
**UNIVERSAL WASTE
AND
TRANSIT INC.**

CONSTRUCTION PERMIT APPLICATION

LOCATED AT

**7208 - 9th Avenue
Tampa, Florida**



VOLUME 3

**Waste Analysis Plan
Quality Assurance Program**

RECEIVED

DEC 02 1987

Hazardous Waste

UNIVERSAL WASTE & TRANSIT

WASTE ANALYSIS PLAN

FOR

STORAGE & TREATMENT FACILITY

AT

7208 - 9TH AVENUE

TAMPA, FLORIDA

D. E. R.

NOV 12 1987

SOUTHWEST DI.
TAMPA

General Waste Analysis

Waste Analysis Rationale

Before any waste material is accepted at the Universal Waste & Transit facility a detailed chemical and physical analysis on a representative sample of the waste must be available for review by facility personnel. At a minimum this information must be in sufficient detail so as to allow the generator to complete the attached Universal Waste & Transit Request For Disposal form. The responsibility for obtaining this analytical information rests with the generator of the waste.

The information requested on the UW&T Request For Disposal form is sufficient for facility personnel to determine the following:

- whether the facility is permitted to handle the waste
- if the waste is potentially amenable to solidification
- where the waste must be stored to insure compatibility
- if the wastes require special handling
- whether sufficient storage space is available

If the generator does not supply the information required on the UW&T Request For Disposal form and the waste is inadvertently accepted into the facility the following steps will be taken:

- immediately contact the generator
- determine if the analytical data is available
- if it is not the waste will be rejected
- or
- samples will be obtained and analyzed by a contract laboratory at the generators cost

Any required sampling will be performed as specified within the "Sampling Techniques" section of this document.

All required analyses will be performed in accordance with the Quality Assurance Plan as appended to this document.

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Frequency Of Analyses

The generator of the waste will be required to update the UW&T Request For Disposal form on the following basis:

- when the process generating the waste has changed
- when plant operations have sufficiently changed to warrant concern over changing waste characteristics
- when on-site quality control (QC) samples indicate a substantial variation between the data obtained and waste identified on the manifest
- if none of the above occur the waste shall be re-analyzed at least on an annual basis

Generator Requirements

Universal Waste & Transit will require all generators who intend to use this facility to submit at least the following:

- a completed UW&T Request For Disposal form
- a one quart (minimum) sample of any bulk waste
(samples are not required for lab packs)
- all required Certification Statements as specified by the RCRA Reauthorization Act
(land ban restrictions)

In lieu of the analytical data required on the UW&T Request For Disposal form the generator may submit a Material Safety Data Sheet(s) or analytical data obtained on a representative sample of the waste. The analytical data must be obtained from a DER or HRS certified laboratory. The laboratory must employ approved sampling and analytical techniques (as specified in 40 CFR Part 261, Appendix I, II & III).

On-Site Waste Inspection

When a waste shipment arrives at the UW&T facility the following steps are taken to insure its acceptability at the site:

1. the manifest is reviewed for completeness (Recordkeeping & Reporting section of this document)
2. the shipment is then visibly inspected for the following:
 - number & type of containers
 - properly labeled and marked
 - irregularities (leaks; damaged drums etc)
 - any restricted wastes present
3. After the shipment passes the initial visual inspection it is identified as being ready for quality control (QC) check samples. The subsequent steps and procedures are identified in the section entitled "Waste Sampling & Analysis".

Waste Sampling & Analysis

All shipments of waste into the UW&T facility will have some portion of the shipment sampled and analyzed to ensure its consistency with the accompanying manifest or shipping document.

The intent of the quality control program is not to completely reanalyze the waste but to determine, through indicator parameters, its conformance with the manifest and the UW&T Request For Disposal form.

The parameters employed on the QC samples will be:

- Flash Point (closed cup)
- pH
- Oxidation/Reduction Potential
- Color
- Total Solids
- Density

These parameters allow us the ability to ascertain a great deal of information in a short time period. Each parameter is discussed below.

Flash Point:

This determination will identify flammable & combustible materials so that appropriate storage and handling can be accommodated.

pH:

The pH value of the waste will allow us to identify the appropriate storage area for that material so that no comingling of incompatible wastes will result. It is also a good indicator parameter for assessing container compatibility.

Oxidation/Reduction Potential:

The ORP test will determine the oxidizing or reducing capacity of the waste. This will help identify any reactive wastes which may arrive at the site.

Color:

The color of the waste is the easiest parameter to assess. This parameter allows us to quickly determine if the waste is consistent with the original sample and waste data submission.

Total Solids:

The solids content of the waste is a simple method to initially screen those incoming containers to determine their potential for solidification.

Density:

As with the color test, the density of a liquid waste should not change dramatically between the time of initial data submission and receipt of the waste at the facility. This parameter allows us the ability to rapidly screen incoming wastes.

All analyses will be performed in accordance with the methods specified in "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods" (SW-846). All specific methodology is included within the Quality Assurance Program which is appended to this plan.

The sampling procedure employed for the QC samples is dependent upon two criteria. Those criteria are:

- containment vessel (drum, tanker, lagoon etc)
- type of waste (liquid, viscous, fly ash etc)

A list of recommended samplers is included as Table 1; recommended sampling points as Table 2 and recommended number of samples to be collected as Table 3.

A list of representative sampling methods as specified in 40 CFR is attached as Table 4. This table will be employed when determining what sampling method and equipment to employ.

Universal Waste & Transit anticipates that most, if not all, of the waste entering the facility will be in 55 gallon drums or smaller containers. UW&T will employ the method of random numbers for the selection of containers to be sampled. The number of drums to be sampled is based upon the American Society for Testing and Materials (ASTM) cube root equation for barrels. A random number generator will be available at the facility.

All personnel involved in the sampling of hazardous waste will be outfitted in the proper protective clothing as specified in the "General" and "Training Program" portions of this application.

Internal Quality Control

Universal Waste & Transit will purchase commercially prepared analytical standards for the pH , ORP, and specific gravity procedures. An ASTM certified thermometer will be employed for the flash point determination. No standards are available for the solids and color determination.

USEPA quality control standards will be used for internal accuracy and precision assessments.

Any detailed chemical analyses will be performed on a contract basis with certified analytical laboratories such as Pace Laboratories in Tampa.

Universal Waste & Transit will develop an acceptable sample label, sample seal and chain-of-custody form prior to submission of the Operating Permit Application.

TABLE 1 SAMPLERS RECOMMENDED FOR VARIOUS TYPES OF WASTE

Waste type	Recommended sampler	Limitations
Liquids, sludges, and slurries in drums, vacuum trucks, barrels, and similar containers	Coliwasa	Not for containers 1.5 m(5 ft) deep.
	a) Plastic	Not for wastes containing ketones, nitrobenzene, dimethylformamide, mesityl oxide, or tetrahydrofuran ^{3,4} .
	b) Glass	Not for wastes containing hydrofluoric acid and concentrated alkali solutions.
Liquids and sludges in ponds, pits, or lagoons	Pond	Cannot be used to collect samples beyond 3.5 m(11.5 ft). Dip and retrieve sampler slowly to avoid bending the tubular aluminum handle.
Powdered or granular solids in bags, drums, barrels, and similar containers	a) Grain sampler	Limited application for sampling moist and sticky solids with a diameter 0.6 cm($\frac{1}{4}$ in.).
	b) Sampling trier	May incur difficulty in retaining core sample of very dry granular materials during sampling.
Dry wastes in shallow containers and surface soil	Trowel or scoop	Not applicable to sampling deeper than 8 cm(3 in.). Difficult to obtain reproducible mass of samples.
Waste piles	Waste pile sampler	Not applicable to sampling solid wastes with dimensions greater than half the diameter of the sampling tube.
Soil deeper than 8 cm(3 in.)	a) Soil auger	Does not collect undisturbed core sample.
	b) Veihmeyer sampler	Difficult to use on stony, rocky, or very wet soil.
Wastes in storage tanks	Weighted bottle sampler	May be difficult to use on very viscous liquids.

TABLE 2 SAMPLING POINTS RECOMMENDED FOR MOST WASTE CONTAINERS

Container type	Sampling point
Drum, bung on one end	Withdraw sample through the bung opening.
Drum, bung on side	Lay drum on side with bung up. Withdraw sample through the bung opening.
Barrel, fiberdrum, buckets, sacks, bags	Withdraw samples through the top of barrels, fiberdrums, buckets, and similar containers. Withdraw samples through fill openings of bags and sacks. Withdraw samples through the center of the containers and to different points diagonally opposite the point of entry.
Vacuum truck and similar containers	Withdraw sample through open hatch. Sample all other hatches.
Pond, pit, lagoons	Divide surface area into an imaginary grid. ^a Take three samples, if possible: one sample near the surface, one sample at mid-depth or at center, and one sample at the bottom. Repeat the sampling at each grid over the entire pond or site.
Waste pile	Withdraw samples through at least three different points near the top of pile to points diagonally opposite the point of entry..
Storage tank	Sample from the top through the sampling hole.
Soil	Divide the surface area into an imaginary grid. ^a Sample each grid.

^aThe number of grid is determined by the desired number of samples to be collected, which when combined should give a representative sample of the wastes.

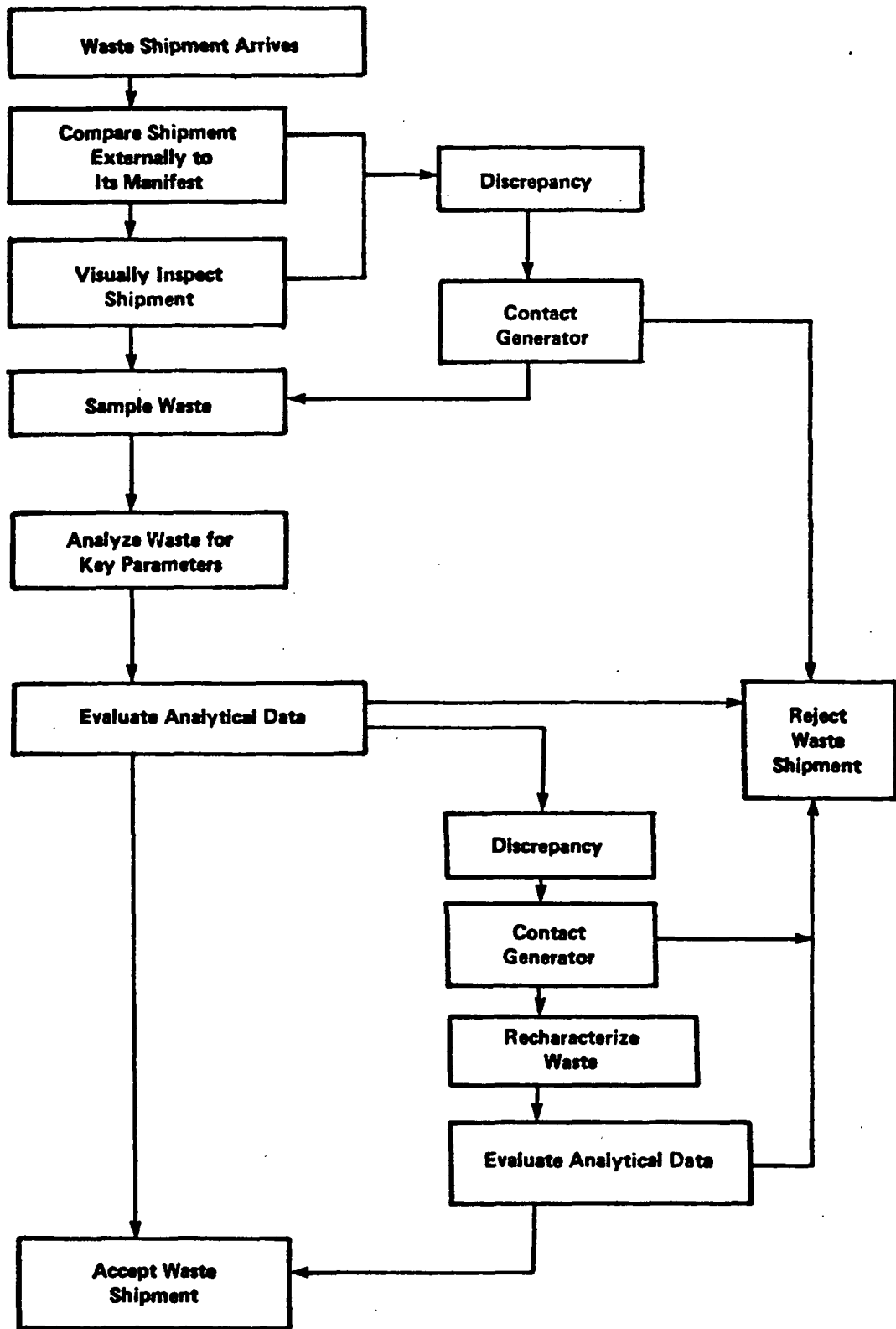
TABLE 3 NUMBER OF SAMPLES TO BE COLLECTED

Case No.	Information desired	Waste type	Container type	Number of samples to be collected
1	Average concentration	Liquid	Drum, vacuum truck, and similar containers	1 Collected with Coliwas
2	Average concentration	Liquid	Pond, pit, lagoon	1 Composite sample of several samples collected at different sampling points or levels
3	Average concentration	Solid (powder or granular)	Bag, drum, bin sack	Same as Case #2
4	Average concentration	Waste pile	--	Same as Case #2
5	Average concentration	Soil	--	1 Composite sample of several samples collected at different sampling areas
6	Concentration range	Liquid	Drum, vacuum truck, storage tank	3 to 10 separate samples, each from a different depth of the liquid
7	Concentration range	Liquid	Ponds, pit, lagoon	3 to 20 separate samples from different sampling points and depths
8	Concentration range	Solid (powder or granular)	Bag, drum, bin	3 to 5 samples from different sampling points
9	Concentration range	Waste pile	--	Same as Case #8
10	Concentration range	Soil	--	3 to 20 separate samples from different sampling areas
11	Average concentration for legal evidence	All types	All containers	3 Identical samples or 1 composite sample divided into 3 identical samples if homogeneous
12	Average concentration	Liquid	Storage tank	Same as Case #2
13	Average concentration	Liquid	Storage tank	Same as Case #6

Table 4

PROPOSED SAMPLING METHODS

Extremely Viscous Liquids	ASTM D140-70
Crushed or Powdered Material	ASTM D346-75
Soil or Rock-Like Material	ASTM D420-69
Soil-Like Material	ASTM D1452-65
Fly Ash-Like Material	ASTM D2234-76
Containerized Liquid Waste	SW-846 Section 1.4.1
Liquids in Tanks	SW-846 Section 1.4.2



Shipment screening procedures.

SAMPLING INFORMATION

DATE SAMPLE TAKEN / /

PERSON SAMPLING

TITLE

TELEPHONE A/C - - Ext.

SAMPLE TYPE:

- (1) GRAB
- (2) COMPOSITE OF MORE THAN ONE SAMPLE
- (3) 24-HOUR COMPOSITE
- (4) IN-DEPTH SAMPLE
- (5) SPLIT SAMPLE
- (6) DUPLICATE SAMPLE
- (7) OTHER _____

COMMENTS _____

LAB NAME

DATE OF ANALYSIS / /

EPA HAZARDOUS WASTE CODES

(40 CFR 261.30-261.33)

Check if waste is **not** hazardous per RCRA

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Check if additional EPA hazardous waste numbers are attached

WASTE DESCRIPTION

WASTE COMPOSITION

Check the one box that best describes the waste stream.

- (1) ORGANIC
- (2) INORGANIC
- (3) BOTH ORGANIC & INORGANIC

APPEARANCE

Check the one box and indicate the number of layers (phases) that best describes the waste stream.

- (1) FREE FLOWING LIQUID
 - (2) RESINOUS LIQUID
 - (3) OILY LIQUID
 - (4) VISCOUS LIQUID
 - (5) SLUDGE
 - (6) POWDERY
 - (7) GRANULAR
 - (8) SOLID
- Number of layers _____

COLOR

Check the one box that best describes the waste stream.

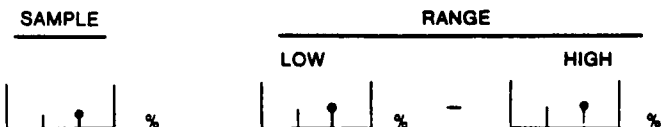
- (1) RED
- (2) BLUE
- (3) YELLOW
- (4) GREEN
- (5) BLACK
- (6) CLEAR
- (7) BROWN
- (8) MILKY WHITE
- (9) PURPLE
- (10) ORANGE

ODOR

Check the one box that best describes the waste stream.

- (1) SWEET
- (2) SOUR
- (3) PUNGENT
- (4) BACTERIOLOGICAL
- (5) ETHER-LIKE
- (6) ALCOHOL-LIKE
- (7) AROMATIC
- (8) SOLVENT-LIKE
- (9) NONE

PERCENT LIQUID



VISCOSITY (Centipoise)



BOILING POINT



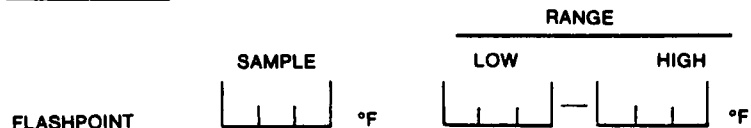
DENSITY
Numerical Value
Mandatory

- (1) lbs/gallon (LIQUIDS)
- (2) lbs/cu. ft. (SOLIDS)



WASTE PROPERTIES

IGNITABILITY (40 CFR 261.21)



ANALYTICAL TECHNIQUE _____

Does Material Ignite When Exposed To:

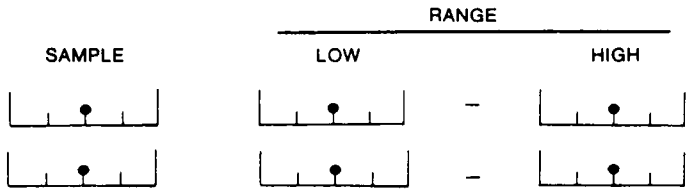
- AIR? (1) Yes (2) No WATER? (1) Yes (2) No FRICTION? (1) Yes (2) No

If yes, explain _____



REACTIVITY (40 CFR 261.23)

CYANIDE AS CN^- TOTAL % BY WEIGHT



SULFIDE AS S^{2-} TOTAL % BY WEIGHT

ANALYTICAL TECHNIQUE _____

Does the waste contain any of the following?

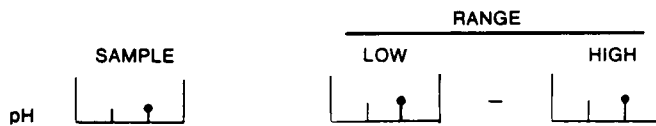
- 1. A solid form of nitrate/nitrite (1) Yes (2) No
- 2. A precipitate of nitrate/nitrite (1) Yes (2) No

Is waste reactive with water to cause splattering or gas release? (1) Yes (2) No

If yes, describe reaction _____

CORROSIVITY (40 CFR 261.22)

Complete either pH for inorganics, or the corrosion rate test for organics. For solids, use the 1% solution test described in the instructions.



Alkalinity
(for pH greater than 9)



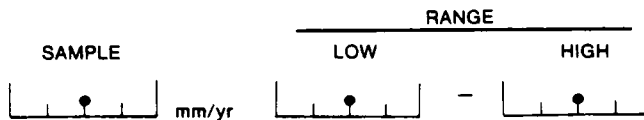
mg/l as calcium carbonate

Acidity
(for pH less than 5)



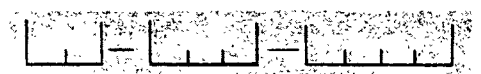
mg/l as calcium carbonate

CORROSION RATE TEST



TOXICITY (40 CFR 261.24)

	LEACHATE - mg/l	LEACHATE - mg/l	LEACHATE - mg/l
LEAD		CHROMIUM	
MERCURY		ARSENIC	
CYANIDE		SELENIUM	
BARIUM		SILVER	
		CADMIUM	
			ENDRIN
			LINDANE
			METHOXYCHLOR
			TOXAPHENE
			2, 4-D
			2, 4, 5-TP SILVEX



COMPONENTS

Specific chemical names of components are required. **DO NOT** use generic names. Account for 100% of the components.

