the salinity value determined in step 3.

5. Switch to TEMPERATURE. If this temperature is the same as step 2, continue. If not, repeat steps 1 through 5.

6. Place the knob on the control shaft - without turning the control shaft - with the pointer at the same temperature as the meter reading. Tighten both sets of screws securely. Care must be taken at this step so that the shaft setting is not moved.

7. Return the instrument to the factory at the earliest opportunity.

2.1.2 Tempertaure Probe/Instrument

To check the accuracy of the Probe/Instrument temperature readings:

1. Place NBS traceable thermometer in solution with thermometer and probe.

2. Place instrument in temperature mode after zeroing and red lining the instrument.

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3. After five minutes, compare temperature of thermometer and instrument. If the instrument varies by ±1C, the instrument should be returned to the factory for calibration and maintenance.

2.2 Probe Cell Calibration

The YSI #3300 Series Cells are calibrated to absolute accuracy of ± 1.5 percent based on a standard solution of 0.01 demol KCl. To prepare this solution:

1. In a one liter flask, dissolve 0.745 grams of pure dry KCl until the solution is one kilogram in weight.
2. Use Table 1 and the temperature of the water to determine the conductivity of the solution just prepared. Note: Table 1 shows conductivity as if the distilled water was nonconductive. Since even high purity distilled water is slightly conductive, the measured conductivity will be higher by an amount equal to the water's conductivity.
3. Place probe in solution and measure conductivity. The conductivity of the solution plus the conductivity of the distilled water should not vary from the meter reading by ± 1.5%. If the reading is greater than 1.5%, clean the probe and then recheck the conductivity. If after cleaning it is not possible to measure the conductivity of the calibration solution within ± 1.5%, the probe and instrument should be returned to the manufacturer for calibration and maintenance.

3.0 MAINTENANCE

3.1 Batteries

The batteries should be replaced either (1) when it is not possible to red line the instrument, (2) after 200 hours of operation, or (3) every 6 months to reduce the danger of corrosion due to leaky batteries.

To replace batteries, remove the six screws from the rear plate. The battery holders are color coded. The positive (+ button) end must go on red.

Use two "D" size alkaline flashlight cells (Eveready E95 or equivalent).

3.2 Probe

3.2.1 Cleaning

When the cell test indicates low readings, the probable cause is dirty electrodes. Hard water deposits, oils, and organic matter are the most likely contaminants.

TABLE 1 - CELL CALIBRATION DATA

Temperature (°C)	Conductivity (umhos/cm)
15	1141.5
16	1167.5
17	1193.6
18	1219.9
19	1246.4
20	1273.0
21	1299.7
22	1326.6
23	1353.6
24	1380.8
25	1408.1
26	1436.5
27	1463.2
28	1490.9
29	1518.7
30	1546.7

For convenient normal cleaning, soak the electrodes for 5 minutes with a locally available bathroom tile cleaner such as: "Rally, Tile, Porcelain, and Chrome Cleaner"; Johnson Wax "Envy, Instant Cleaner"; or Lysol Brand "Basin, Tub, Tile Cleaner".

For storage cleaning, a 5 minute soak in a solution made of 10 parts distilled water, 10 parts isopropyl alcohol, and 1 part HCl can be used.

Always rinse the probe in distilled water after cleaning and before storage.

CAUTION: Do not touch the electrodes inside the probe. Platinum black is very soft and can be scraped off.

If cleaning does not restore the probe performance, re-platinizing is required.

3.2.2 Probe Replatinizing

1. Equipment required:
    a. YSI #3140 Platinizing Solution, 2 fluid ounce (3% platinum chloride dissolved in 0.025% lead acetate solution)
    b. YSI Model 33 meter
    c. 50 ml glass beaker or equivalent
    d. Distilled water
2. Procedure
    a. Clean probe as in section 3.2.1 - either method

b. Place the cell in the beaker and add sufficient YSI #3140 solution to cover the electrodes. Do not cover the top of the probe

c. Plug the probe into the Model 33 and switch to the X100 scale to platinize the electrode

d. Move the probe slightly to obtain the highest meter reading and continue platinizing for the appropriate time shown below:

Meter Reading (umhos/cm)	Time (minutes)
30,000	5
25,000	6
20,000	8
15,000	11
10,000	16

e. After the elapsed time, remove the probe and rinse in distilled water.

f. Return the solution to its container. Two ounces of solution should be sufficient for 50 treatments.