SAMPLE	PERCENT RANGE	
	LOW	HIGH

CHECK IF ADDITIONAL COMPONENT DESCRIPTIONS ARE ATTACHED

ANALYTICAL TECHNIQUE _____

Does this waste stream contain biologic materials, pathogens, or etiological agents:

(1) Yes (2) No

SHIPPING INFORMATION

ANTICIPATED ANNUAL VOLUME

- (1) GALLONS (LIQUIDS)
- (2) CU. FT. (SOLIDS)

Anticipated Transport Frequency	
<input type="checkbox"/>	1. DAILY
<input type="checkbox"/>	2. WEEKLY
<input type="checkbox"/>	3. BI-WEEKLY
<input type="checkbox"/>	4. MONTHLY
<input type="checkbox"/>	5. QUARTERLY
<input type="checkbox"/>	6. SEMI-ANNUALLY
<input type="checkbox"/>	7. ANNUALLY
<input type="checkbox"/>	8. ONE TIME

DOT HAZARD CLASSES APPLICABLE

- | | | |
|--|--|---|
| <input type="checkbox"/> 01 COMBUSTIBLE | <input type="checkbox"/> 08 FLAMMABLE SOLID | <input type="checkbox"/> 15 POISON B |
| <input type="checkbox"/> 02 CORROSIVE | <input type="checkbox"/> 09 IRRITATING AGENT | <input type="checkbox"/> 16 RADIOACTIVE |
| <input type="checkbox"/> 03 ETIOLOGIC AGENT | <input type="checkbox"/> 10 NONFLAMMABLE GAS | <input type="checkbox"/> 17 ORM-A |
| <input type="checkbox"/> 04 EXPLOSIVE A | <input type="checkbox"/> 11 ORGANIC PEROXIDE | <input type="checkbox"/> 18 ORM-B |
| <input type="checkbox"/> 05 EXPLOSIVE B | <input type="checkbox"/> 12 ORM-E | <input type="checkbox"/> 19 ORM-C |
| <input type="checkbox"/> 06 FLAMMABLE GAS | <input type="checkbox"/> 13 OXIDIZER | <input type="checkbox"/> 20 ORM-D |
| <input type="checkbox"/> 07 FLAMMABLE LIQUID | <input type="checkbox"/> 14 POISON A | <input type="checkbox"/> 99 NONE |

Will packages contain a reportable quantity of a hazardous substance? (1) Yes (2) No

PROPOSED SHIPPING METHOD

The disposal site must be notified prior to shipping if packaging other than indicated here is to be used.

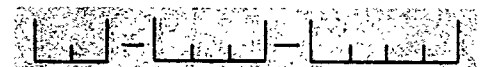
	CONTAINER TYPE	SIZE
<input type="checkbox"/> (1) DOT APPROVED DRUM	_____	_____
<input type="checkbox"/> (2) BULK LIQUID	_____	_____
<input type="checkbox"/> (3) BULK SOLID	_____	_____
<input type="checkbox"/> (4) OTHER	_____	_____

I certify and warrant that the above waste stream identification for the materials offered for disposal as appears on this form, and any attachments or supplements, is true and correct. I further certify and warrant that the identification is the result of an analysis of a representative sample obtained and analyzed in accordance with procedures specified by the U.S. Environmental Protection Agency.

Authorized Signature _____

Name _____

Date _____ Title _____



7.0 Calculations

7.1 External Standard Calibration

The concentration of each analyte in the sample is determined by calculating the amount of standard purged or injected, from the peak response, using the calibration curve or the calibration factor determined in paragraph 4.1.1. The concentration of a specific analyte may also be calculated as follows:

Aqueous samples

$$\text{Concentration (ug/l)} = \frac{[(A_x) (A) (V_t) (D)]}{[(A_s) (V_i) (V_s)]}$$

where:

A_x = Response for the analyte in the sample, units are in either area counts or peak height.

A = Amount of standard injected or purged (ng)

A_s = Response for the external standard, units the same as for A_x .

V_i = volume of extract injected, uL. For purge and trap analysis, V_i is not applicable and = 1

D = Dilution factor, if dilution was made on the sample prior to analysis. If no dilution was made, $D=1$ and is dimensionless

V_t = Volume of total extract, uL. For purge and trap analysis, V_t is not applicable and is = 1

V_s = Volume of sample extracted or purged, mL.

Nonaqueous samples

$$\text{Concentration (ng/g)} = \frac{[(A_x)(A)(V_t)(D)]}{[(A_s)(V_i)(W)]}$$

where:

W = weight of sample extracted or purged, g. The wet weight or dry may be used, depending upon the specific applications of the data.

A_x , A_s , A, V_t , D, and V_i have the same definition as for aqueous samples.

7.2 Internal Standard Calibration

For each analyte of interest, the concentration of that analyte in the sample is calculated as follows:

Aqueous samples:

$$\text{Concentration (ug/L)} = \frac{[(A_x)(C_{is})(D)]}{[(A_{is})(RF)(V_s)]}$$

where:

A_x = Response for the analyte being measured, units are either area counts or peak height.

C_{is} = Amount of internal standard added to extract or volume purged, ng.

D = Dilution factor, if a dilution was made on the sample prior to analysis. If no dilution was made then D=1 and is dimensionless.

A_{is} = Response of the internal standard, units same as A_x .

RF = Response factor for analyte, as determined in paragraph 4.3.2.

V_s = Volume of water extracted or purged, mL.

Nonaqueous samples:

$$\text{Concentration (ug/kg)} = \frac{[(A_s)(C_{is})(D)]}{[(A_{is})(RF)(W_s)]}$$

where:

W_s = Weight of sample extracted, g. Either a dry weight or wet weight may be used, depending upon the specific application of the data.

A_s , C_{is} , D , A_{is} , and RF have the same definition as for aqueous samples.

8.0 Instrument QC

8.1 QC Check Samples

To establish the ability to generate acceptable accuracy and precision, the following operations are performed.

The quality (QC) check sample concentrate is prepared containing the analytes of interest. The QC check sample concentration varies dependent upon the analytes being investigated. The QC check samples are prepared from stock standards independent from those used for calibration.

8.1.1 Preparation and Analysis

Reagent water is spiked with a known amount of the QC check sample concentrate. Four aliquots of the spiked water are analyzed by the same procedures used to analyze the actual samples. For volatile organics, the preparation/analysis process is purge and trap GC. For semivolatile organics, the QC check samples undergo solvent extraction.

8.1.2 Calculations

The average percent recovery in ug/l, and the standard deviation of the recovery in ug/l, for each analyte of interest are calculated. For each analyte the percent recovery and standard deviation are compared to the corresponding QC acceptance criteria for each of the methods. If the percent recovery and standard deviation for all the analytes of interest meet the acceptance criteria, the system performance is acceptable and the analysis of actual samples can begin. If any analyte fails to meet the criteria, then the test must be repeated. Repeated failure, however will confirm a system problem and must be corrected before any analysis of actual samples begins.

$$\% \text{ recovery} = C_a / C_t * 100$$

where:

C_a = concentration of analyte obtained from analysis.

C_t = true concentration value for analyte spiked.

$$\text{Std. Dev.} = [\text{sum}(x - m)^2 / N]^{1/2}$$

where:

x = individual recovery values

m = mean recovery value

N = number of recovery values

8.2 Spiked Samples

On an ongoing basis, at least one sample per analytical batch (maximum of 20 samples per analytical batch) to assess accuracy is performed. The concentration of the spike is determined as follows:

8.2.1 Compliance Monitoring

If, as in compliance, the concentration level of a specific analyte in the sample is being checked against a regulatory limit, the spike is at that limit or 1 to 5 times the background limit, whichever is larger.

8.2.2 Non-Limit Specific

If the concentration of a specific in the sample is not being checked against a limit specific to that analyte, then the spike concentration is the same as the QC check sample or 1 to 5 times greater than background concentration, whichever concentration is greater.

8.3 Background Concentrations

One unspiked and one spiked sample are analyzed to determine the percent recovery of the spiked compounds. The percent recovery for each analyte is compared to the corresponding acceptance criteria for each method. If the percent recovery falls outside the designated range a check standard is analyzed to assess the system performance.

8.4 Matrix Spikes

As part of the QC program, method accuracy for each matrix studied is assessed. After analysis of five spiked samples of the same matrix type, the percent recovery and standard deviation are calculated for each analyte of interest. Accuracy is assessed as a percent recovery interval from (+2 * std. dev.) to (-2 * std. dev.). The accuracy assessment for each analyte is updated on a regular basis.

8.5 Surrogate Spikes

The accuracy and precision limits for surrogate standards are obtained in the following manner:

For each sample analyzed, the percent recovery of each surrogate is calculated. Once a minimum of thirty samples of the same matrix have been analyzed, the average percent recovery and standard deviation of the percent recovery for each surrogate are calculated. The control limits for the surrogates are done in the following manner:

$$\begin{aligned}\text{Upper Control Limit (UCL)} &= P + 3s \\ \text{Lower Control Limit (LCL)} &= P - 3s\end{aligned}$$

where:

p = percent recovery for each surrogate

s = standard deviation of the percent recovery for each surrogate

If the recoveries do not fall into the limits established the following is done:

Calculations, internal standards, and surrogate solutions are checked for errors. Reanalysis of the extract is done. Also reextraction and reanalysis are performed. If none of these options fail to rectify the problem, instrument performance is checked. (Section 8.1) At a minimum, the surrogate recovery limits on a matrix by matrix basis are updated annually.

8.6 Percent Completeness

To insure the quality of the data that is produced by the laboratory, the quantity of acceptable quality control data is maintained.

$$\% \text{ completeness} = I / T * 100$$

where:

I = the total number of quality control data that falls within limits (includes QC check samples, spike samples, and surrogate spikes)

T = Total number of QC samples attempted

The laboratory maintains that greater than 85% completeness produces acceptable data.

9.0 Documentation

9.1 Forms

1. Form I Analytical Results - Organic Analysis Data Sheet

Retention times, retention time windows, and calibration factors.

11. Form XI - Pesticide/PCB Identification

Sample Identification, primary analytical column, retention time and windows, confirmation column, and GC/MS confirmation.

12. Form XII - GC/MS Tuning and Mass Calibration (DFTPP)

Spectra of standards generated from authentic standards, spectra for analytes from actual analysis., and Spectrometer identifier.

13. Form XIII - GC/MS Tuning and Mass Calibration (BFB)

Spectra of standards generated from authentic standards, spectra for analytes from actual analysis, and Spectrometer identifier.

14. Chromatograms

All chromatograms for reported results labeled with sample identification, method identification, and identification of retention time of analyte on chromatograms.

Analyte concentration, Sample weight, Percent water Final volume of extract or diluted samples, date extracted, and detection limits.

2. Form II - Initial Calibration Data - Volatile Compounds
Response factors, calibration check compounds, system performance check compounds, and standard deviation of calibration data.
3. Form III - Initial Calibration Data - Semivolatile Compounds
Response factors, Calibration check compounds, system performance check compounds, and standard deviation of calibration data.
4. Form IV - Continue Calibration Check - Volatile Compounds
Response factors, Calibration check compounds, system performance check compounds, and percent difference.
5. Form V - Continue Calibration Check - Semivolatile Compounds
Response factors, Calibration check compounds, system performance check compounds, and percent difference.
- 6 Form VI - Surrogates
 - Water surrogate percent recovery
 - Soil surrogate percent recoveryAmount of surrogate spiked, and percent recovery of each surrogate.
7. Form VII - Matrix/Duplicate Spikes
 - Watermatrixspike/matrixspikeduplicate recovery
 - Soil matrix spike/matrix spike duplicate recoveryAmount spiked, percent recovery, and relative percent difference for each compound in the spiked samples for the analytical batch.
8. Form VIII - Method Blank Summary
Identity and amount of each constituent.
9. Form IX - Pesticide Evaluation Standards Summary
Calibration factors, percent breakdown (compounds 4,4' - DDT and Endrin), and percent difference of calibration factors.
10. Form X - Pesticide/PCB Standards Summary

DRAFT

CONFIDENTIAL

Generic Quality Assurance Plan

Prepared For:
State of Florida
The Department of Environmental Regulation

Prepared By:
PACE Laboratories, Inc.
Tampa, FL 55422

June 1987

Consultant Manager
Laboratory Director

Date

Consultant QA Officer

Date

DER QA Officer

Date

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A. INTRODUCTION

The Generic Quality Assurance (QA) Plan was written in compliance with the Florida Department of Environmental Regulation (FDER) with "Guidelines for Preparing Quality Assurance Plans" (DER-QA-001/85 January 30, 1986). This document contains the seventeen (17) required elements of a Quality Assurance Plan and is prepared in such a way that entire sections can be referenced in subsequent project plans.

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D. APPENDICES

Appendix A	Ground Water Monitoring Field Quality Assurance Manual
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III. STATEMENT OF POLICY

PACE Laboratories, Inc. is committed to the policy of providing the highest quality product to its clients. The validity and reliability of the information generated is maximized by the adherence to documented quality control procedures and quality assurance protocols. PACE emphasizes the application of sound quality assurance/quality control principles beginning with the initial planning of the project, through all the field and laboratory activities and ultimately to the generation of the final report. The principles of data quality objectives, representativeness, completeness, comparability, precision and accuracy are applied.

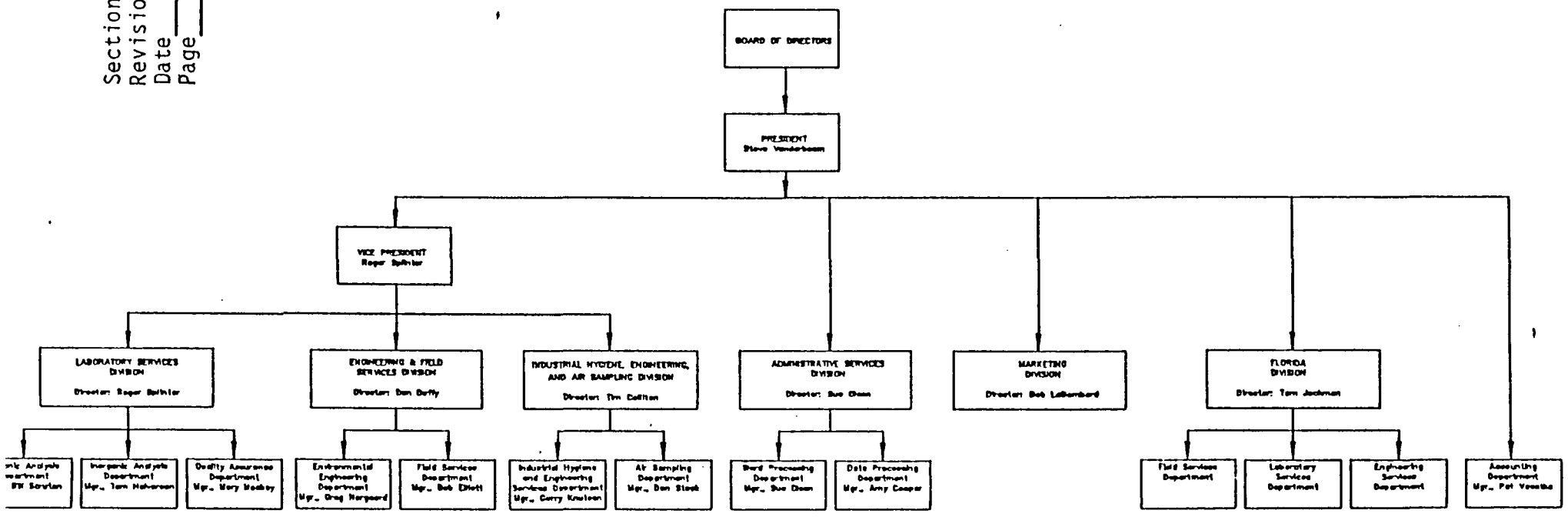
PACE is committed to providing the resources, including facilities, equipment and personnel, to ensure the adherence to rigorous QA/QC protocols. Individual Quality Assurance Project Plans are developed for monitoring analytical projects to conform with the established QA/QC protocols.

IV. PROJECT ORGANIZATION AND RESPONSIBILITY

The organizational structures for PACE Laboratories, Inc. and the Laboratory Division of PACE (Tampa) are provided in Figures IV-1 and IV-2. Resumes which give qualifications, specific duties and experience summaries for each of the professionals in the organization are provided in Section XVII.

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Figure IV-1
 PACE Laboratories, Inc.
 ORGANIZATIONAL STRUCTURE



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Figure IV-2

PACE LABORATORIES, INC.
FLORIDA DIVISION

Organizational Structure

Thomas A Jackman, Ph.D.
Director

Laboratory Services

Inorganic

Timothy M O'Dell	Supervisor
Kathy L. Harris	Chemist, Quality Assurance Officer
Michael F. Valder	Chemist
Michael C. Jackman	Technician
Ron Brock	Lab Aide

Organic

Michael W. Palmer	Chemist
R. Niles Bashaw	Chemist

Field Services

James E. Franklin	Environmental Technician
John T. Stimus	Environmental Technician

Engineering

Curt W. Lessl	Ch.E., E.I.T.
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Administration

Sandra G. Bell	Secretary
Cheryl Kochansky	Receptionist/Typist

V. QUALITY ASSURANCE/OBJECTIVES

A. INTRODUCTION

The purpose of the Quality Assurance/Quality Control (QA/QC) program outlined here is to define procedures for the evaluation and documentation of sampling, analytical methodologies and the reduction validation and reporting of data. The objective is to provide a uniform basis for sampling, sample handling, instrument condition, methods control, performance evaluation and analytical data generation and reporting.

The Quality Assurance program is designed to monitor all phases of a project including: pre-survey planning, sample collection, preservation, transportation and storage, sample log-in and tracking, laboratory analysis, and data validation and reporting of results.

The scope of the program includes those audit procedures used to evaluate the application of the procedures defined within this QA/QC program.

B. SAMPLE COLLECTION

1. Duplicate Samples

One out of every 10 samples will be collected in duplicate and analyzed separately.

2. Travel Blanks

A travel blank will be prepared using organic free deionized

water each day of sample collection. The environmental technician will prepare the appropriate sample bottles which will travel to the job site and return without being opened. The travel blanks will be analyzed only if contaminants are found in the field blanks.

3. Field Blanks

Field blank samples will be collected at each monitoring well. Field blanks may be analyzed upon review of the raw data or at the request of the client.

4. Ground Water Sample Collection

Ground water sample collection will be performed as described in Section VI using standard operating procedures from the PACE "Groundwater Monitoring Field Quality Assurance Manual".

C. LABORATORY QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

1. Objectives

The primary objective of the analytical QA/QC plan is to insure validity and reliability of analytical results. To this end, all samples collected during the project will be analyzed following EPA or other approved methods, and other QA/QC requirements detailed in this plan.

Specific objectives for the completeness of QA effort are accuracy, precision, representativeness, documentation, and comparability. These are summarized in Table V-1.

2. Completeness of QA Effort

Travel blanks, method blanks, and field blanks will be provided for each set of water samples collected. A method blank will also be run with each day's analysis. A minimum of 10 percent duplicate spiked samples will be analyzed or 1 per group of samples collected. Surrogates will be added to each sample for organic analysis to monitor adequate system performance. Prior to the monitoring program, PACE Laboratories, Inc. will validate their analytical methodology consistent with EPA Methods. Independently prepared external reference samples shall be analyzed quarterly at a minimum.

3. Accuracy Goals

For sample spikes, reagent water spikes, and performance check evaluations at concentrations of 10 ug/l or greater, recoveries should range from 80-120 percent at the 95 percent confidence level or +/- 2 standard deviations from the mean recovery. Reference sample results should be within +/- 20% of the true values.

4. Precision Goals

The relative percent difference (RPD) for all duplicate analysis will be calculated and reported. The RPD should range within the control limits specified for that analyses. These control limits are summarized in Table V-2.

5. Detection Limits Goals

Method detection limits are established in Section IX for

all analyses. The detection levels listed in Section IX will be utilized unless the sample matrix dictates otherwise. Laboratory method blanks should have concentrations below the method detection levels for the compounds of interest. Method detection limit for soil samples will be established appropriately based on the nature of the sample matrix.

6. Completeness Goals

The completeness goal will be greater than or equal to 90 percent.

7. Documentation

The documentation system includes the following elements: calibration procedures, analytical procedures, computational procedures, quality control procedure, bench data, operating procedures, lab notebook policy.

8. Comparability Goals

Comparability between data generated in the laboratory is matrix dependent. Every effort is made to compare sample results of similar matrices analyzed by equivalent methods.

9. Representativeness Goals

The samples collected will be representative of the environment that is being assessed.

TABLE V-1
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>		<u>Accuracy (%R, Sd)¹</u>	
Acidity	Water	0	0	NA	
Alkalinity	Water	3	8	100	2
Bacteria					
Total Coliform	Water	NA		NA	
Fecal Coliform	Water	NA		NA	
Fecal Coliform	Water	NA		NA	
Total Plate	Water	NA		NA	
Biochemical					
Oxygen Demand	Water	NA		95	6
Boron	Water	9	6	96	12
Chemical Oxygen Demand, - High	Water	427	664	104	10
Chemical Oxygen Demand - Low	Water	0.8	0.6	101	12
Chloride	Water	0.6	0.6	100	5
Chlorine, Residual	Water	ID		ID	
Cyanide, Total	Water	0.1	0.2	88	11
Chromium, Hexavalent	Water	0.02	0.05	99	4
Cyanide, Chlorine Amenable	Water	ID		ID	
Fluoride, Total	Water	0.5	0.12	97	13
Fluoride, Dissolved	Water	ID		ID	
Hardness, Total	Water	7.8	8.8	NA	
Hardness, Calcium	Water	NA		NA	

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>		<u>Accuracy (%R, Sd)¹</u>	
Nitrate Nitrogen	Water	3.6	4.4	96	8
Total Kjeldahl Nitrogen	Water	0.8	0.7	103	9
Nitrite Nitrogen	Water	ID		ID	
Organic Nitrogen	Water	ID		ID	
Oil & Grease Soxhlet	Water	NA		97	10
Oil & Grease Gravimetric	Water	NA		97	10
Dissolved Oxygen Electrode	Water	NA		NA	
pH	Water	0	0	100	0.4
Phenol	Water	0.004	0.004	91	10
Total Phosphorus	Water	0.7	1.1	101	8
Ortho Phosphorus	Water	ID		91	26
Silica, Reactive	Water	ID		NA	
Total Solids	Water	23	26	100	7
Total Volatile Solids	Water	ID		95	17
Total Suspended Solids	Water	66	77	100	8
Total Volatile Suspended Solids	Water	ID		ID	

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>		<u>Accuracy (%R, Sd)¹</u>	
Total Dissolved Solids	Water	23	26	94	6
Specific Conductivity	Water	1.3	3.5	100	2
Sulfate	Water	28	34	102	8
Sulfide	Water	ID		ID	
Sulfite	Water	ID		ID	
Surfactants	Water	ID		ID	
Turbidity	Water	0.84	1.9	95	10
% Asn	HW or Oil	0.9	1.4	NA	
% Chlorine	HW or Oil	0.4	0.5	NA	
Density	HW or Oil	NA		NA	
Flash Point	HW or Oil	ID		ID	
Free Liquids	HW or Oil	NA		NA	
% Sulfur	HW or Oil	0.32	0.32	NA	
% Water	HW or Oil	ID		NA	
Cyanide, Total	HW or Oil	ID		75	0
Cyanide, Amenable	HW or Oil	ID		ID	
Cyanide, Reactive	HW or Oil	ID		ID	
Sulfide Total	HW or Oil	ID		ID	
Reactive	HW or Oil	ID		ID	
pH	HW or Oil	0	0	NA	

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>		<u>Accuracy (%R, Sd)¹</u>	
Specific Conductivity	HW or Oil	1.3	3.5	100	2
Specific Gravity	HW or Oil	0.7	2.6	NA	
Formaldehyde	Water	NA		78	18

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

Measurement Parameter	Experimental Matrix	Precision (\bar{X} , Sd) ¹		Accuracy (%R, Sd) ¹	
Aluminum-U	Water	ID		120	39
Aluminum-A	Water	ID		106	13
Aluminum-A	Soil	ID		103	10
Antimony-U	Water	ID		100	16
Antimony-A	Water	ID		101	16
Antimony-A	Soil	ID		96	0
Arsenic-U	Water	1	2	99	19
Arsenic-U	Soil	ID		NA	
Barium-U	Water	ID		106	16
Barium-A	Water	0.19	0.29	104	11
Barium-A	Soil	36	75	101	8
Beryllium-U	Water	ID		104	12
Beryllium-A	Water	ID		9	1
Beryllium-A	Soil	ID		92	1
Cadmium-U	Water	ID		99	8
Cadmium-A	Water	0.04	0.05	9	3
Cadmium-A	Soil	0.10	0.12	100	5
Calcium-A	Water	3.9	4.8	103	4
Chromium-U	Water	0.3	0.5	82	10
Chromium-A	Water	0.55	0.92	103	5
Chromium-A	Soil	0.7	0.7	94	8

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

Measurement Parameter	Experimental Matrix	Precision		Accuracy	
		(\bar{X} , Sd) ¹	(\bar{X} , Sd) ¹	(%R, Sd) ¹	(%R, Sd) ¹
Cobalt-U	Water		ID	108	9
Cobalt-A	Water		ID	96	9
Copper-U	Water		ID	90	8
Copper-A	Water	0.29	0.39	100	1
Copper-A	Soil	0.4	0.5	100	0
Iron-A	Water	0.29	0.76	99	3
Lead-U	Water	4.4	3.6	103	8
Lead-A	Water	2.8	2.0	102	7
Lead-A	Soil	9.8	12		
Magnesium-A	Water	2.3	2.5	100	2
Manganese-A	Water	0.03	0.04	99	3
Mercury	Water	0.3	0.9	95	12
Mercury	Soil		ID		ID
Molybdenum-U	Water		ID		NA
Molybdenum-A	Water		ID	98	14
Molybdenum-A	Soil		ID		ID
Nickel-U	Water	1.6	2.6	99	5
Nickel-A	Water	0.2	0.7	99	5
Nickel-A	Soil	2.4	2.4	102	6
Potassium-A	Water	0.3	0.5	99	3
Potassium-A	Soil		ID	100	0

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

Measurement Parameter	Experimental Matrix	Precision (\bar{X} , Sd) ¹		Accuracy (%R, Sd) ¹	
Selenium-U	Water		ID	86	16
Selenium-H	Water	0.8	0.8	102	22
Silver-U	Water		ID	90	21
Silver-A	Water	0.4	0.5	98	10
Silver-A	Soil		ID		ID
Sodium	Water	6.5	8.5	101	3
Strontium	Water	0.03	0.04	91	10
Thallium-U	Water		ID	100	3
Thallium-A	Water		ID	100	0
Thallium-A	Soil		ID	92	0
Tin-U	Water		ID	130	0
Tin-A	Water		ID	107	8
Tin-A	Soil		ID	100	0
Titanium-A	Water		ID	108	13
Vanadium-U	Water		ID	78	0
Vanadium-A	Water		ID	105	17
Vanadium-A	Soil		ID	92	5
Zinc-U	Water		ID	100	18
Zinc-A	Water	0.7	1.1	100	1
Zinc-A	Soil	2.6	2.7	100	3

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

Measurement Parameter	Experimental Matrix	Precision		Accuracy	
		(\bar{X} , Sd) ¹	(\bar{X} , Sd) ¹	(%R, Sd) ¹	(%R, Sd) ¹
Chloromethane	Water	10	8.7	82	31
Bromomethane	Water	6.8	5.3	97	15
Vinyl Chloride	Water	6.9	5.4	93	20
Chloroethane	Water	7.6	7.7	94	17
Methylene Chloride	Water	5.1	5.6	96	13
1,1-Dichloroethylene	Water	7.6	1.1	94	15
1,1-Dichloroethane	Water	4.7	4.7	92	14
Chloroform	Water	6.7	5.5	96	15
Carbon Tetrachloride	Water	10	6.5	93	13
1,2-Dichloropropane	Water	7.2	6.0	93	10
1,1,2-Trichloro- ethylene	Water	11	7.5	91	11
Dibromochloromethane	Water	9.0	7.7	97	19
1,1,2-Trichloroethane	Water	9.0	7.7	97	19
Chloroethylvinyl Ether	Water		ID	94	20
1,1,2,2-Tetrachloro- ethylene	Water	12	8.6	88	12
Chlorobenzene	Water	8.3	4.5	86	14
1,3-Dichlorobenzene	Water	9.3	6.3	80	19
1,4-Dichlorobenzene	Water	11	6.9	83	21
Dichlorodifluoro methane	Water	11	11	106	26
Trichlorofluoromethane	Water	7.1	6.9	104	11

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>		<u>Accuracy (%R, Sd)¹</u>	
1,2-Dibromoethane	Water	ID		ID	
Methyl-t-butyl ether	Water	ID		ID	
Dichlorofluoromethane	Water	7.3	4.7	104	12
Trans-1,2-Dichloroethylene	Water	6.7	5.4	98	10
1,2-Dichloroethane	Water	4.1	4.1	100	12
1,1,1-Trichloroethane	Water	5.3	4.5	97	12
Bromodichloromethane	water	4.6	3.4	100	10
2,3-Dichloropropene	Water	3.9	3.3	99	12
Trans-1,3-Dichloropropene	Water	5.1	5.3	90	19
Cis-1,3-Dichloropropene	Water	5.6	4.5	100	13
1,2-Dibromomethane	Water	5.0	4.8	101	17
Bromoform	Water	6.9	6.3	96	14
1,1,2,2-Tetrachloroethane	Water	7.9	10	99	13
1,2-Dichlorobenzene	Water	9.0	8.3	92	13
Benzene	Water	8.0	10	99	15
Toluene	Water	11	9.6	95	9.9
Ethylbenzene	Water	8.2	8.3	98	11
m-Xylene	Water	7.7	9.0	9.0	13
o-Xylene	Water	7.8	9.4	9.1	15
Benzene	Water	ID		ID	
Bromodichloromethane	Water	ID		ID	
Bromoform	Water	ID		ID	

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>	<u>Accuracy (%R, Sd)¹</u>
Bromomethane	Water	ID	ID
Carbon Tetrachloride	Water	ID	ID
Chlorobenzene	Water	ID	ID
Chloroethane	Water	ID	ID
2-Chloroethylvinyl Ether	Water	ID	ID
Chloroform	Water	ID	ID
Chloromethane	Water	ID	ID
Dibromochloromethane	Water	ID	ID
1,2-Dichlorobenzene	Water	ID	ID
1,3-Dichlorobenzene	Water	ID	ID
1,4-Dichlorobenzene	Water	ID	ID
1,1-Dichloroethane	Water	ID	ID
1,2-Dichloroethane	Water	ID	ID
1,1-Dichloroethene	Water	ID	ID
trans-1,2-Dichloroethene	Water	ID	ID
1,2-Dichloropropane	Water	ID	ID
cis-1,3-Dichloropropene	Water	ID	ID
trans-1,3-Dichloropropene	Water	ID	ID
Ethyl Benzene	Water	ID	ID
Methylene Chloride	Water	ID	ID
1,1,2,2-Tetrachloroethane	Water	ID	ID
Tetrachloroethene	Water	ID	ID

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>	<u>Accuracy (%R, Sd)¹</u>
Toluene	Water	ID	ID
1,1,1-Trichloroethane	Water	ID	ID
1,1,2-Trichloroethane	Water	ID	ID
Trichloroethene	Water	ID	ID
Trichlorofluoromethane	Water	ID	ID
Vinyl Chloride	Water	ID	ID
Acenaphthene	Water	ID	ID
Acenaphthylene	Water	ID	ID
Aldrin	Water	ID	ID
Anthracene	Water	ID	ID
Benzo(a)anthracene	Water	ID	ID
Benzo(b)fluoranthene	Water	ID	ID
Benzo(k)fluoranthene	Water	ID	ID
Benzo(a)pyrene	Water	ID	ID
Benzo(g,h,i)perylene	Water	ID	ID
Benzyl butyl phthalate	Water	ID	ID
B-BHC	Water	ID	ID
B-BHC	Water	ID	ID
Bis(2-Chloroethyl)ether	Water	ID	ID
Bis(2-Chloroethoxy)methane	Water	ID	ID
Bis(2-Chloroisopropyl)ether	Water	ID	ID

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>	<u>Accuracy (%R, Sd)¹</u>
Bis(2-ethylhexyl)phthalate	Water	ID	ID
4-Bromophenyl phenyl ether	Water	ID	ID
2-Chloronaphthalene	Water	ID	ID
4-Chlorophenyl phenyl ether	Water	ID	ID
Chrysene	Water	ID	ID
4,4'-DDD	Water	ID	ID
4,4'-DDE	Water	ID	ID
4,4'-DDT	Water	ID	ID
Dibenzo(a,h)anthracene	Water	ID	ID
Di-n-butyl phthalate	Water	ID	ID
1,2-Dichlorobenzene	Water	ID	ID
1,3-Dichlorobenzene	Water	ID	ID
1,4-Dichlorobenzene	Water	ID	ID
3,3'-Dichlorobenzene	Water	ID	ID
Dieldrin	Water	ID	ID
Diethyl phthalate	Water	ID	ID
Dimethyl phthalate	Water	ID	ID
2,4-Dinitrotoluene	Water	ID	ID
2,6-Dinitrotoluene	Water	ID	ID
Di-n-octyl phthalate	Water	ID	ID
Endosulfan sulfate	Water	ID	ID
Endrin aldehyde	Water	ID	ID

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>	<u>Accuracy (%R, Sd)¹</u>
Fluoranthene	Water	ID	ID
Fluorene	Water	ID	ID
Heptachlor	Water	ID	ID
Heptachlor epoxide	Water	ID	ID
Hexachlorobenzene	Water	ID	ID
Hexachloro butadiene	Water	ID	ID
Hexachloroethane	Water	ID	ID
Indeno(1,2,3-cd)pyrene	Water	ID	ID
Isophorone	Water	ID	ID
Naphthalene	Water	ID	ID
Nitrobenzene	Water	ID	ID
N-Nitrosodi-n-propylamine	Water	ID	ID
PCB-1260	Water	ID	ID
Phenanthrene	Water	ID	ID
Pyrene	Water	ID	ID
1,2,4-Trichlorobenzene	Water	ID	ID
4-Chloro-3-methylphenol	Water	ID	ID
2-Chlorophenol	Water	ID	ID
2,4-Dichlorophenol	Water	ID	ID
2,4-Dimethylphenol	Water	ID	ID
1-Methyl Naphthalene	Water	ID	ID
2-Methyl Naphthalene	Water	ID	ID

TABLE V-1 (Continued)
QUALITY ASSURANCE OBJECTIVES

<u>Measurement Parameter</u>	<u>Experimental Matrix</u>	<u>Precision (\bar{X}, Sd)¹</u>	<u>Accuracy (%R, Sd)¹</u>
2,4-Dinitrophenol	Water	ID	ID
2-methyl-4,6-dinitrophenol	Water	ID	ID
2-Nitrophenol	Water	ID	ID
4-Nitrophenol	Water	ID	ID
Pentachlorophenol	Water	ID	ID
Phenol	Water	ID	ID
2,4,6-Trichlorophenol	Water	ID	ID
PCB,			
Arachlor-1016	Water	ID	ID
Arachlor-1221	Water	ID	ID
Arachlor-1232	Water	ID	ID
Arachlor-1242	Water	ID	ID
Arachlor-1248	Water	ID	ID
Arachlor-1254	Water	ID	ID
Arachlor-1260	Water	ID	ID

- 1) \bar{X} = Average Range Between Duplicate Analysis
%R = Average Percent Recovery Of Spikes
Sd = Standard Deviation
NA = Not Applicable
ID = Insufficient Data
U = Furnace Atomic Absorption
A = Flame Direct Aspiration
H = Hydride

Accuracy and precision control limits have not been internally generated for all parameters and matrices. Control values (Table V-1) and EPA specified quality control objectives are used as guidelines when internally generated statistics are insufficient.

TABLE V-2
PRECISION GOALS*

<u>Duplicate Analysis</u>	<u>Maximum Relative Percent Difference</u>
Volatiles	30%
Semi-Volatiles	30%
Metals	20% -

* These limits are for advisory purposes and are not meant to be used as a criteria for re-analysis of samples.

VI. SAMPLING PROCEDURES

A. SAMPLING PROCEDURES FOR GROUND WATER AND SURFACE WATER

Ground and surface water sampling techniques employed by PACE are in accordance with the EPA Region IV Standard Operating Procedures and Quality Assurance Manual, and FDER's Supplement "A" - Standard Operating Procedures and Quality Assurance Manual.

Trained field sampling crews will be sent to the site for sample collection and delivery of samples to the laboratory.

Samples from monitoring wells will be taken with a precleaned stainless steel bailer. Bailers are precleaned by washing first with detergent then rinsed with tap water and finally triple rinsed with deionized water.

Prior to sampling, the water level in the well is determined with an electronic water level meter and recorded on the field log data sheet, along with all the other pertinent information. (See Appendix A, page 74). The volume of water in the casing is calculated and three to five times that volume is purged from the well. In all cases the well is purged until the conductivity, temperature, and pH has stabilized.

All samples collected for metals analysis will be filtered with a disposable 0.45 micron filter immediately after collection and preserved with nitric acid.

The bailer to be used for sampling is used for purging two inch diameter wells and a gas driven centrifugal pump is used when larger volumes of water need to be removed, (static water level

less than 25 feet). Wells with static water levels greater than twenty-five feet and casing diameters greater than 3 inches are purged with a submersible pump.

See Appendix A for detailed sampling and prepumping standard operating procedures.

For surface water sampling, see Appendix A pg 48.

Table VI-1 lists the containers used for sampling, preservatives, holding times and conditions for ground and surface water samples. New bottles are used for sample collection. Detailed bottle preparation procedures are listed in Appendix A for the specific parameters of concern.

B. SAMPLING PROCEDURES FOR SOILS AND SEDIMENTS

Soil and sediments will be collected according to procedures in Test Methods for Evaluating Solid Waste EPA-SW-846.

There are numerous methods that can be used when taking soil samples, ranging from a power auger to a sample spade.

Soil sampling is used to determine the depth and range of contamination from spillage or the leaching effect of rain on material stored above ground. The depth and placement of the borings should be determined by the project manager and the client, using the suspected range of contamination as a guide. A background boring is usually collected to analyze the conditions of the soil.

Step 1. Meeting with project manager to discuss analysis to be

run and placement and depth of borings and also the various depths at which samples are to be collected.

- Step 2. Prepare and clean auger and sample bottles. (For PCB samples all bottles must be hexane rinsed.)
- Step 3. Contact client once on site to gain access to site area.
- Step 4. Collect a surface sample in the first boring location, if desired. (Fill out a soil boring data sheet as you go along.)
- Step 5. Begin boring. If a total composite is desired, place the soil in a large jar. If samples are desired at only certain depths the unwanted soil can be discarded in a pile next to the boring.
- Step 6. Continue augering until the desired depth is reached. Then fill the sample bottles from the bottom of the auger.
- Step 7. Usually the auger will have to be cleaned with D.I. water or hexane between samples.
- Step 8. Repeat Step 6 until you have collected all the samples desired.
- Step 9. Refill the hole with the soil augered out and place a stake in the hole to mark the location.

TABLE VI-1
SAMPLE PRESERVATION TECHNIQUES AND
RECOMMENDED HOLDING TIMES

<u>Parameter</u>	<u>Vol. Req. (ml)</u>	<u>Container^(a)</u>	<u>Preservative</u>	<u>Recommended Holding Time</u>	<u>EPA Proposed Holding Time</u>
<u>A. Non Metals</u>					
Acidity	100	P, G	Cool, 4°C	24 Hours	14 Days
Alkalinity	100	P, G	Cool, 4°C	24 Hours	14 Days
Bacteria	250	Whirlpak,	Cool, 4°C	6 Hours -	6 Hours -
		Sterilized Glass	(2 ml 0.1 N Thiosulfate for chlorinated waters)	48 Hours - potable waters	48 Hours - potable waters
<u>Biochemical</u>					
Oxygen Demand	100	P, G	Cool, 4°C	6 Hours	48 Hours
Boron	100	P	Cool, 4°C	7 Days	-
<u>Chemical</u>					
Oxygen Demand	100	P, G	H ₂ SO ₄ (pH <2)	7 Days	28 Days
Chloride	50	P, G	None Required	7 Days	28 Days
Chlorine Residual	500	P, G	Det. on Site	No Holding	2 Hours
Color	100	P, G	Cool, 4°C	24 Hours	48 Hours
Cyanides	500	P, G	4°C, NaOH (pH >11)	24 Hours	14 Days
			0.6 g. ascorbic acid		
Fluoride	300	P, G	Cool, 4°C	7 Days	28 Days
Hardness	100	P, G	4°C, HNO ₃ (pH <2)	7 Days	6 Months

TABLE VI-1
SAMPLE PRESERVATION TECHNIQUES AND
RECOMMENDED HOLDING TIMES (Cont'd)

<u>Parameter</u>	<u>Vol. Req. (ml)</u>	<u>Container(a)</u>	<u>Preservative</u>	<u>Recommended Holding Time</u>	<u>EPA Proposed Holding Time</u>
Nitrogen, Ammonia	500	P, G	4°C, H ₂ SO ₄ (pH <2)	24 Hours	28 Days
Kjeldahl	500	P, G	4°C, H ₂ SO ₄ (ph <2)	7 Days	28 Days
Nitrate	50	P, G	Cool, 4°C	24 Hours	48 Hours
Nitrite	50	P, G	Cool, 4°C	48 Hours	48 Hours
Nitrate-nitrite	50	P, G	4°C, H ₂ SO ₄ (pH <2)		28 Days
Grease & Oil	1000	G	4°C, H ₂ SO ₄ (pH <2)	24 Hours	28 Days
Oxygen, Dissolved					
Probe	300	G	Det. on Site	No Holding	1 Hour
Winkler	300	G	Fix on Site	4-8 Hours	8 Hours
pH	25	P, G	Cool, 4°C	6 Hours	2 Hours
Phenols	500	G only	Cool, 4°C, H ₂ SO ₄ (pH <2)	24 Hours	28 Days
Phosphorus,					
Total	100	P, G	4°C, H ₂ SO ₄ (pH <2)	7 Days	28 Days
Ortho	100	P, G	4°C, H ₂ SO ₄ (ph <2)	24 Hours	48 Hours
Silica	100	P only	Cool, 4°C	7 Days	28 Days

TABLE VI-1
SAMPLE PRESERVATION TECHNIQUES AND
RECOMMENDED HOLDING TIMES (Cont'd)

<u>Parameter</u>	<u>Vol. Req. (ml)</u>	<u>Container(a)</u>	<u>Preservative</u>	<u>Recommended Holding Time</u>	<u>EPA Proposed Holding Time</u>
Solids,					
Total	100	P, G	Cool, 4 ⁰ C	7 Days	7 Days
Suspended	100	P, G	Cool, 4 ⁰ C	7 Days	7 Days
Volatile	100	P, G	Cool, 4 ⁰ C	7 Days	7 Days
Dissolved	100	P, G	Cool, 4 ⁰ C	7 Days	48 Hours
Settleable	100	P, G	None Required	24 Hours	48 Hours
Specific					
Conductance	100	P, G	Cool, 4 ⁰ C	24 Hours	28 Days
Sulfate	100	P, G	Cool, 4 ⁰ C	7 Days	28 Days
Sulfide	500	P, G	2 ml Zinc Acetate	24 Hours	7 Days
Sulfite	100	P, G	Det. on Site	No Holding	48 Hours
Surfactants	250	P, G	Cool, 4 ⁰ C	24 Hours	48 Hours
Turbidity	100	P, G	Cool, 4 ⁰ C	7 Days	48 Hours
<u>B. Metals</u>					
Total	100	P	HNO ₃ (pH < 2)	6 Months	
Dissolved	200	P	Filter on Site HNO ₃ (pH < 2)	6 Months	
<u>C. Hazardous Waste & Oil Analysis</u>					
% Ash	50 ml	P, G	None Required	-	-
% Chlorine (bomb)	1 g	P, G	None Required	-	-
Density	50 g	P, G	None Required	-	-

TABLE VI-1
SAMPLE PRESERVATION TECHNIQUES AND
RECOMMENDED HOLDING TIMES (Cont'd)

<u>Parameter</u>	<u>Vol. Req. (ml)</u>	<u>Container(a)</u>	<u>Preservative</u>	<u>Recommended Holding Time</u>	<u>EPA Proposed Holding Time</u>
Flash Point	25 ml	P, G	None Required	-	-
Heat of Combustion	1 g	P, G	None Required	-	-
% Sulfur (Bomb)	1 g	P, G	None Required	-	-
Viscosity	25	P, G	None Required	-	-
% Water					
<u>D. Gas Chromatography</u>					
Herbicide	500	G, Foil or Teflon Cap	Cool, 4 ^o C	7 Days (Pre-extraction) 40 Days (Completion)	
Phenol	1000	G. Teflon Cap Teflon Cap	Cool, 4 ^o C, H ₂ SO ₄ pH < 2, Sodium Thiosulfate	7 Days (Pre-extraction) 40 Days (Completion)	
PCB, Water	1500	G, Foil or Teflon Cap	Cool, 4 ^o C	7 Days (Pre-extraction) 40 Days (Completion)	
Soxhlet	50 g	G, Foil or Teflon Cap	Cool, 4 ^o C	7 Days (Pre-extraction) 40 Days (Completion)	
Sludge	10 g	G, Foil or	Cool, 4 ^o C	7 Days (Pre-extraction) 40 Days (Completion)	

TABLE VI-1
SAMPLE PRESERVATION TECHNIQUES AND
RECOMMENDED HOLDING TIMES (Cont'd)

<u>Parameter</u>	<u>Vol. Req. (ml)</u>	<u>Container (a)</u>	<u>Preservative</u>	<u>Recommended Holding Time</u>	<u>EPA Proposed Holding Time</u>
Oil	5 g	G, Foil or	Cool, 4°C Teflon Cap		
Purge & Trap					
Water	40	Vial, Teflon Septum	Cool, 4°C	14 Days	
Solids	5 g	Vial, Teflon Septum	Cool, 4°C	14 Days	
Solvent					
Characterization					
Liquid	1	G, M	None Required		-
Solid	2 g	G, M	None Required		-

a - P = Plastic
G = Glass

Reference - F.R., Vol. 49, No. 209, U.S. EPA, 1984.