3.2.3 Storage

It is best to store conductivity cells in deionized water. Cells stored in water require less frequent platinization. Any cell that has been stored dry should be soaked in deionized water for 24 hours before use.

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Revision: 0
Date: 4/85
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CALIBRATION AND MAINTENANCE PROCEDURES HAAKEBUCHLER pH STICK

1.0 INTRODUCTION

This procedure presents the steps for calibrating and maintaining the HaakeBuchler pH Stick. Instrument operation principles and procedures and specifications are presented in Procedure 5617003.

2.0 CALIBRATION

2.1 Calibration Solutions

The instrument requires distilled water, a pH 7 buffer solution, and a pH 4 buffer solution for calibration. To prepare the buffer solutions, dissolve the buffer powders provided with the instrument into the volume of distilled water specified on the buffer powder packets. (Note: the manufacturer does not specify whether buffer and pH 4 solutions, other than that provided, may be used as substitute solutions).

The pH of the buffer and pH 4 solutions will vary with the temperature of the solution. Use the table below to determine solution pH based on temperature.

Temp	0'C	10'C	20'C	25'C	30'C	40'C	50'C
pH 4	4.00	4.00	4.00	4.01	4.02	4.04	4.06
pH 7	7.11	7.06	7.01	7.00	6.98	6.97	6.97

2.2 Calibration Procedure

The instrument requires calibration in the field prior to each use. However, as a check of proper instrument function, the instrument should be periodically calibrated in the laboratory, particularly if the instrument has been stored for an extended period without use.

To calibrate the instrument:

1. Remove the protective sheath and rinse the electrode in distilled water.
2. Place the electrode in the pH 7 buffer solution, depress the white operation button below the LCD display and allow the reading to stabilize.
3. Adjust pH 7 control using the tool on the end of the protective sheath. The pH 7 control is the upper most white control on the right side of the instrument. Adjust the pH control until the meter reads pH 7.
4. Rinse the electrode in distilled water.
5. Place the electrode in pH 4 solution, depress the white operation button, and allow the reading to stabilize.
6. Adjust the slope control (white control below pH 7 control on the right side of the instrument) until the meter reads the correct value of the pH 4 solution.
7. Rinse the probe in distilled water.
8. Repeat steps 2 through 7.
9. Record calibration on the instrument log form.
10. Store instrument properly.

3.0 MAINTENANCE

3.1 Storage

To maintain high accuracy and to obtain a long electrode life, the pH stick must be stored correctly when not in use. Always rinse the electrode in distilled water before replacing it in its protective sheath. The electrode must not be let to dry out.

The absorbent pad at the bottom of the sheath must be kept saturated with a pH 7 buffer solution. If this is not available, distilled water can be used as a temporary measure. Replace distilled water with buffer solution at the earliest possible opportunity. Always place buffer (or distilled water) into sheath following each use.

To retain accuracy and speed of response, the insulation of the connectors on the electrode and the body must be kept clean and dry. This is best assured by not unnecessarily removing the electrode from the body.

When not in use, place the pH stick in the wallet provided and store in a dry place.

3.2 Electrode Cleaning

If rinsing the electrode in distilled water is not deemed sufficient to clean the electrode, it can be cleaned in a N/10 HCl acid solution. Following cleaning in the acid, the electrode should be soaked in a pH 7 buffer solution for 24 hours before rinsing. Record cleaning on instrument's log form.

3.3 Battery

Normal battery life is in excess of 200 hours of continuous use. Cells should be replaced at 2 year intervals or earlier if exhausted (voltage per cell of less than 1.35V). Replacement cells must be mercury type V312H or direct equivalent. When refitting cells, make sure they are refitted in the manner illustrated on the battery housing.