VII. SAMPLE CUSTODY

A. CHAIN OF CUSTODY

Chain of Custody will be initiated in the field according to Appendix A pg 50.

B. CONTROL OF INCOMING SAMPLES

PACE has a designated sample custodian whose primary responsibility is to document receipt of samples, initiate the appropriate log-in procedures described below, assure proper documentation and prompt analyses of the samples. The sample custodian also maintains proper custody of samples and analytical data to verify the integrity of reports submitted to our clients.

When samples are received at the laboratory accompanied by a chain of custody form (Figure VII-1), the sample custodian will initiate the following steps:

1. Verify that each sample was in the packing container as recorded on the Chain of Custody record.
2. Document on the Chain of Custody form any breaking of seal of sample bottles which may have occurred during transport to the laboratory.
3. Sign and date the "received at laboratory by" box. The exact number of sample containers received by the laboratory is recorded for each sample.
4. Next, a sample and analysis data entry form is filled out (see Figure VII-2). This sheet contains all pertinent

information about the client, sample collection, sample matrix, analyses to be performed and number of bottles received.

All samples received by PACE are identified and labeled showing the name of the client, sample location or code, date received and the preservative added to the bottle. Samples are entered into the log book which contains the following:

1. A number assigned to each sample. Numbers begin with 1 on the first day of the year.
2. Identification of the client name.
3. Date the sample was received at the laboratory.
4. Number of bottles received for each sample.
5. Initials of person who checked in samples.

To complete the sample and analysis data entry procedure, all the information from the sample receiving form is entered into a computer noted as the Lab Data Management System (LDMS). A copy of what was checked into the LDMS is attached to the original check-in sheet and kept with any other information about the project. Before samples are stored, they are rechecked to make sure they are in the correct container and are properly preserved.

C. MAINTENANCE OF CUSTODY AND SAMPLE STORAGE

PACE has implemented standard operating procedures to assure the integrity of both samples and data so that they are not degraded or disclosed to unauthorized personnel. In order to insure that this policy is maintained, the laboratory facilities are under controlled access. Only employees of PACE Laboratories, Inc.

are allowed access to the laboratory facilities. Visitors must register at the front desk. Visitors are accompanied at all times when in the laboratory by an employee of PACE. The building is locked and secured at the end of each working day. Keys to the building are issued only to select personnel.

Samples are stored either in refridgerators at 4⁰ C, at room temperature, or in a ventilated hazardous waste room. All sample storage areas have locks and are secured at the end of each working day by the sample custodian.

Samples are removed from their proper storage location by the analyst and are returned to the storage area immediately after the required sample volume has been taken. This minimizes unnecessary time spent searching for samples and helps prevent matrix degradation from prolonged exposure to room temperature.

Most samples are retained in storage in their original locations for approximately two months. Preserved metals samples and hazardous waste type samples are stored for up to six months. After the final report is sent and clients are allowed adequate time to review the results, the samples are properly discarded or returned to the client.

PACE normally will complete the sample analysis within ten working days after receipt, except for those parameters whose holding time requires otherwise. Those parameters with holding times less than 24 hours are given top priority for immediate analysis.

Additional and more rigorous chain of custody protocols for samples and data can be implemented by client request. For

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samples involving a high degree of confidentiality or potential litigation, PACE Laboratories, Inc. has developed more extensive sample and data handling protocols to assure the scientific and legal defensibility of the report submitted.

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Dodge, MN 55422 612 544 5543

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NAME OF CLIENT _____ PROJECT TELEPHONE NO. _____ PROJECT NUMBER _____

SAMPLE NO.	GENERAL	METALS	NITROGEN	CYANIDE	VOLATILES	SAMPLE DESCRIPTION	TRANSFER NO. & CHECK								
							1	2	3	4	5	6	7		

PERSON RESPONSIBLE FOR SAMPLE COLLECTION	AFFILIATION	TRANSFER NUMBER	ITEM NUMBER	TRANSFERS RELINQUISHED BY	ACCEPTED BY	DATE	TIME
		1					
		2					
		3					
		4					
		5					
		6					
		7					

PURPOSE OF ANALYSIS (use back of front sheet if needed)

ORIGINAL

Client Name: _____ Contact: _____ Phone #: _____

Address: _____ Project Name: _____

Client #: _____ Project #: _____ Collected By: _____ Date: _____

Lab Rec'd Date: _____ By: _____ Check-in By: _____ Due Date: _____ Priority: _____

Special Instructions: _____ PACE Contact: _____

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LYSIS
JRM

SAMPLE #

SAMPLE DESCRIPTION (30 Characters)

MATRIX

BOTTLE TYPES (30 Characters)

COMMENTS

FIGURE VII-2

ANALYSIS:

ANALYSIS:

ANALYSIS:

ANALYSIS:

ANALYSIS:

ANALYSIS:

ANALYSIS:

BOTTLE TYPES:	
Cyanide	CN
General	GN
Metals Not Filtered	MF
Metals Filtered	MU
Mercury	NT
Oil & Grease	OG
Phenol	PH
Radiochemical	RA
Sulfide	SU
TC	TC
Whirlpak	WK
GC VOA	GV
GC O Amber	GL
GC Misc. Releg	GM
GC Releg	GO
III Filter Cassette	IF
III Impinger	II
III Sorbent Tube	IT
III Diffusion Mon	IM
III Bulk Sample	IB

VIII. CALIBRATION PROCEDURES AND FREQUENCY

A. LABORATORY OBJECTIVES

Standardized calibration of the equipment used is necessary to obtain valid data. Standard procedures for the preparation of standard solutions is also necessary to generate valid data. Detailed procedures for calibrations are provided as follows for each piece of lab equipment or can be found in the corresponding analytical methods manual.

1. Metals Analysis Calibration Procedures

a. Stock Solution Preparation

1. Reagents and standard solutions for EPA Atomic Absorption (AA) methods are purchased from American Scientific Products.
2. Stock reagents and working standards are prepared and stored according to EPA methods.
3. All standards prepared for use throughout the laboratory are entered in the Standard Notebook with all information regarding source of the standard, the preparation of that standard, i.e., date, analyst, name of each compound and amount used and final volume. All standard and stock reagent containers are labeled with the standard's or reagent name, date and analysts' initials.

for every analyte by the analysis of EPA Quality Control Solutions. When measurements for the certified components exceed the specified control limits, the analysis must be terminated, the problem corrected, the instrument recalibrated and the calibration reverified.

3. The values for the initial and subsequent continuing calibration verifications shall be recorded for AA and cyanide analyses, as indicated.
4. The instrument detection limits are documented within 30 days of the start of the analyses and at least quarterly (every 3 months), and must meet the levels specified. The instrument detection limits (IDL) are 3 times the standard deviation obtained for the analysis of a standard solution (each analyte in reagent water) at a concentration 3-5 times the IDL on three (3) nonconsecutive days with 7 consecutive measurements per day. These instrument detection limits will be lower than or equal to the required detection limit.
5. A calibration blank is analyzed each time the instrument is calibrated, at the end of the run, and at a frequency of 10% during the run. The results for the calibration blank solution shall be recorded for AA analysis, as indicated. Blanks are to be reported as "less than (numeric value)" when the concentration is less than the required detection limit, not as "N.D." or "D.L.". If this blank result is greater than the (RDL), terminate analysis, correct the

4. For Atomic Absorption and cyanide systems, calibration standards are prepared by diluting the stock solution at the time of analysis. Low calibration standards are prepared fresh each time an analysis is to be made and discarded after use. A blank and at least three calibration standards in graduated amounts in the appropriate range is prepared. The calibration standards are prepared using the same type of acid or combination of acids and at the same concentration as will result in the samples following sample preparation.

b. Calibration of Atomic Absorption

1. The Atomic Absorption system is set up according to EPA and manufacturer's instruction. Beginning with the blank and working towards the highest concentration each standard is aspirated and the absorbance readings are recorded. Readings for the highest standard are compared with previous data and the suggested manufacturers guidelines for optimum instrument performance. The system is calibrated daily or each time an analysis is performed. The instrument response obtained for each compound in a newly prepared standard is compared to the response obtained from the previous standard which was verified by EPA QA Standard. The two standards must agree within 15% or the new standard may not be used until the discrepancy has been resolved.
2. After the AA system has been calibrated, the accuracy of the initial calibration is verified and documented

problem and recalibrate.

6. Continuing Calibration Verification

To assure calibration accuracy during each analysis run, one of the standards is analyzed for each analyte at a frequency of 10% during an analysis run, and after the last analytical sample. The analyte concentrations in the continuing calibration standard must be at or near the mid-range levels of the calibration curve.

The same continuing calibration standard is used throughout the analysis runs for a case of samples received.

If the deviation of the continuing calibration verification is greater than the Control Limit specified, the instrument is recalibrated and the preceding 10 samples reanalyzed for the analytes affected. Information regarding the continuing verification of calibration for AA is recorded.

B. FIELD INSTRUMENTATION

Calibration procedures and frequency of calibration for field equipment is an integral component of each instrument's Standard Operating Procedure (SOP) detailed in PACE Laboratories, Inc. Field Manual (See Appendix A). The instruments used will be routinely calibrated in conformance with manufacturer's specification, at a minimum. The Log Sheet for each piece of equipment will contain the following items where appropriate:

1. Date of calibration,
2. All data pertaining to the calibration and/or maintenance procedure (not contained in specific equipment worksheets),
3. Next due date of calibration and/or maintenance,
4. Initials of person performing the calibration and/or maintenance,
5. Adjustments made and the accuracy of the equipment prior to and following calibration (where applicable),
6. A record of equipment failure or inability to meet specifications (where applicable).

Tables VIII-1 and VIII-2 provide calibration procedures for the field pH meter and conductivity meter.

**TABLE VIII-1
STANDARD PROCEDURE FOR
CALIBRATION OF pH METERS**

- STEP 1: Choose appropriate pH buffers depending upon expected pH of the sample (Acidic use four and seven, Basic use seven and ten).
- STEP 2: Turn selector dial to zero and the meter to warm up for the ten minutes.
- STEP 3: Adjust temperature dial to the temperature of the buffers.
- STEP 4: Rinse the probe with D.I. water and place it in the seven buffer. Turn the selector dial to the pH position.
- STEP 5: While gently stirring the buffer with the probe turn the calibration knob until the meter is reading seven.
- STEP 6: Turn the selector dial back to zero. Rinse the probe with D.I. water and place it in either the four or ten buffer.
- STEP 7: Turn the selector dial to pH. The meter should read four or ten depending upon the buffer being used. If it does not, split the difference by turning the calibration knob.
- STEP 8: Turn the selector dial to zero, rinse the probe with D.I. water and place it in the seven buffer.
- STEP 9: Turn the selector dial to pH. If the meter reads seven it is now ready to be used. The probe should be rinsed and the temperature dial adjusted between samples.
- STEP 10: Turn the selector dial to zero and record what the meter reads. As long as the zero remains the same it is not necessary to recalibrate until the next day.

TABLE VIII-2
STANDARD PROCEDURE FOR
CALIBRATION OF CONDUCTIVITY METERS

- STEP 1: Check batteries by turning the switch on and the range dial to TEST. The meter must read above the test line or new batteries are needed.
- STEP 2: Using a thermometer take the temperature of the 717 umho/cm standard and adjust the temperature dial accordingly.
- STEP 3: Rinse probe with D.I. water and place in the 717 umho/cm standard.
- STEP 4: Turn the range dial to 0-1,000 and switch the meter on, use a gentle up and down motion with the probe to thoroughly mix the standard.
- STEP 5: Turn the Stp screw until the meter is reading 720. Turn the switch off and rinse the probe using D.I. water.
- STEP 6: Take temperatures of the 1413 umho/cm and adjust the temperature dial.
- STEP 7: Turn the range dial to 0-10,000, place the probe in the standard and turn meter on. The meter should read 1400. The meter is now ready for use. The temperature of every sample must be taken and the probe rinsed between samples.

IX. ANALYTICAL PROCEDURES

TABLE IX-1
ANALYTICAL METHODS

<u>Parameter</u>	<u>Method</u>	<u>Minimum Detection Limit</u>	<u>Standard Methods 15th Ed.</u>	<u>EPA Methods 1979</u>	<u>ASTM</u>
<u>A. Non-Metals</u>					
Acidity	Potentiometric Titration	1 mg/l	402		D1067-70
Alkalinity	Potentiometric Titration	1 mg/l	403	310.1	D1067
	Automated Methyl Orange	10 mg/l		310.2	
Bacteria,					
Total Coliform	Membrane Filter	-	909C		
Fecal Coliform	Membrane Filter	-	980C		
Fecal Strept.	Membrane Filter	-	910A		
Total Plate	Agar Medium	-	907		
Biochemical Oxygen					
Demand, 5-day	Winkler	1 mg/l	507	405.1	
	Electrode	6 mg/l	507		
Boron	Curcumin 405-A	0.2 mg/l	404A	212.3	
Chemical Oxygen Demand	Dichromate Reflux High	50 mg/l	508A	410.1	D1252-78
	Dichromate Reflux Low	5 mg/l	508A		
Chloride	Mercuric Nitrate	1 mg/l	407B	325.3	D512-67
	Automated Ferricyanide	1 mg/l		325.2	
Chlorine, Residual	Amperometric Titration	0.01 mg/l	408C	330.1	D1253-76
Color	Visual Comparison	1 Unit	204A		
Cyanide, Total	Pyridine-Barbitutic Acid, Colorimetric	0.01 mg/l	412D	335.2	D2036-75
	Amendable Chlorination-colorimetric	0.02 mg/l	412F	335.1	
Flouride, Total	Distillation-Electrode	0.1 mg/l	413A		D1179-72
Fluoride, Diss.	Electrode	0.1 mg/l	413B	340.2	

TABLE IX-1
ANALYTICAL METHODS

<u>Parameter</u>	<u>Method</u>	<u>Minimum Detection Limit</u>	<u>Standard Methods 15th Ed.</u>	<u>EPA Methods 1979</u>	<u>ASTM</u>
Hardness, Total	EDTA Titration	1 mg/l as CaCO ₃	314B	130.2	D1126-67
Hardness, Calcium	EDTA Titration	1 mg/l as CaCO ₃		242.1	
Nitrogen, Ammonia	Distillation-Titration	0.1 mg/l as N	417D	350.2	
Kjeldahl	Digestion-Distillation-	0.1 mg/l as N	420B	351.3	D3590-77
Nitrate	Automated Cadmium	0.1 mg/l as N	418F	353.2	D3967-79
Nitrite	Automated Cadmium	0.1 mg/l as N	418F	353.2	D3867-79
Organic	Kjeldahl-NH ₃	0.1 mg/l as N	420A	-	
Oil & Grease	Soxhlet	1 mg/l	503C		
	Partition-Gravimetric	1 mg/l	503A	413.1	
Oxygen, Dissolved	Winkler	0.1 mg/l	421B	360.2	D1589-60
	Electrode	0.1 mg/l	421F	360.1	
pH	Electrode	0.1 Unit	423	150.1	D1293-78
Phenol	Distillation-Extraction Colorimetric	0.005 mg/l	420.1		D1783-70
Phosphorus, Total	Persulfate Digestion- Ascorbic Acid Reduction	0.02 mg/l as P	424F	365.2	D515-78
Ortho	Ascorbic Acid Reduction	0.02 mg/l as P	424F		
Silica, Reactive	Molybdosilicate	0.02 mg/l	425C	370.1	D859-65
Solids, Total	Gravimetric	1 mg/l	209A	160.3	
Total Volatile	Gravimetric	1 mg/l	209E	160.4	
Suspended	Gravimetric	1 mg/l	209D	160.2	
Suspended Volatile	Gravimetric	1 mg/l	209A		
Total Dissolved	Gravimetric	1 mg/l	209B	160.1	
Settleable	Gravimetric	1 mg/l	209F	160.5	
Specific Conductance	Meter	1 umho	205	120.1	D1125-77

TABLE IX-1
ANALYTICAL METHODS

<u>Parameter</u>	<u>Method</u>	<u>Minimum Detection Limit</u>	<u>Standard Methods 15th Ed.</u>	<u>EPA Methods 1979</u>	<u>ASTM</u>
Sulfate	Turbimetric	1 mg/l	426C	375.4	D516-68
	Automated Methyl Thymol Blue	3mg/l	-	375.2	
Sulfide	Colorimetric Titration	0.1 mg/l as S	427C	376.2	
		0.2 mg/l as S	427D	376.1	
Sulfite	Titration	0.2 mg/l as S	428F	377.1	D1339-78
Surfactants (MBAS)	Methylene Blue	0.05 mg/l	512A	425.1	D2330-68
Turbidity	Meter	0.1 NTU	214A	180.1	D1889-71
<u>Parameter</u>	<u>Method</u>	<u>Minimum Detection Limit</u>	<u>Standard Methods 15th Ed.</u>	<u>EPA Methods 1979</u>	<u>SW 846</u>
B. <u>Metals</u>					
Aluminum	AA-Direct Aspiration AA-Furnace	0.4 mg/l	303C	202.1	
		7 ug/l	304	202.2	
Antimony	AA-Direct Aspiration AA-Furnace	0.8 mg/l	303A	204.1	7040
		3 ug/l	304	204.2	7041
Arsenic	AA-Gaseous Hydride AA-Furnace	1 ug/l	303E	206.3	7061
		4 ug/l	304	206.2	7060
Barium	AA-Direct Aspiration AA-Furnace	0.2 mg/l	303C	208.1	7080
		3 ug/l	304	208.2	7081
Beryllium	AA-Direct Aspiration AA-Furnace	0.02 mg/l	303C	210.1	7090
		0.2 ug/l	304	210.2	7091
Cadmium	AA-Direct Aspiration AA-Furnace	0.01 mg/l	303A	213.1	7130
		0.1 ug/l	304	213.2	7131
Calcium	AA-Direct Aspiration EDTA Titration	0.4 mg/l	303A	215.1	
		1 mg/l	311C	215.2	

TABLE IX-1
ANALYTICAL METHODS

<u>Parameter</u>	<u>Method</u>	<u>Minimum Detection Limit</u>	<u>Standard Methods 15th Ed.</u>	<u>EPA Methods 1979</u>	<u>SW 846</u>
Chromium, Total	AA-Direct Aspiration	0.05 mg/l	303A	218.1	7190
	AA-Furnace	1 ug/l	304-	218.2	7191
	Colorimetric	0.02 mg/l	312B		7196
Cobalt	AA-Direct Aspiration	0.05 mg/l	303A	219.1	
	AA-Furnace	1 ug/l	304	219.2	
Copper	AA-Direct Aspiration	0.05 mg/l	303A	220.1	721.0
	AA-Furnace	4 ug/l	304	220.2	721.1
Iron	AA-Direct Aspiration	0.05 mg/l	303B	236.1	
	AA-Furnace	1 ug/l	304	236.2	
Lead	AA-Direct Aspiration	0.1 mg/l	303A	239.1	7420
	AA-Furnace	1 ug/l	304	239.2	7421
Lithium	AA-Direct Aspiration	0.02 mg/l	317B		
Magnesium	AA-Direct Aspiration	0.4 mg/l	303A	242.1	
Manganese	AA-Direct Aspiration	0.03 mg/l	303A	243.1	
	AA-Furnace	1 ug/l	304	243.2	
Mercury	AA-Cold Vapor	0.2 ug/l	303F	245.1 7471	7470 or 7471
Molybdenum	AA-Direct Aspiration	0.3 mg/l	303C	246.1	
	AA-Furnace	5 ug/l	304	246.2	
Nickel	AA-Direct Aspiration	0.05 mg/l	303A	249.1	7520
	AA-Furnace	2 ug/l	304	249.2	7521
Potassium	AA-Direct Aspiration	0.01 mg/l	303A	258.1	
Selenium	AA-Gaseous Hydride	1 ug/l	303E	270.3	7740
	AA-Furnace	5 ug/l	304	270.2	7741
Silver	AA-Direct Aspiration	0.04 mg/l	303A	272.1	7760
	AA-Furnace	0.2 ug/l	304	272.2	7761

TABLE IX-1
ANALYTICAL METHODS

<u>Parameter</u>	<u>Method</u>	<u>Minimum Detection Limit</u>	<u>Standard Methods 15th Ed.</u>	<u>EPA Methods 1979</u>	<u>SW 846</u>
Sodium	AA-Direct Aspiration	0.1 mg/l	303A	273.1	
Strontium	AA-Direct Aspiration	0.05 mg/l	303A		
Thallium	AA-Direct Aspiration	0.4 mg/l	303A	279.1	7840
	AA-Furnace	3 ug/l	304	279.2	7841
Tin	AA-Direct Aspiration	2 mg/l	303A	282.1	
	AA-Furnace	5 ug/l	304	282	
Titanium	AA-Direct Aspiration	1.0 mg/l	303C	283.1	
	AA-Furnace	1 ug/l	304	283.2	
Vanadium	AA-Direct Aspiration	1 mg/l	303C	286.1	7910
	AA-Furnace	5 ug/l	304	286.2	7911
Zinc	AA-Direct Aspiration	0.1 mg/l	303A	289.1	7950
	AA-Furnace	1 ug/l	304	289.2	7951

C. Hazardous Wastes & Oil Analyses

% Ash	Gravimetric	0.01%	209E		
% Chlorine	Bomb Calorimeter	0.01%		8808-63	
Density	Gravimetric	0.01	213E		
Flash Point Closed Cup	Pensky-Martin	10°F		D93-73	1010
Free Liquids	Paint Filter	1 ml			9095
Heat of Combustion	Bomb Calorimeter	100 BTU		D240-64	
Leach Test, EP Toxicity	Extraction	-			1310
ASTM Water	Extraction			D3987	

TABLE IX-1
ANALYTICAL METHODS

<u>Parameter</u>	<u>Method</u>	<u>Minimum Detection Limit</u>	<u>Standard Methods 15th Ed.</u>	<u>EPA Methods 1979</u>	<u>SW 846</u>
% Sulfur	Bomb Calorimeter	0.01%		D129-64	
Viscosity	Saybolt	0.1 S	-	D88-56	
% Water	Distillation	0.1%		D95-74	
Cyanide, Total	Pyridine-Barbitutic Acid Colorimetric				9010
Amenable	Chlorination-Colorimetric				9010
Reactive	Pyridine-Barbitutic Acid Colorimetric				261.23
Sulfide, Total	Titration				9030
Reactive	Titration				261.23
pH	Electrode				9040
Specific Conductance	Meter				9050
Specific Gravity	Mass Displacement		213E		

<u>Parameter</u>	<u>Method</u>	<u>EPA 600-4-82-067 July 1982</u>	<u>MDH*</u>	<u>SW 846</u>
<u>D. Organic Analytical Method</u>				
Purgeable Halocarbons (includes trihalomethanes)	Gas Chromatography	601		8010 8020
Purgeable Aromatics	Gas Chromatography	602		8020
Acrolein & Acrylonitrile	Gas Chromatography	603		8030
Phenols	Gas Chromatography	604		8040
Phthalate Esters	Gas Chromatography	606		8060

TABLE III
ANALYTICAL METHODS

<u>Parameter</u>	<u>Method</u>	<u>EPA 600-4-82-067 July 1982</u>	<u>MDH*</u>	<u>SW 846</u>
Pesticides & PCB's	Gas Chromatography	608		8080
Nitroaromatics & Isophorone	Gas Chromatography	609		8090
Polynuclear Aromatic Hydrocarbons	Gas Chromatography	610		8100
Haloethers	Gas Chromatography	611		
Purgeables	Gas Chromatography Mass Spectrophotometer	624		8240
Base/Neutral Acids	Gas Chromatography Mass Spectrophotometer	625		8250 8270
Purgeables (includes 601, 602)	Gas Chromatography		465B	8015
1,2-Dibromoethane	Gas Chromatography	601**		

* Minnesota Health Department Method 504.1
** ECD detector used in place of Hall detector

=====
The following parameters are analyzed at PACE Laboratories, Inc in Minneapolis, Minnesota and are not currently analyzed in the Tampa:

<u>Parameter</u>	<u>Method</u>
Purgeables	EPA 624 Gas Chromatograph- Mass Spectrometer
Base/Neutral	EPA 625 Gas Chromatograph- Mass Spectrometer

X. DATA REDUCTION VALIDATION AND REPORTING

Upon receiving samples for a project, all background information pertaining to that project is entered via the LDMS as described in Control of Incoming Samples (Section VII).

All information is then gathered and organized by the LDMS and is displayed in a series of reports. These reports show the progress of the analytical workload which is reviewed and assessed by the appropriate laboratory manager. These reports are reviewed before the beginning of each week and a work schedule are made for performing the analytical tasks needed to complete each project. Each technician then uses this schedule and a daily updated report to perform analyses in guiding them in completing each analytical task. The data are then appropriately recorded on parameter specific raw data sheets, which are signed and dated by the technician. These raw data sheets are reviewed and approved by signature of the laboratory manager. The data are then entered into the computer by the LDMS operator and when the last piece of data is entered for a particular project a draft report is formulated for that project. The raw data sheets go to the Quality Assurance Department (QAD) to be reviewed for calculation errors, precision and accuracy. QC data are recorded and plotted on QC charts, any data point, which exceeds the calculated control limit is investigated and corrective action taken when necessary. If there are any changes in the data, the QAD will notify the laboratory manager and the LDMS operator before the final report is generated. All changes in original data are crossed out with a straight line and the corrected number is written in, initialed by the technician, and dated. These raw data are then filed and stored in the QAD where the access is restricted to authorized personnel only. When the laboratory manager is satisfied that the draft report results are valid and correct, a final report

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is produced, which is reviewed and signed by the Laboratory Manager and the Director of Laboratory Services. The project is invoiced and mailed to the client. A copy of the report is retained for PACE's files.

When needed, additional footnotes are attached describing problems, interferences, analytical procedures, quality control or other information necessary for accurate data interpretation by the client.

XI. INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

A. INTERNAL QUALITY ASSURANCE CHECKS

Internal quality assurance procedures are designed to assure the consistency and continuity of data. If required, external quality assurance procedures (interlaboratory checks) are carried out to assess the accuracy of the data generated. Internal quality assurance procedures include:

1. Instrument performance checks;
2. Instrument calibration;
3. Documentation on the traceability of instrument standards, samples, and data;
4. Documentation on analytical methodology and QC methodology (QC methodology includes spiked samples, duplicate samples, and split sample use of reference blanks and check standards for method accuracy and precision); and
5. Documentation on sample preservation and transport.

B. TYPES OF QUALITY CONTROL CHECKS INCLUDE BUT ARE NOT LIMITED TO:

1. Method Blank Analysis

A method blank is a volume of deionized-distilled laboratory water carried through the entire analytical scheme. The method blank volume must be approximately equal to the sample volumes being processed.

2. Surrogate Spike Analysis

Surrogate spikes are routinely added to samples, standards, and blanks to monitor the performance of analytical methods and equipment. The surrogate spiking compounds should behave in a similar fashion to analytical compounds, but should not be found naturally occurring in samples.

3. Duplicate Analysis

At selected stations on a random time frame, duplicate samples are collected from two sets of field equipment installed at the site, or duplicate grab samples are collected, or samples are randomly split in the laboratory and analyzed separately. This provides a check of sampling, techniques, and analytical methods for precision.

4. Matrix Spike/Matrix Spike Duplicate Analysis

Known amounts of a particular constituent are added to an actual sample at concentrations at which the accuracy of the test method is satisfactory. The amount added is coordinated with the laboratory. This method provides a proficiency check for the accuracy of the analytical procedures.

The spiked samples can also be run in duplicate as indicated in an analytical procedure (ie., Volatile Organic Analysis U.S. EPA Method 601). This provides a check of analytical procedures for precision.

5. Control Charts

Control Charts are used to monitor variations in the precision and accuracy of routine analysis and detect trends in these variations. QC control charts are

constructed from data representing performance of the complete analytical method. The construction of a control chart requires initial data to establish the mean and range of measurements. Control charts are used to monitor both accuracy and precision.

C. FREQUENCY OF QUALITY CONTROL CHECKS

With each lot of samples analyzed at a particular time, at least one matrix spike, and one matrix spike duplicate sample are run. The total number of laboratory matrix spike duplicates and matrix spikes analyzed over the course of a project are at least 10% of the total number of samples. Surrogate spike compounds are added to each analysis run where called for in the respective method.

At least one method blank is analyzed with each batch of analyses. Internal standards, as recommended in the pertinent methods, are added to several samples as a check on accuracy of the external standard.

XIII. PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

A. INSTRUMENTATION MAINTENANCE

PACE is dependent on sophisticated instrumentation. The end result of any test performed on an instrument depends on the inherent accuracy and proper operation, use and function of the instrument itself.

It is essential that the instruments in the laboratory operate under optimum conditions at all times. Local service personnel are available on an on-call basis. Formalized preventive maintenance contracts have been executed with outside vendors. Much of the preventive maintenance is done on a day-to-day basis, in-house. The laboratory staff at PACE is familiar with the manufacturer's operating manual on each instrument and routinely performs various service checks.

Each instrument, prior to use, is calibrated according to the manufacturer's instructions. Next to the instrument, for the analyst's use, is a set of operating instructions. Daily checks of the instrument performance are made by the analyst assigned responsibility for that instrument.

B. EQUIPMENT LOG RECORD

An inventory control system including all equipment and instrumentation is maintained by the equipment manager as the basis for maintenance and calibration control. The inventory control documentation includes for each item:

1. Description of item.

2. Manufacturer, model number, and serial number.
3. Name, address, and telephone number of company which services item.
4. Type of service policy.
5. Timing and frequency of routine maintenance, servicing, and calibration.

C. ROUTINE MAINTENANCE AND TROUBLESHOOTING

Preventive maintenance that is routinely performed does not correct for all problems associated with the VOA analyses. Samples with very high concentrations and equipment malfunctions can cause a variety of problems that are difficult to diagnose. It may be necessary to disconnect portions of the analytical system to identify the problem. (For example the purge and trap system can be eliminated by directly injecting onto the column.) A troubleshooting guide for an individual method is only a guideline; each problem may require a combination of corrective actions before acceptable data may be generated.

XIV. SPECIFIC ROUTINE PROCEDURES TO BE USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS OF SPECIFIC MEASUREMENT PARAMETERS INVOLVED

A. OVERVIEW

The Quality Assurance Program provides a measure of the credibility of the data produced in the laboratory on a day to day basis. The program is designed to ensure that the laboratory continues to generate valid results through current quality control assessment procedures as well as preventive and corrective measures.

The following sections describe in detail the Quality Control measures used at PACE Laboratories, Inc. These practices are critical in assuring the consistent production of reliable data. However, the experience, knowledge, professional pride and motivation of the analyst are human qualities which are difficult to measure. Yet these subjective factors are crucial in assuring optimum performance. Therefore, the Quality Assurance Program at PACE is intended to help each analyst evaluate his performance in a valuable manner. The program is not a critic of poor results, but a constructive tool for the assurance of the high level of performance maintained by PACE Laboratories, Inc.

This section documents the system used at PACE to verify - on a daily basis - that procedures pertaining to laboratory methods, glassware, solvents, reagents and gases are in control.

The reliability and credibility of analytical laboratory results can be established by the inclusion of a program of randomly-

scheduled replicate analyses, analysis of standard or spiked samples, and the cooperative analysis of split samples by several laboratories. These external quality control checks should be an integral part of any sampling and analytical plan.

Regularly scheduled analysis of known duplicates, standards, and spiked samples are a routine aspect of data reduction validation and reporting procedures (see Section X). The specific procedures used to calculate these values follow.

B. QUALITY CONTROL PROCEDURES FOR ANALYTICAL PERFORMANCE

The system used at PACE involves the use of precision and accuracy data to determine the acceptability of analytical results. Precision refers to the reproductibility of the results and accuracy measures the degree of difference between observed and true values. Approximately, one of every ten analyses performed at PACE is run in duplicate (precision). Also, every tenth to fifteenth sample is spiked with a synthetic standard to check the accuracy of the method. Once 15 to 18 sets of precision or accuracy data have been obtained, a quality control chart is prepared. The Shewart technique⁽⁴⁾ is the statistical method used to construct the charts. These quality control charts provide a quick, visual means for monitoring the daily performance of the laboratory. Figures XIV-1 and XIV-2 contain examples of accuracy and precision charts along with their corresponding data sheets.

1. Precision

The precision, or ability to reproduce results, of each method is monitored by the construction of statistically

meaningful charts. Samples representing the entire range of concentrations and interferences are analyzed in duplicate. Since the range between duplicates varies with concentration, all precision data is separated into concentration ranges. Two factors are considered when assigning ranges to a particular parameter. First, each concentration range must contain a "significant" number of data pairs to allow calculation of statistically sound precision values. Therefore, considering the relatively small number of samples analyzed, the fewest number of concentration ranges is desired. Yet, as the second consideration, the ranges must be small enough so that variation in true concentration values does not negatively affect the average range and standard deviation. In most cases, concentrations separated by a factor of ten provide the simplest consideration of the data. However, these are arbitrary designations and are subject to change depending upon the test, number of data sets, and the distribution of the data sets within a range.

After 15 to 18 duplicate results have been obtained for a concentration range, a Shewart Quality Control Chart is calculated. The ranges between each set of duplicates are entered into the computer program for precision. The program calculates the average range (R) and multiplies it by the factor 3.27 to produce the upper control limit (UCL). The chart for the concentration range will graphically display the average range (R) and the upper control limit (UCL). The range values for successive duplicate analyses are plotted on the chart and any value that exceeds the upper control limit is considered out of

control. If such an out of control situation exists, the test is shut down until the problem is identified, corrected and documented. The charts are periodically updated with the accumulation of 15 to 18 additional data pairs.

Precision data can also be reviewed through the calculation of the Relative Percent Difference (RPD) for a matrix spike duplicate analysis using the following equation

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2} \times 100$$

where:

- RPD = Relative percent Difference
- D₁ = First Sample Value
- D₂ = Second Sample Value

This method of calculating precision is used for volatile organic analysis or other analysis as specified in a particular project plan.

2. Accuracy

In addition to the guarantee of precise results, one must also be assured of the accuracy of those results. This is accomplished by spiking one of every ten to fifteen samples analyzed with a synthetic standard for the parameter. The sample is analyzed and the recovery(P_i) of the spike is

determined. When 15 to 18 spike results have been obtained, the computer program for accuracy will calculate the mean percent recovery (P), the standard deviation (Sp), and the upper and lower control limits, (UCL, LCL). A test is considered in control if the percent recovery (P_i) is between the upper and lower control limits. These limits are determined to be plus or minus two standard deviations from the mean percent recovery ($P + 2Sp$), or plus or minus ten percent from the mean percent recovery ($P + 10\%$). Successive data points are plotted on the accuracy chart which graphically displays the UCL, LCL and P. With the accumulation of 15 to 18 additional data sets, a new chart is prepared.

The Quality Control Charts for accuracy and precision are kept in separate three ring notebooks where they can be easily reviewed for QC interpretation. The analysts themselves are encouraged to use them as a constructive measure of the test's integrity and their own professional performance.

3. Other Quality Control Procedures

a. Method Blank Analysis

A method blank is a volume of deionized, distilled laboratory water carried through the entire analytical scheme. The method blank volume must be approximately equal to the sample volumes being processed.

1. Method blank analysis must be performed at the

following frequency:

A method blank analysis must be performed every twelve hours, once per lot or with every twenty (20) samples of similar concentration and/or sample matrix, whichever is more frequent.

It is the laboratory's responsibility to ensure that method interferences caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms be minimized.

2. For the purpose of this protocol, an acceptable laboratory method blank should meet the following criteria:

A method blank for volatile analysis should contain no greater than two times (2X) the Detection Limit of common laboratory solvents (common laboratory solvents are: methylene chloride, acetone, benzene, methyl ethyl ketone and toluene). The method blank must not contain greater than five times (5X) the Detection Limit of those compounds previously listed.

b. Analytical Standards

All analyses require that standard samples, samples that the analyst has prepared from pure materials and distilled water or purchased from certified materials

(traceable to the National Bureau of Standards) be analyzed concurrently with the samples. In general, the range covered by the standards should comprise the useful parameters concentration range and sensitivity of the analytical method.

The data generated from analysis of these standards are documented and reviewed in the same manner as the matrix spike analysis for accuracy.

c. Sample Analysis

Samples can be analyzed upon successful completion of the initial QC activities. Any major system maintenance may necessitate a recalibration. Minor maintenance should necessitate only the calibration verification.

C. DOCUMENTATION

As discussed earlier, if a test result for quality control exceeds the control limits, the test is stopped until the source of error is identified and corrected. Great care is taken to promptly document the situation in the Laboratory Out-of-Control Situation (LOCS) Notebook. This documentation provides a valuable review of the laboratory's performance. It also helps to resolve current problems that may have occurred previously under similar circumstances. Any situation that requires documentation is assigned an identifying "LOCS" number which describes the page in the LOCS notebook and the situation. For example, "LOCS #12.7" indicates an out-of-control situation is documented on page 12 of the notebook and is the seventh entry

of the page. This identification number is entered in the comment section on the raw data sheet so that either the analyst or supervisory personnel can quickly review the situation.

D. WEEKLY QC REVIEW

The Quality Control staff meets with the laboratory personnel, supervisor, manager, and director at least once a week at a predetermined time. Out-of-control situations from the previous week are reviewed to determine the progress made in resolving the problem.

New situations of concern are discussed and corrective measures are instituted. This meeting also serves to cultivate new ideas on how the laboratory may perform more efficiently. The open, informal discussion reduces the occurrence of problems due to lack of communication. The results of these weekly reviews and the subsequent actions taken are recorded in the Weekly QC Review Notebook.

E. COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

For most remedial activities these 3 terms are quality characteristics which should be considered during study planning. Data completeness can be quantified during data assessment. It is expected that laboratories should provide data, meeting QC acceptance criteria, for 90% or more of the requested determinations. It is incumbent for planners to identify any sample types, such as control or background locations, which require 100% completeness. Representativeness is most often thought of in terms of collection of

representative samples that can accurately assess the environment being evaluated (compositing sub-aliquots if appropriate) or selection of representative sample aliquots during laboratory analysis. Comparability is a consideration during planning to avoid noncomparability between different organizations' data or between different analytical methods or sample matrices.

REFERENCES

1. U.S. EPA, Handbook for Analytical Quality Control in Water and Wastewater Laboratories, NERC 1972.

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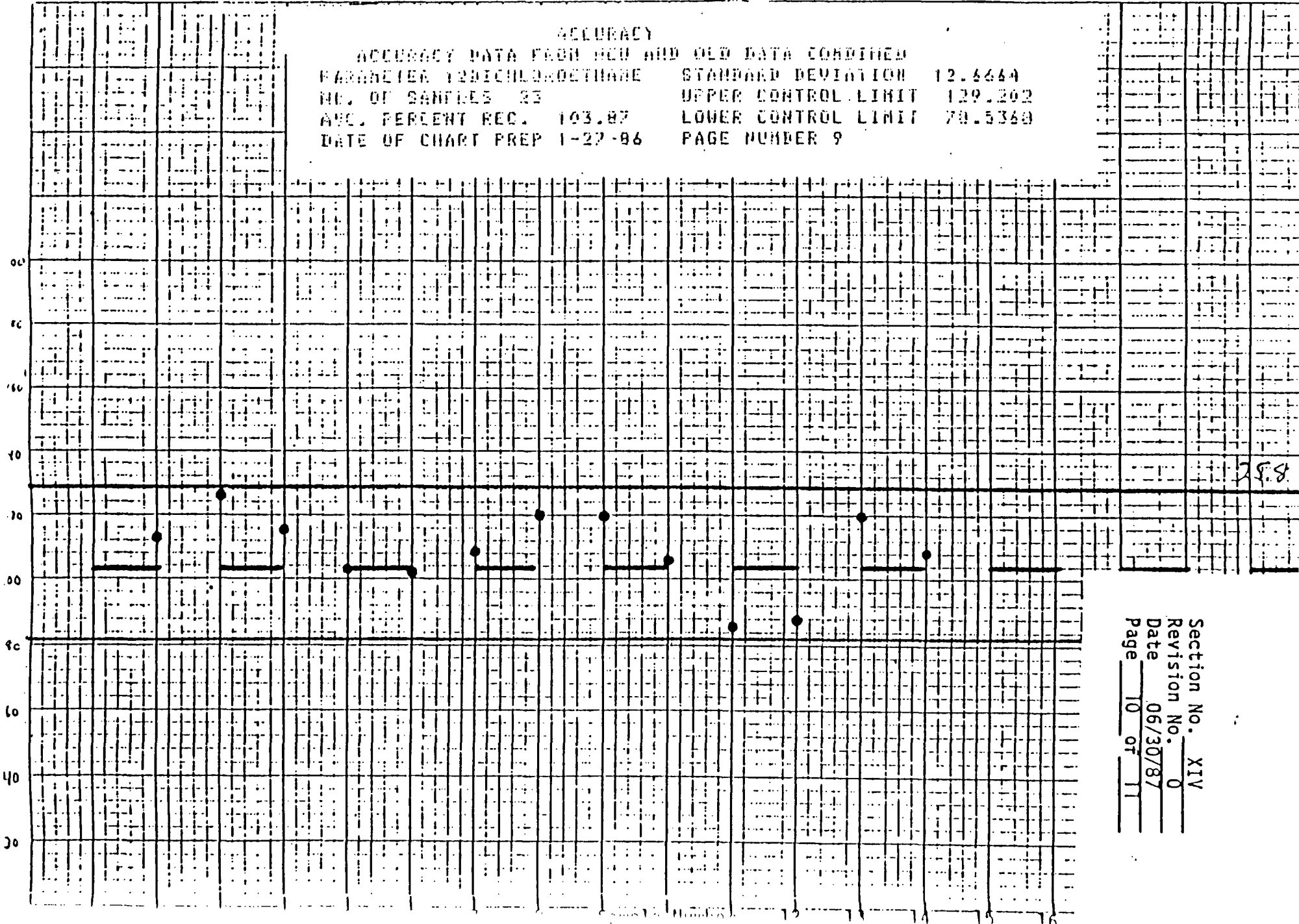
Parameter:
 Upper & Lower Control Limit (UCL-LCL):
 # of Samples Considered:

Average % Recovery:
 Standard Deviation:
 Date of Chart Preparation:

QUALITY CONTROL
 SHEWHART CONTROL CHART FOR PRECISION

Page #:

ACCURACY
 ACCURACY DATA FROM NEW AND OLD DATA COMBINED
 PARAMETER 1,2-DICHLOROETHANE STANDARD DEVIATION 12.6664
 NO. OF SAMPLES 23 UPPER CONTROL LIMIT 129.202
 AVG. PERCENT REC. 103.87 LOWER CONTROL LIMIT 70.5368
 DATE OF CHART PREP 1-27-86 PAGE NUMBER 9



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Parameter:
Concentration Range:
Upper Control Limit (UCL):
of Samples Considered:

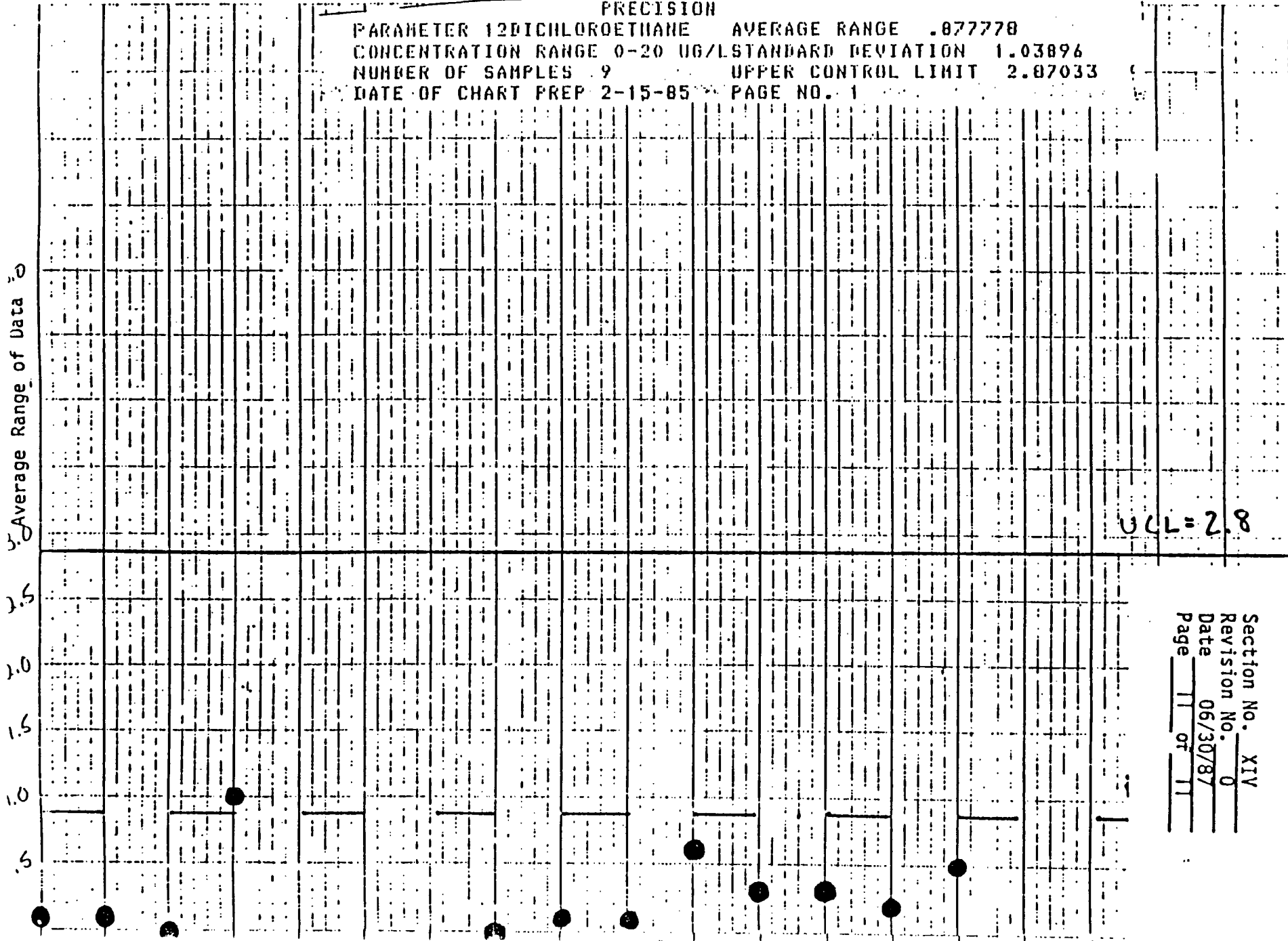
Average Range of Data:
Standard Deviation:
Date of Chart Preparation:

Page #:

QUALITY CONTROL
SHEWHART CONTROL CHART FOR PRECISION

PRECISION

PARAMETER 1,2-DICHLOROETHANE AVERAGE RANGE .877778
CONCENTRATION RANGE 0-20 UG/L STANDARD DEVIATION 1.03896
NUMBER OF SAMPLES 9 UPPER CONTROL LIMIT 2.87033
DATE OF CHART PREP 2-15-85 PAGE NO. 1



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IV. CORRECTIVE ACTIONS

When, as a result of audits or QC sample analysis, sampling or analysis systems are shown to be unsatisfactory, a corrective action shall be implemented. The Project Manager, Laboratory Director, Quality Assurance Manager, and analyst may be involved in the corrective action. If previously reported data is affected by the situation requiring correction or if the corrective action will impact the project budget or schedule, the action should directly involve the Project Manager and the Quality Assurance Manager. Corrective actions are of two kinds:

steps
ows:

- A. Immediate, to correct or repair nonconforming equipment and systems. The need for such an action will most frequently be identified by the analyst as a result of calibration checks and QC sample analyses.
- B. Long term, to eliminate causes of nonconformance. The need for such actions will probably be identified by audits. Examples of this type of action include:
 - 1. Staff training in technical skills or in implementing the QA Program;
 - 2. Rescheduling of laboratory routine to ensure analysis within allowed holding times;
 - 3. Identifying vendors to supply reagents of sufficient purity; and
 - 4. Revision of QA system or replacement of personnel.

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submittal as verification that the problem has been eliminated.

XVI. QUALITY ASSURANCE REPORTS TO MANAGEMENT

A. OBJECTIVE

This section describes the methods used by PACE to store and retrieve quality assurance records and issue the appropriate reports.

B. REQUIREMENTS

Comprehensive records shall be maintained to provide evidence of the quality assurance activities. All points which indicate an out-of-control situation must be evaluated and explained. Any corrective actions and re-analysis of samples must be fully explained and documented.

C. IMPLEMENTATION

Procedures for recording all aspects of the quality assurance program will be written and placed on file. Appropriate personnel will be trained in the use of these procedures.

D. DISCUSSION

The proper maintenance of quality assurance records is essential to document validity and reliability and to provide support in evidentiary proceedings as needed.

The original quality assurance records will be kept in the Program Quality Assurance Department.

All information received from outside sources will be retained

by the group using the data.

Access to working files will be restricted to only project personnel.

Access to all files containing quality assurance records will be restricted to listed personnel.

Upon termination of an individual task or work assignment, working files will be processed for storage as quality assurance records.

E. RESPONSIBILITIES

The Project Manager shall be responsible for ensuring that quality assurance records are being properly stored and that they can be retrieved.

The Quality Assurance Department shall be responsible for maintaining the records, which will include quality assurance record files and a quality assurance records index.

The Quality Assurance Department shall be responsible for identifying the documents to be designated as quality assurance records. These shall be responsible for identifying the documents to be designated as quality assurance records.

F. REPORTS TO MANAGEMENT

Quarterly reports are provided by the Quality Assurance Department to the President, Vice President and Director of Laboratory Services of PACE. This report addresses the

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quarterly Quality Assurance Activities including details of corrective actions implemented, audit results, and Q.C. summary information.

THOMAS A. JACKMAN, Ph.D.
Director, Florida Division
PACE Laboratories, Inc.

EDUCATION

Ph.D. Chemistry	University of South Florida, Tampa, Florida, 1976.
B. A. Chemistry	University of South Florida, Tampa, Florida, 1971.

PROFESSIONAL AFFILIATIONS

American Chemical Society
Sigma XI
American Association for the Advancement of Science
Association of Official Analytical Chemists

PROFESSIONAL EXPERIENCE

Experienced in the acquisition and interpretation of data from various types of analytical instrumentation. Representative instrumentation includes:

- Gas Chromatography (FID, ECD, NPFID, FPD, HALL, DID)
- Gas Chromatography/Mass Spectrometry
- Atomic Absorption Spectrophotometry
- Ion Chromatography
- Infrared, Visible, Ultraviolet Spectroscopy
- Nuclear Magnetic Resonance
- Electron Paramagnetic Resonance

Specialized expertise in the use of chemical analytical instrumentation for the detection of trace quantities of chemical compounds in various matrices. This includes:

Analysis of industrial atmospheres to determine worker exposure to hazardous materials. Working knowledge of NIOSH sampling and analytical procedures.

Analysis of fire debris to determine the presence of absence of potential accelerants. Qualified as an expert witness in state and federal courts in Florida and Louisiana.

Analysis of water, wastewater, and hazardous waste in accordance with USEPA Protocol. Working knowledge of the 500 and 600 series protocol, SW-846, ASTM, AOAC, and Standard Methods.

Experienced in the generation and detection of trace organic chemicals in the air. Actively participating in a research project which involves the generation and validation of low concentrations of organosulfur and organophosphorus compounds. The analytical protocol requires the use of gas chromatographic separation with flame photometric detection.

Provide technical support and consulting to clients regarding the determination of regulatory compliance in the following areas:

Hazardous Waste: Permitting, agency liaison, and interpretation of RCRA and HSWA regulatory requirements.

Superfund: Project Manager for Remedial Investigation at a site included on the National Priorities List. Provide technical expertise in all aspects of the investigation and remedy selection and participate in negotiations with the Environmental Protection Agency. Working knowledge of the provisions of the CERCLA and SARA regulations.

Air Emissions: Air Emissions testing (EPA Methods 1-5, 6,7,8,9,12,13), permitting, and regulatory liaison.

WORK EXPERIENCE

1987 - Present

PACE Laboratories, Inc.
Director, Florida Division

Responsible for operations and management of organization specializing in environmental consulting and laboratory analysis.

1977 - 1987

Interscience, Inc.
Vice President, Senior Chemist

Responsible for all aspects pertaining to the operation of an analytical chemical laboratory. Also responsible for environmental monitoring programs and consulting services.

1976 - 1977

Department of Chemistry
Wright State University
Dayton, Ohio
Postdoctoral Fellow

1976

Hillsborough Community College
Tampa, Florida
Instructor

1972 - 1976

Department of Chemistry
University of South Florida
Tampa, Florida

KATHY L. HARRIS
Chemist
Quality Assurance Officer
PACE Laboratories, Inc.

EDUCATION

B. S. Chemistry University of Florida, Gainesville,
Florida, 1981.
Computer Courses Eastern Mennonite College
Waters HPLC Short Course
IL - AA Course, Flame and Furnace

EXPERIENCE

June 1987 - PACE Laboratories, Inc.
Present Chemist
Quality Assurance Officer

Analytical and quantitative testing using AA,
flame and furnace, GC, IC, UV-Vis, TLC,
titrametric and gravimetric assays, Kjeldahl
nitrogen, COD, BOD, and IR.

Responsible for quality control, data
interpretation, equipment maintenance and
repair, and technical consulting.

July 1985 - Interscience, Inc.
June 1987 Chemist

Analytical and quantitative testing, quality
control, data interpretation, equipment
maintenance and repair, and technical
consulting.

Proficient in analytical techniques: AA,
flame and furnace, LC, GC, IC, UV-Vis, TLC,
titrametric and gravimetric assays, sterile
preparticulate matter, Kjeldahl nitrogen,
COD, BOD, and IR, with exposure to NMR.

Dec. 1984 - Merck & Company, Inc.
Mar. 1985 Chemist

Developed HPLC method which was 50% faster than the assay currently in use in Q.C. Participated in strain improvement program by establishing analytical support for the program with HPLC and Technicon auto analyzer.

June 1982 - Merck & Company, Inc.
Dec. 1987 Quality Control Technician

Responsible for maintaining quality throughout the processes of pharmaceutical manufacturing.

Sept. 1981 - University of Florida
Apr. 1982 Department of Biochemistry
Chemist I

Pioneered only lab in the Southeast for sequencing and analysis of synthesized amino acids. Developed an HPLC method for quantitation of amino acids.

June 1979 - Shands Teaching Hospital, Inc.
Apr. 1982 Medical Laboratory Technician

Analyzed blood serum using automated instrumentation and flame AA.

MEMBERSHIPS

Florida Society of Environmental Analysts

CURT W. LESSL
Chemical Engineer
PACE Laboratories, Inc.

EDUCATION

1979 St. Louis Community College, St. Louis, Missouri,
Associate Degree in General Education.

1985 University of South Florida, Tampa, Florida, B. S.
Chemical Engineering

EXPERIENCE

1987 - PACE Laboratories, Inc.
Present Chemical Engineer

RCRA compliance; air emissions testing and permitting; POTW discharge permitting; hazardous waste manifest preparation, documentation, shipment, and disposal; waste treatment process development and design; bench scale and pilot plant studies; classification of chemical waste for lab pack disposal; economic analysis; personnel training; SARA/Community Right to Know; Environmental Auditing.

1986 - Interscience, Inc.
1987 Chemical Engineer

MEMBERSHIPS

American Institute of Chemical Engineers
Engineer in Training

MICHAEL F. VALDER
Chemist
PACE Laboratories, Inc.

EDUCATION

B. S. Chemistry University of South Florida, Tampa,
Florida, 1986.

EXPERIENCE

1987 - PACE Laboratories, Inc.
Present Chemist

Responsibilities include general wet chemistry, ion chromatography, and low level chloride in concrete analysis. Certified Visible Emissions observer with client contact in areas concerning visible emissions.

1986 - Interscience, Inc.
1987 Chemist

Major responsibilities include general wet chemistry, ion chromatography, and low level chloride in concrete analysis.

MEMBERSHIPS

Florida Society of Environmental Analysts

R. NILES BASHAW
Chemist
PACE Laboratories, Inc.

EDUCATION

B. S. Chemistry Florida State University, Tallahassee,
Florida, 1957.

PROFESSIONAL AFFILIATIONS

American Chemical Society
Florida Advisory Committee on Arson Prevention (FACAP)
International Association of Arson Investigators (IAAI)
International Association for Fire Safety Science
Florida Chapter of IAAI
Pinellas Arson Co-Op of Florida (PARCO)

EXPERIENCE

1987 - PACE Laboratories, Inc.
Present Chemist

Fire and explosion cause and origin determinations for residential, commercial and industrial losses. Fire and materials chemistry analyses. Participation in laboratory and full scale burn testing. Gas chromatography, Infrared and Mass Specoscopy analyses, Forensic chemistry analysis.

1985 - Interscience, Inc.
1987 Chemist

Fire and explosion cause and origin determinations for residential, commercial and industrial losses. Fire and materials chemistry analyses. Participation in laboratory and full scale burn testing. Gas chromatography, Infrared and Mass Specoscopy analyses, Forensic chemistry analysis.

1982 - Selin Company
1985 President

A marketing firm representing several manufacturers selling to the gift and stationery market in Florida.

1973 - Iminac, Inc.
1982 Subsidiary of The Dow Chemical Company
Sales Manager and Technology Manager

Responsible for marketing and the research and development. Iminac was purchased by the major managers.

1957 - Dow Chemical Company
1973 Advanced from Chemist to Research Specialist

Conducted individual and group research in fire chemistry, polymer chemistry, radiation chemistry, free radical chemistry and chemical synthesis.

1954 - Florida State University
1957

Individual research in radiation chemistry and teaching assistant.

MICHAEL WAYNE PALMER
Chemist
PACE Laboratories, Inc.

EDUCATION

1984 University of Tampa, Tampa, Florida, Bachelor of
Science, Majors: Chemistry, Biology, Marine
Science, December 1984.

EXPERIENCE

1987 - PACE Laboratories, Inc.
Present Chemist

Analysis of pesticides, herbicides, poly aromatic hydrocarbons, volatile organics and PCB's, in drinking water, waste water, soil and oil by gas chromatography. Experienced with FID, Hall, ECD, PID, TCD gas chromatographs equipped with FID, Hall, PID, ECD and TCD detection. Experienced with EPA Methods including 601, 602, 608, 610, 504.2

1986 - ENVIROPACT, Inc.
1987 Analytical Chemist

Analysis of pesticides, herbicides, poly aromatic hydrocarbons, volatile organics and PCB's, in drinking water, waste water, soil and oil by gas chromatography using Shimadzu Mini G.C. and a Varian 3700 with a Tracor Hall Detector.

1985 - State Department of HRS
1986 Chemist II

Analysis of pesticides, herbicides, EDB and hydrocarbons in water and food by gas chromatography and method development using Hewlett Packard, Perkin Elmer, and Tracor gas chromatographs on line with a Hewlett Packard Data System.

JOHN T. STIMUS
Environmental Technician
PACE Laboratories, Inc.

EDUCATION

1985 University of Tampa, Tampa, Florida, Bachelor of
 Science, April, 1985.

EXPERIENCE

1987 - PACE Laboratories, Inc.
Present Environmental Technician

 Experienced in the collection of air,
 groundwater, wastewater and hazardous waste
 samples. Completed 40 hours training for
 work on hazardous waste sites.

1986 - ENVIROPACT, Inc.
1987 Remedial Technician/Field Supervisor

 Chemist, Wet Lab Supervisor

1985 - University of Tampa
1986 Admissions Representative

1985 - Hillsborough County Schools
1985 Substitute Teacher

JAMES E. FRANKLIN
Environmental Technician
PACE Laboratories, Inc.

EDUCATION

University of Minnesota, Bachelor of Arts, Biology

Vermilion Community College, Ely, Minnesota, EAT Program

EXPERIENCE

1986 - PACE Laboratories, Inc.
Present Environmental Technician

Transferred to Florida in June, 1987.
Responsible for supervising the Field
Services Department.

Ground water sample collection for analysis
of trace level contaminants at sanitary
landfills, Super Fund sites, hazardous waste
sites, accidental spills and leaking
underground storage tanks.

Waste water sample collection at a wide
variety of manufacturing and industrial
facilities for NPDES permitting, process
control, and compliance testing.

Flow monitoring involving the construction
and installation of weirs, other primary
devices, and the set up and maintenance of
ISCO 2500 systems.

Soil sampling for PCB's, organics, and
conventional parameters. One project
involved sampling a grid covering over 3
square kilometers.

Hazardous waste sampling, labelling, and
recontainerization involving a wide range of
wastes and materials. Experienced in SCBA
(self-contained breathing apparatus) and air-
line work.

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Revision No. 0
Date 06/30/87
Page 13 of 14

Completed a 16 hour course on hazardous waste safety for EPA Level B.

Co-author of PACE's Hazardous Waste QC Manual.

Air stack sampling of industrial emissions to test for compliance and process efficiency.

Sample custody involving sample check-in, chain of custody, and Contract Lab Protocol.

Prior to joining PACE, Mr. Franklin's experience included:

Field Services for the MN Department of Health.

Portage Crew with the U. S. Forest Service in Ely, Minnesota.

Laboratory technician with the University of MN, Minneapolis.

MEMBERSHIPS

National Water Well Association

RONALD ERWIN BROCK
Lab Aide
PACE Laboratories, Inc.

EDUCATION

James Sprunt Institute, Kennansville, N.C., Radio & Television Repair, 1977-1979.

Wallace-Rosehill High School, Wallace, N.C., 1977.

EXPERIENCE

1987 - Present PACE Laboratories, Inc.
Lab Aide

Responsibilities include preparation of equipment for use in field sampling and in laboratory analyses.

1982 - 1987 Rhone-Poulenc Inc.
Research Triangle Park, N.C.
Research Assistant

Analyzed crop samples and environmental samples for Aldicarb.

Data entry and quarterly reports.

ALPHABETICAL CROSS INDEX OF MATERIALS

A

	MSDS#		MSDS#
Accelerator for Urethane Enamel	1115	Adhesive, Sealant, RTV-102	---- 1142
Acetaldehyde	----- 535	Adhesive (Polyacrylate and Monomer, Part 1 of 2)	----- 1150
Acetene	----- 457	Adipic Acid	----- 400
Acetic Acid, Ammonium Salt	---- 139	Adipic Acid Dinitrile	----- 549
Anhydrous	----- 327	Adipic Acid Nitrile	----- 549
Glacial	----- 327	Adipic Ketone	----- 570
Isopropyl Ester	--- 496	Adiponitrile	----- 549
Methyl Ester	----- 503	AGE	----- 576
Propyl Ester	---- 515	AGITENE	----- 1210
Vinyl Ester	----- 509	AgNO3	----- 81
Zinc Salt, Dihydrate	---- 550	AIRBRASIVE POWDER #1	----- 1000
28% 28% 28%	----- ----- ----- 327A	#3	----- 1197
Acetic Aldehyde	----- 535	AIRCOSIL 45, Brazing Alloy	---- 41
Acetic Anhydride	----- 434	AlSi 286, 304, 305, 308, 309, 310, 314, 316, 317, 329, 347, 348, 405, 409, 410, 414, 440's, 450's	----- 164
Acetic Ether	----- 437	Al	----- 100
Acetic Oxide	----- 434	Alboline	----- 525
Acetidin	----- 437	Alcohol-Resin Flux	----- 1032
Acetoacetic Acid, Ethyl Ester	- 553	Aldehyde	----- 535
Acetoacetic Ester	----- 553	ALFONIC 1412A	----- 490
Acetoacetone	----- 556	Al(H2PO4)3	----- 11
Acetone	----- 300	ALIPAL CD-128	----- 490
Acetone Solvent Blend	---- 420	Aliphatic Naphtha	----- 530
Acetonic Acid	----- 546	Alkaline Cleaner, Liquid	----- 1158, 1159, 1160
Acetonitrile	----- 499	Alkaline Cleaning Agent, Liquid	1090
Acetophenon	----- 567	Alkaline Cleaning Agent, Solid	1195
Acetophenone	----- 567	Alkaline Electrocleaner	----- 1185
Acetylacetate, Active	----- 553	Alkaline Etch (HAVILAND ND 68G)	1041
Acetylacetone	----- 556	Alkaline Hot Tank Cleaner	---- 1109, 1113
Acetylbenzene	----- 567	Alkaline Paint Booth Water Wash	1112
Acetyl Chloride	----- 452	Alkaline Paint Booth Purgin Solution, Concentrate	----- 1114
Acetyldimethylamide	----- 458	Alkaline Spray Cleaner, Granular	1186
Acetylene	----- 403	Alkaline Steam Clean Compound, Liquid	----- 1111
Acetylenogen	----- 78	ALKALUME 1744	----- 1206
Acetylene Tetrabromide	----- 562	ALKANEX Insulating Varnish	---- 1163
Acetyl Oxide	----- 434	ALK-TRI	----- 312
Acid Ammonium Fluoride	----- 49	Alkyd Paint, Air-Drying, Gloss Black	----- 1193
Acid Anhydride, Liquid, Epoxy Curing Agent	----- 1091B, 1101	Alkyd Primer, Corrosion Resisting	----- 1194
Acid K	----- 475	Alkyd Primer, Red Oxide	----- 1192
ACINTOL FA 2, 3	----- 495	Allomaleic Acid	----- 545
ACONEW EXTRA, 450, 500	----- 495	Allyl Alcohol	----- 505
Acraldehyde	----- 573	Allyl Aldehyde	----- 573
Acroleic Acid	----- 449	Allyl Chloride	----- 374
Acrolein	----- 573	Allyl 2,3-Epoxypropyl Ether	----- 576
Acrylaldehyde	----- 573	Allyl Glycidyl Ether	----- 576
Acrylamide	----- 577	1-(Allyloxy)-2,3-Epoxypropane	----- 576
Acrylate Spray Coating	----- 1059	Alpha-Aminopyridine	----- 568
Acrylic Acid	----- 449	ALPHA-FLOC	----- 507
Butyl Ester	---- 547	ALPHA 413-F THINNER	----- 1077
n-Butyl Ester	--- 547	611 FLUX	----- 1080
Methyl Ester	---- 551	810 THINNER	----- 1078
ACRYLIC ADHESIVE Q, Parts A & B	1001A, B	811 FLUX	----- 1250
Acrylic Aldehyde	----- 573		
Acrylic Amide	----- 577		
Acrylic Resin Monomer	----- 441		
ACRYLIC TOUCH-UP LACQUER, AEROSOL	----- 1265		
Acrylonitrile (Monomer)	----- 381		
ACTIRON NX-3	----- 378		
Adhesive, Epoxy, Parts A & B	-- 1172		

	MSDS#
812 THINNER -----	1252
815 FLUX -----	1079
MELROSE 611 FLUX -----	1080
Alpha-pyridinamine -----	568
Alum -----	92
Alumina, Fused, Powdered -----	1197
Alumina Powder -----	1000
Aluminum Metal/Powder -----	100
Aluminum Phosphate C5 -----	11
Aluminum Sulfate, Liquid -----	92
Aluminum Trioxide, Powdered ---	1197
Amchlor -----	21
Amido-Amine Epoxy Curing Agent	1074
Amidosulfonic Acid -----	72
Aminobenzene -----	407
1-Aminobutane -----	569
Aminocaproic Lactam -----	580
Aminocyclohexane -----	537
2,2'-Aminodiethanol -----	426
Aminoethane -----	540
2-Aminoethanol -----	418
2-((2-Aminoethyl) amino) Ethanol -----	555
Aminoethylethanolamine -----	555
n-Aminoethylethanolamine -----	555
N-Aminoethyl Piperazine -----	408
6-Amino Hexanoic Acid Lactam ---	580
6-Amino hexanoic Acid Cyclic Lactam -----	580
2-Aminopropane -----	483
2-Aminopyridine -----	568
O-Aminopyridine -----	568
Ammoneric -----	21
Ammonia, Anhydrous, Gas or Liquid -----	1
Ammonia Water (Strong) -----	1A
Ammonium Acetate -----	139
Ammonium Bichromate -----	129
Ammonium Bifluoride -----	49
Ammonium Chloride -----	21
Ammonium Dichromate -----	129
Ammonium Dodecyltrioxyethylene Sulfate -----	490
Ammonium Fluoride -----	111
Ammonium Hydrate -----	1A
Ammonium Hydrofluoride -----	49
Ammonium Hydrogen Fluoride ---	49
Ammonium Hydroxide (28-30%) ---	1A
Ammonium Laureth-3 Sulfate ---	490
Ammonium Lauryl Ether Sulfate -	490
Ammonium Metavanadate -----	130
Ammonium Muriate -----	21
Ammonium Nitrate -----	79
Ammonium Peroxydisulfate -----	33
Ammonium Persulfate -----	33
Ammonium Salt -----	130
Ammonium Vanadate -----	130
AMOCO TMA -----	330
AMOLITE Oil -----	1264
Amorphous Silica -----	69
AMSCO Rubber Solvent -----	371
AMSCO SOLV 5425 -----	486
AMSCO SOLV 5470 -----	353
AMSCO Special Naphtholite ---	391
di-n-Amylamine -----	582
Amyl Acetate Primary (Mixed Isomers) -----	486

	MSDS#
Amyl Hydride -----	523
n-Amyl Alcohol -----	506
Amyl Ethyl Ketone -----	480
n-Amyl Methyl Ketone -----	302
Amyl Nitrite -----	575
AN (Acrylonitrile) -----	381
ANCAMINE T-1 -----	1072B
Anhydrotrimellitic Acid -----	330
Anhydrous Acetic Acid -----	327
Anhydrous Boric Acid -----	143
Anhydrous Ammonia -----	1
Aniline -----	407
Aniline Oil -----	407
Anilinobenzene -----	461
ANSI/AWS A5.8, Brazing Alloys: BAG-1 -----	41
Antimony -----	70
Antimony (III) Oxide -----	28
Antimony Sesquioxide -----	28
Antimony Trioxide -----	28
Antimony White -----	28
Aqua Ammonia -----	1A
Aqua Fortis -----	7
Ar -----	64
ARALDITE 6005 -----	335B
6010 -----	335B
6084 -----	335
ARALDITE CY179 -----	386
ARCOSOLVE PM -----	522
Argon -----	64
ARKLONE P or ARKLONE P-113 ---	314
ARMAFLEX PIPE INSULATION ---	1133B
ARMSTRONG 520 ADHESIVE -----	1133A
ARMSTRONG D-253 -----	1287
AROCOLOR 1254 -----	1200
AROMATIC A-150 -----	1286
Aromatic Naphtha: Aromatic 100 -----	1061
Aromatic 150 -----	1061A
Aromatic Naphtha, High Flash --	1286
Arsenic Hydride -----	178
Arsenic Trihydride -----	178
Arsine -----	178
Arsenous Hydride -----	178
Arseniuretted Hydrogen -----	178
Asbestos (Chrysotile) -----	15A
Asbestos (Rubber sheet & gaskets, compressed) -----	15B
Asbestos Tape (Crysotile) ---	15
AsH3 -----	178
ASHLAND 190/P-3224 -----	1073
Rubber Solvent -----	371
ASTM = American Society for Testing and Materials	
ASTM A481 -----	83
B6 -----	73
B69 -----	176
B237 -----	70
B299 -----	75
B350 -----	17
B385 -----	84
B386 -----	84
B387 -----	84
B440 -----	23
B493, B494, B495 -----	17
C5, C45, C46, C49, C53, C258, C415 and C828 -----	22

	MSDS#
C53, C295 -----	39
C911 -----	22
D13 -----	375
D124 -----	477
D234 -----	476
D235 -----	334, 334A 1257, 1258
D303 -----	338
D304 -----	337
D315 -----	15
D329 -----	300
D330 -----	320
D331 -----	319
D343 -----	321
D362 -----	317
D363 -----	332
D364 -----	318
D369 -----	468, 469, 473, 474
D388 -----	491
D439 -----	467
D456 -----	3
D458 -----	48
D476 -----	118
D484, Type I -----	1257, 1258
D537 -----	85
D538 -----	43
D561 -----	51
D578-D581 -----	46
D600, Class B, 6% Cobalt - 24% Lead -----	363, 1268 384
D605 -----	42
D607 -----	24
D700 Type 2,3,11 -----	1254A
D700 Type 13,22 -----	1254
D740 -----	303
D770 -----	324
D835, D836 -----	316
D841 -----	317
D843, D845, D846 -----	318
D975 -----	470
D1007 -----	442
D1152 -----	354
D1153 -----	304
D1249, Type 1 -----	414
D1719 -----	398
D1763, Type I, Grade I: Class I -----	335B
Class V -----	335
D1786 -----	331
D1835 -----	380, 481
D1836 -----	397
D1933 -----	61
D1984 -----	495
D2116 -----	1010
D2190 -----	509
D2270 -----	1264
D2323 -----	405
D2359 -----	316
D2378 -----	360
D2403 -----	417
D2422 -----	1264
D2439 -----	355
D2472 -----	27
D2627 -----	353
D2693 -----	323

	MSDS#
D2826, D2827 -----	351
D2916 -----	356
D3055 -----	389
D3126 -----	338
D3127 -----	437
D3128 -----	352
D3130 -----	515
D3172 -----	491
D3264 -----	407
D3400, Type III -----	99
D3487 -----	393
D3504 -----	438
D3506 -----	310
D3540 -----	486
D3541 -----	345
D3547 -----	547
D3699 -----	488
D3734 -----	1286
D3735 -----	391
F65 -----	486
F104 Type I, Class 1 -----	15B
ASTRO 3069, Parts A & B -----	1072A, B
3104 -----	1075

Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

SPECIAL 3044 -----	1029
4017 (Parts A&B) -----	1190
Automotive Gasoline, Lead-free -----	467
AZ-111 PHOTO RESIST -----	1014
AZ-1112A REMOVER -----	1015
AZ 119S -----	1205A
AZ 119 THINNER -----	1205
2-Azacycloheptanone -----	580
Azacyclopentane -----	498

B

B & B 3100 -----	1092
BaCl2 -----	132
BaCO3 -----	119
BAKELITE ERL 4221 -----	386
Baking Varnish, Clear in Xylene -----	1184
Ba(NO3)2 -----	173
Ba(OH)2·8H2O -----	40
BZH6 -----	103
Ba(OH)2 8H2O -----	40
BARCO BOND MB-100X and MB-12 --	1177
Barium Carbonate -----	119
Barium Chloride -----	132
Barium Dichloride -----	132
Barium Dinitrate -----	173
Barium Fluoride -----	131
Barium Hydrate -----	40
Barium Hydroxide (Octahydrate) -----	40
Barium Nitrate -----	173
Barium Octahydrate -----	40
Be -----	59
Benzene (Benzol) -----	316
Benzene Carbinol -----	536
Benzene Methanol -----	536

	<u>MSDS#</u>		<u>MSDS#</u>
Benzenamine -----	407	BN (Boron Nitride) -----	113
Benzenecarbonyl Chloride -----	459	B2O3 (Boron Nitride) -----	143
Benzenecarboxylic Acid -----	402	Boletic Acid -----	545
1,4-Benzenedicarboxylic Acid --	443	BORAX Pentahydrate -----	112
1,2-Benzenedicarboxylic Acid		BORDEN FM 203W -----	1168
Anhydride -----	417	Boric Acid -----	4
1,2-Benzenedicarboxylic Acid,		Boric Acid, Anhydrous -----	143
Dimethyl Ester -----	430	Boric Anhydride -----	143
1,4-Benzenedicarboxylic Acid,		Boric Oxide -----	143
Dimethyl Ester -----	404	2-Bornanone -----	531
1,2-Benzenedicarboxylic Acid,		Boroethane -----	103
Monopotassium Salt -----	475	Boron Hydride -----	103
1,2-Benzenedicarboxylic Di-2-		Boron Nitride Powder -----	113
propenyl Ester -----	527	Boron Oxide -----	143
Benzene Tetrahydride -----	516	Boron Sesquioxide -----	143
Benzoic Acid -----	402	BORON Solvent VM&P Naphtha 2429	391
Benzoyl Chloride -----	459	Boron Trifluoride -----	91
Benzoyl Methide -----	567	Bottom Ash -----	155
Benzoyl Peroxide, Dry -----	500	BR-123 PRIMER -----	1126A
Benzoyl Superoxide -----	500	Brazing Alloy (Ag/Cd/Zn/Cu) ---	41
Benzyl Alcohol -----	536	Brazing Flux, Acid Fluoride ---	1144
Benzylidimethylamine -----	326	BrF5-----	172
BERYLCO #10 -----	32	Brimstone -----	56
Beryllium-Copper Alloy -----	165	Bromine -----	77
Beryllium Copper (Be-Cu) Alloy	165	Bromine Pentafluoride-----	172
Beryllium, Metal/Powder -----	59	Bromine Pentafluoride (DOT)----	172
BF3 -----	91	Bromobenzene -----	564
BZH6 -----	103	BRULIN 815 MX -----	1158
B10H14 -----	104	BRULIN 815 QR -----	1159
BHT -----	456	Bunker "C" -----	474
Bi -----	60	Bunker Fuel -----	473
Bibenzene -----	451	1-Buranamine -----	569
Bichromate of Potash-----	168	1,3-Butadiene -----	463
Bichromate of Soda -----	153	Butane-1 -----	485
Bicyclo (4.4.0) Decane -----	563	1,4-Butanediol -----	485
Biethylene -----	463	Butane, Liquefied Gas -----	481
Biphenyl -----	451	1,4-Butanedicarboxylic Acid ---	400
Biphenyl-Biphenyloxide,		1,3-Butanediol -----	362
Eutectic Mixture -----	1076	1,4-Butanediol -----	485
Bis(2-Aminoethyl)Amine -----	1034	n-Butanethiol -----	504
N,N'-Bis (2-Aminoethyl)-		Butanoic Acid -----	553
ethylenediamine -----	1035	2-Butanol-----	578
Bis(p-Aminophenyl)Methane -----	346	Butanol, 1-Butanol or	
Bis(2-Chloroethyl) Ether -----	571	n-Butanol -----	337
2,6-Bis (1,1,-Dimethylethyl)-		2-Butanol or sec-Butanol -----	442
4-Methylphenol -----	456	t-Butanol -----	497
Bis(2-Ethoxyethyl) Ether -----	565	Butanone or 2-Butanone -----	303
Bis(2-Ethylhexyl)Phthalate ---	414	2-Butanone Peroxide -----	329A
Bis(Hydroxyethyl)Amine -----	426	Butenedioic Acid, (E) -----	545
Bismuth, Metal/Powder -----	60	trans-Butenedioic Acid -----	545
2,2-Bis(4 Hydroxyphenol)Propane	369	cis-Butenedioic Anhydride -----	438
Bisphenol A -----	369	2-Butoxy Ester -----	519
Bisphenol A Diglycidyl Ether --	335B	2-Butoxyethanol -----	320
Bisphenol-A/epichlorohydrin ---	559	2-(2'-Butoxyethoxy) Ethanol ---	322
Bituminous Coal Dust -----	491	2(2'-Butoxyethoxy) Ethanol ----	322
Bivinyl -----	463	Acetate -----	368
BIWAX 142-C (Part B) -----	1091B	n-Butyl Acetate or	
142-R (Part A) -----	1091A	Butyl Acetate -----	338
BLACO-PER -----	313	Butyl Acrylate -----	547
BLACO-THANE -----	311	i-Butyl Alcohol -----	398
BLACO-TRI -----	312	n-Butyl Alcohol, Butyl Alcohol or	
BLACO-TRON TF -----	314	1-Butyl Alcohol -----	337
BLANKROLA SOLVENT -----	1063	sec-Butyl Alcohol -----	442
Bleach Solution -----	115	n-Butyl Aldehyde -----	542
BLUE GOLD -----	1160	n-Butylamine -----	569
Bluestone -----	29	Butylated Hydroxy Toluene ----	456
Blue Vitriol -----	29	n-Butyl carbinol -----	506

MSDS#

Butyl CARBITOL -----	322
Butyl CARBITOL Acetate -----	368
4-tert-Butylcatechol or p-t-Butylcatechol -----	421
Butyl CELLOSOLVE -----	320
4-t-Butyl-1,2-Dihydroxybenzene	421

Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

Butyl DIOXITOL -----	322
1,3-Butylene Glycol (or b-Butylene Glycol) -----	362
1,4 Butylene Glycol -----	485
1,3-Butylene Glycol Dimethy- acrylate -----	1106
S.B.A., Butylene Hydrate -----	442
1-Butyl Ethanoate -----	338
o-Butyl Ethylene Glycol -----	320
Butyl Ethyl Ketone -----	306
Butyl Glycol -----	320
4-t-Butyl-1-Hydroxybenzene ----	422
Butyl Mercaptan -----	504
n-Butyl Methacrylate -----	554
Butyl 2-Methacrylate -----	554
n-Butyl Methyl Ketone -----	425
Butyl 2-Methyl-2-Propenoate ---	554
Butyl OXITOL -----	320
t-Butyl Perbenzoate (or Peroxybenzoate) -----	406
4-t-Butylphenol or p-tertiary-Butylphenol -----	422
Butyl 2-Propenoate -----	547
t-Butylpyrocatechol -----	421
Butyl Sulphydrate -----	504
Butyral -----	542
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CAS = Chemical Abstract Services
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Note: Some older Genium Sheets have
CAS numbers in an XXX XXX XXX format.
The ACS format is preferred and is
the current practice.

000050 00 0 -----	360
000050 21 5 -----	546
000056 23 5 -----	410
000057 11 4 -----	415
000057 13 6 -----	528
000060 29 7 -----	343
000060 34 4 -----	552
000062 53 3 -----	407
000064 17 5 -----	361
000064 18 6 -----	416
000064 19 7 -----	327
000065 85 0 -----	402
000067 56 1 -----	354
000067 63 0 -----	324
000067 64 1 -----	300
000067 66 3 -----	315
000067 68 5 -----	428
000068 11 1 -----	574
000068 12 2 -----	424

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000070	55 3 ----- 1068	000095	47 6 ----- 318A
000071	23 8 ----- 494	000095	48 7 ----- 560
000071	36 3 ----- 337	000095	50 1 ----- 358
000071	41 0 ----- 506	000096	14 0 ----- 397A
000071	43 2 ----- 316	000096	22 0 ----- 478
000071	55 6 ----- 311	000096	33 3 ----- 551
000074	82 8 ----- 440	000096	33 3 ----- 551
000074	85 1 ----- 457	000096	45 7 ----- 423
000074	86 2 ----- 403	000097	88 1 ----- 554
000074	87 3 ----- 373	000097	99 4 ----- 520
000074	93 1 ----- 465	000098	00 0 ----- 479
000074	98 6 ----- 380	000098	01 1 ----- 413
000075	00 3 ----- 538	000098	29 3 ----- 421
000075	01 4 ----- 382	000098	54 4 ----- 422
000075	04 7 ----- 540	000098	82 8 ----- 395
000075	05 8 ----- 499	000098	86 2 ----- 567
000075	07 0 ----- 535	000098	88 4 ----- 459
000075	08 1 ----- 510	000098	95 3 ----- 439
000075	09 2 ----- 310	000099	87 6 ----- 557
000075	12 7 ----- 390	000100	21 0 ----- 443
000075	15 0 ----- 350	000100	41 4 ----- 385
000075	19 4 ----- 529	000100	42 5 ----- 351
000075	20 7 ----- 78	000100	51 6 ----- 536
000075	21 8 ----- 433	000101	02 0 ----- 411
000075	31 0 ----- 483	000101	14 4 ----- 372
000075	36 5 ----- 452	000101	68 8 ----- 1105
000075	44 5 ----- 66	000101	77 9 ----- 346
000075	45 6 ----- 307	000102	71 6 ----- 427
000075	52 5 ----- 508	000103	11 7 ----- 345
000075	65 0 ----- 497	000103	83 3 ----- 326
000075	69 4 ----- 309	000104	76 7 ----- 367
000075	83 2 ----- 397A	000105	46 4 ----- 519
000075	71 8 ----- 308	000105	60 2 ----- 580
000076	03 9 ----- 524	000106	35 4 ----- 306
000076	13 1 ----- 314	000106	46 7 ----- 514
000076	14 2 ----- 572	000106	68 3 ----- 480
000076	22 2 ----- 531	000106	92 3 ----- 576
000077	73 6 ----- 340	000106	93 4 ----- 492
000077	78 1 ----- 344	000106	98 8 ----- 481
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000078	59 1 ----- 357	000107	05 1 ----- 374
000078	79 5 ----- 341	000107	06 2 ----- 359
000078	83 1 ----- 398	000107	13 1 ----- 381
000078	92 2 ----- 442	000107	15 3 ----- 325
000078	93 3 ----- 303	000107	18 6 ----- 505
000079	01 6 ----- 312,	000107	21 1 ----- 323
	1156	000107	31 3 ----- 432
000079	06 1 ----- 577	000107	83 5 ----- 397A
000079	10 7 ----- 449	000107	87 9 ----- 305
000079	20 9 ----- 503	000107	88 0 ----- 362
000079	24 3 ----- 436	000107	98 2 ----- 522
000079	27 6 ----- 562	000108	01 0 ----- 566
000079	29 8 ----- 397A	000108	05 4 ----- 509
000079	46 9 ----- 448	000108	10 1 ----- 304
000080	05 7 ----- 369	000108	20 3 ----- 541
000080	62 6 ----- 441	000108	21 4 ----- 496
000084	74 2 ----- 429	000108	24 7 ----- 434
000085	42 7 ----- 482	000108	31 6 ----- 438
000085	44 9 ----- 417	000108	32 7 ----- 447
000087	61 6 ----- 365	000108	83 8 ----- 501
000087	86 5 ----- 517	000108	86 1 ----- 564
000088	89 1 ----- 534	000108	88 3 ----- 317
000088	19 7 ----- 1068	000108	90 7 ----- 366
000090	72 2 ----- 378	000108	91 8 ----- 537
000091	17 8 ----- 563	000108	93 0 ----- 489
000091	66 7 ----- 348	000108	94 1 ----- 301

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000109	60 4	515
000109	66 0	523
000109	73 9	569
000109	79 5	504
000109	86 4	352
000109	89 7	453
000109	94 4	502
000109	99 9	379
000110	17 8	545
000110	19 0	396
000110	43 0	302
000110	46 3	575
000110	49 6	526
000110	54 3	397
000110	63 4	485
000110	80 5	319
000110	82 7	389
000110	83 8	516
000110	86 1	405
000110	91 8	356
000111	15 9	321
000111	30 8	548
000111	40 0	1034
000111	41 1	555
000111	41 1	555
000111	42 2	426
000111	44 4	571
000111	69 3	549
000111	76 2	320
000111	90 0	460
000112	24 3	1035
000112	34 5	322
000112	36 7	565
000115	10 6	342
000115	27 5	339
000115	28 6	511
000115	86 6	333
000117	81 7	414
000120	61 6	404
000120	92 3	570
000121	44 8	392
000121	69 7	347
000122	39 4	461
000123	42 2	353
000123	54 6	556
000123	72 8	542
000123	75 1	498
000123	73 9	578
000123	86 4	338
000123	91 1	412
000124	04 9	400
000124	17 4	368
000124	38 9	54
000126	73 8	521
000127	18 4	313
000127	19 5	458
000128	37 0	456
000128	39 2	1208
000131	11 3	430
000131	17 9	527
000138	87 4	493
000140	31 8	408
000141	32 2	547
000141	43 5	418
000141	78 6	437
000141	79 7	454

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000142	82 5	464, 1275
000143	39 9	58
000144	62 7	328
000150	76 5	455
000151	50 8	13
000302	01 2	126
000464	49 3	531
000504	29 0	568
000513	77 9	119
000497	19 8	48
000527	60 6	581
000540	84 1	383
000544	92 3	12
000546	93 0	97
000552	30 7	330
000557	05 1	444
000563	80 4	466
000576	26 1	561
000584	84 9	331
000586	81 2	493
000591	78 6	425
000598	62 9	135
000614	45 9	406
000628	63 7	487
000630	08 0	35
000631	61 8	139
000864	66 2	435
000872	50 4	431
000877	24 7	475
000999	97 3	513
001010	97 0	37
001189	08 8	1106
001300	71 6	409A
001303	86 2	143
001305	62 0	39
001305	78 8	22
001306	06 5	137
001306	19 0	133
001309	37 1	175
001309	48 4	94
001309	64 4	28
001310	02 7	31
001310	58 3	2
001310	73 2	3, 3A
001312	81 8	145
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001314	36 9	134
001314	62 1	88
001317	36 8	38
001317	38 0	158
001317	39 1	157
001317	65 3	1082
001318	33 8	112
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Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

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001330 20 7	----- 318	007646 85 7	----- 18
001330 78 5	----- 332	007647 01 0	----- 30, 30A
001332 21 4	----- 15A	007664 38 2	----- 8
001333 74 0	----- 65	007664 39 3	----- 6
001333 82 0	----- 5	007664 41 7	----- 1
001333 86 4	----- 51	007664 93 9	----- 9
001333 86 4	----- 51	007681 49 4	----- 138
001336 21 6	----- 1A	007697 37 2	----- 7
001338 23 4	----- 329	007704 34 9	----- 56
001341 49 7	----- 49	007705 08 0	----- 19
001344 09 8	----- 99	007719 09 7	----- 86
001344 28 1	----- 1000, 1197	007719 12 2	----- 110
001344 67 8	----- 121	007720 78 7	----- 57
001592 23 0	----- 445	007722 64 7	----- 95
001633 05 2	----- 120	007722 84 1	----- 44A, B
002050 92 2	----- 582	007723 14 0	----- 25
002551 62 4	----- 27	007726 95 6	----- 77
004094 36 0	----- 500	007727 37 9	----- 61
005329 14 6	----- 72	007727 54 0	----- 33
005970 45 6	----- 550	007733 02 0	----- 96
006484 52 2	----- 79	007758 95 4	----- 150
006834 92 0	----- 85	007758 98 7	----- 29
006846 50 0	----- 1039	007758 99 8	----- 29
007429 90 5	----- 100	007761 88 8	----- 81
007439 96 5	----- 148	007772 99 8	----- 67
007439 97 6	----- 26	007778 50 9	----- 168
007439 98 7	----- 84	007778 54 3	----- 68
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007440 16 6	----- 147	007782 49 2	----- 136
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007440 28 0	----- 80	007783 05 3	----- 9A
007440 29 1	----- 76	007783 06 4	----- 52
007440 31 5	----- 74	007784 42 1	----- 178
007440 32 6	----- 166	007785 87 7	----- 151
007440 36 0	----- 70	007789 09 5	----- 129
007440 37 1	----- 64	007789 12 0	----- 153
007440 41 7	----- 59	007789 24 4	----- 105
007440 43 9	----- 23, 154	007789 30 2	----- 172
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007446 08 4	----- 152	008000 41 7	----- 493
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007446 20 0	----- 96	008001 26 1	----- 476
007447 39 4	----- 121	008002 09 2	----- 484
007488 55 3	----- 14	008004 13 5	----- 1076
007546 30 7	----- 146	008006 39 1	----- 493
007550 35 8	----- 149	008006 61 4	----- 467
007553 56 2	----- 114	008006 61 9	----- 1280
007580 67 8	----- 160	008006 64 2	----- 375
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007601 90 3	----- 102	008014 95 1	----- 9A
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007631 99 4	----- 101	008030 31 7	----- 530
007632 00 0	----- 116	008032 32 4	----- 530
		008050 09 7	----- 377
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009002 89 5 -----	539
009002 93 1 -----	1291
009004 34 6 -----	507
009004 35 7 -----	532
009005 25 8 -----	472
009005 90 7 -----	375
009014 63 5 -----	377
010022 31 8 -----	173
010022 68 1 -----	171
010024 92 2 -----	109
010025 87 3 -----	117
010026 04 7 -----	106
010028 15 6 -----	34
010031 43 3 -----	174
010042 76 9 -----	159
010043 01 3 -----	92
010043 11 5 -----	113
010043 35 3 -----	4
010043 52 4 -----	141
010045 94 0 -----	169
010101 39 0 -----	55
010101 97 0 -----	37
010102 44 0 -----	47
010108 64 2 -----	144
010421 48 4 -----	142
011130 12 4 -----	112
011135 81 2 -----	16
012070 12 1 -----	123
012125 11 8 -----	111
012125 02 9 -----	21
012230 71 6 -----	40
013093 70 1 -----	161
013933 17 0 -----	118
013478 00 7 -----	20
013494 80 9 -----	108
013746 66 2 -----	140
013775 80 9 -----	10
013933 17 0 -----	121
014708 14 6 -----	128
014808 60 7 -----	71
016721 80 5 -----	87
016893 85 9 -----	31
016940 66 2 -----	93
016961 83 4 -----	89
017194 00 2 -----	40
017702 41 9 -----	104
019287 45 7 -----	103
021368 68 3 -----	531
021908 53 2 -----	170
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025068 38 6 -----	335, 335B
025134 21 8 -----	1062
025322 68 3 -----	364
026027 38 3 -----	1094
026444 49 5 -----	450, 1081
026444 72 4 -----	378
026590 20 5 -----	1091B
027323 18 8 -----	1200
030525 89 4 -----	462
032612 48 9 -----	490
032718 56 2 -----	526
050922 29 7 -----	1130
061790 12 3 -----	495
061790 53 2 -----	69
063231 67 4 -----	1253
064741 88 4 -----	1264
064741 89 5 -----	1264
064742 46 7 -----	525
064742 73 0 -----	1274
064748 89 8 -----	530
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068476 33 5 -----	473
068476 34 6 -----	470
068553 00 4 -----	474
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Caustic Baryta -----	40
Lime -----	39
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<p>Can't find the material you need? Genium recommends that you contact the manufacturer of the material.</p>	
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Chlorendic Anhydride -----	339
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Cyclohexanone -----	301
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D

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Diatomite -----	69
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Diborane -----	103
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N,N-Diethylaniline -----	348
Diethyl Carbitol -----	565
Diethylenedioxiide -----	412
Diethylene Glycol n-Butyl Ether -----	322
Diethylene Glycol Ether -----	565
Diethylene Glycol Monobutyl Ether -----	322
Diethylene Glycol Monobutyl Ether Acetate -----	368

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Diethylene Glycol Monoethyl Ether	460
Diethylene Oxide	379
Diethylenetriamine	1034
N,N-Diethyl Ethanamine	392
Diethyl Ether	343
Di(2-Ethylhexyl) Phthalate	414
Diethyl Kerone	478
Diethylolamine	426
Diethyl Oxide	343
Diethyl Phthalate	435
DIFFERENTIATED KLARIFIANT	1020
Difluorochloromethane	307
Diglycidyl Bisphenol-A Ether	335B
1,4-Dihydroxybutane	485
b,b'-Dihydroxydiethylamine	426
Diisobutyl Ketone	501
Diisopropyl	397A
Diisopropyl Ether	541
Diisopropyl Oxide	541
sym-Diisopropylacetone	501
N,N-Dimethyl Acetamide	458
Dimethacrylate Ester of 1, 3-Butanediol	1106
Dimethylacetone	478
Dimethylamide Acetate	458
(Dimethylamino) Benzene	347
Dimethylamino Ethanol	566
N-Dimethylamino Ethanol	566
N,N-Dimethylamino Ethanol	566
2-Dimethylamino Ethanol	566
-Dimethylaminoethyl Alcohol	566
c-Dimethylaminotoluene	326
N,N-Dimethylaniline	347
Dimethylbenzene	318
1,2-Dimethylbenzene	318A
1,3-Dimethylbenzene	318B
1,4-Dimethylbenzene	318C
N,N-Dimethylbenzylamine	326
2,2- and 2,3-Dimethylbutane	397A
Dimethyl Carbinol	324
Dimethylenediamine	325
1,1-Dimethylethanol	497
Dimethylethanolamine	566
N,N-Dimethylethanolamine	566
Dimethyl Ether	342
Dimethylformaldehyde	300
N,N-Dimethylformamide	424
2,6-Dimethyl-4-Heptanone	501
N,N-Dimethyl-2-Hydroxyethylamine	566
Dimethylketal	300
Dimethyl Ketone	300
Dimethylnitromethane	448
2,6-Dimethylphenol	561
Dimethyl Phthalate	430
Dimethyl p-Phthalate	404
Dimethyl Silicone Fluid	349
Dimethyl Sulfate (DMS)	344
Dimethyl Sulfoxide	428
Dimethyl Terephthalate	404
Di-n-butyl Phthalate	429
Dinitrogen Tetroxide	47
Diocetyl Phthalate	414
4-Diol	485
Diolamine	426
1,4-Dioxane	412

	MSDS#
DIOXITOL	460
1,3-Dioxolan-2-one, 4 Methyl	447
Dioxonium Perchlorate	102
DIPE	541
Diphenyl	451
Dipentylamine	582
Diphenylamine	461
Diphenyl-Diphenyloxide, Eutectic Mixture	1076
Diphenyl Methane Diisocyanate	1202A
4,4'-Diphenylmethane Diisocyanate	1105
Disodium Hexafluorosilicate	31
Disodium Dichromate	153
Disodium Salt	153
Disulfuric Acid	9A
2,6-Di-t-Butyl-4-Hydroxytoluene	456
2,6-Di-t-Butyl-p-Cresol	456
2,6-Di-t-Butyl-p-Methylphenol	456
2,6-Di-t-butylphenol	1208
Dithiocarbonic Anhydride	350
Divinyl	463
DL-Lactic Acid	546
DMA	458
DMAC	458
DMF or DMFA	424
DMP	430
DMP-30	378
DMSO	428
DMT	404
DOLPH CW-340-1	1147
DOLPH T-200X (xylene)	1148
"DOP"	414
DOT I.D. No. (see UN No.)	
DOWANOL DB	322
DE	460
EB	320
EE	319
EM	352
PM	522
DOW CORNING GP-77 VARNISH	1171
DOW CORNING 200	349
561	349
DOW CORNING 994 VARNISH	1289
DOW CORNING 997 VARNISH	1290
DOW CORNING 1090 VARNISH	1169
DOWFLAKE	141
DOWTHERM A	1076
DOWTHERM G	1215
DOWTHERM J	1262
DOW Vinyltoluene, Grades T12 and T50	336
DPA	461
DRAKE Special VM&P 2429	391
Dry Ice	54
Dumasin	570
Duplicating Toners (Xerox)	1028
DUPONT Y-469-D PIGMENT	1124
DURITE LD 5102	1103
Dust, Wood	376
1,4-Dyeyarobutane	549
DYKEM LAYOUT FLUIDS	1154
DYKEM REMOVER AND THINNER	1153

E

	<u>MSDS#</u>
EA934 A&B -----	1011A, B
EAA -----	553
EAGLE #20 (PbO) -----	38
EAK -----	480
Eastman 910 Adhesive -----	1219
EASY-FLO 45, Brazing Alloy ----	41
ECCOSTRIP 93 -----	1033
EDE -----	492
Electrical Insulating Oil ----	393
ELECTRO-BRITE NAZ-32 -----	1166
ELECTRO-BRITE Z-200 -----	1155
Electrocleaner, Alkaline -----	1185
Electroless copper solutions (see CUPOSIT) -----	
Elvanol -----	539
EMERSOL 132 and 153 -----	415
EMTAL 42 and 500 -----	42
Emulsifier (MAKON NF-5) Alkoxyated Alkanolamide-type	1122
Enamel, Alkyd Resin, Green (Exempt Solvent) (Deere & Co. JDM F2A2) -----	1174
ENDOX 114 -----	1230
ENSTRIP A -----	1145
Epichlorohydrin/Bisphenol A-type Diepoxide Resin, Unmodified: Liquid, Epoxy Equiv. Wt. 175-195 -----	335B
Solid, Epoxy Equiv. Wt. 900-1000 -----	335
Liquid Solution -----	1128
EPI-CURE 855 -----	1269
EPI-CURE 856 -----	1074
EPI-REZ 509 -----	335B
EPI-REZ 510 -----	335B
EPI-REZ 530C -----	335
EPOCAST 2226B -----	1101
EPOLON 22 BLACK MASTIC (A & B)	1221
EPON Curing Agent D -----	1027B
Curing Agents V-15, V-25, V-40 -----	394
826 and 828 Resin -----	335B
829 Resin -----	1128
1004 Resin -----	335
EPOTUF 37-139 -----	335B
37-140 -----	335B
37-304 -----	335
EPORAL -----	1036
Epoxy Adhesive, 2-part Solventless -----	1177
Epoxy Bond Coat, #946 -----	1129
1,4-Epoxybutane -----	379
Epoxy Curing Agent, Liquid: Acid Anhydride Type -----	1101
Amido-Amine Type -----	1074
Polyamide Type -----	394
3,4-Epoxyhexylmethyl-3,4- epoxyhexylmethylcarboxylate --	386
1,2-Epoxyethane -----	433
Epoxy Putty (ASTRO 3069) -----	1072A, B

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Epoxy Resin: Asbestos-Filled Paste -----	1027
Coating Powder with curing agent -----	1179
Curing Agent -----	558
Cycloaliphatic, Liquid -----	386
Filled -----	1027A
Hydrated Alumina-Filled Liquid -----	1091A
Liquid and Curing Agent (2 part) -----	1181, 1189, 1190
Liquid, Dyed Green(GE 2PV-32)	1089
Liquid, w/Hardner -----	1025, 1026
Liquid, w/Hardner, thixotropic -----	1191
Liquid, Uncured -----	559
Modified, Film Form with Curing Agent -----	1126B
Modified, Solution of -----	1126A
Solution -----	1128, 1129
Epoxy Resin, Unmodified (Epi- chlorohydrin/Bisphenol A-Type): Liquid, Epoxy Equivalent Wt. 175-195 -----	335B
Solid, Epoxy Equivalent Wt. 900-1000 -----	335
EPOXY VARNISH 74023 -----	1026
Epoxy Varnish, Amido-Amine Hardner, Solventless -----	1075

Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

ERL 4221 -----	386
Erythrene -----	463
1,2-Ethanediamine -----	325
Ethanedioic Acid -----	328
1,2-Ethandiol -----	323
Ethanenitride -----	499
Ethanethiol -----	510
Ethanoic Acid -----	327
Ethanoic Anhydride -----	434
Ethanol -----	361, 535
Ethanolamine -----	418
Ethanol, Denatured -----	1073, 1242
Ethanol, Specially Denatured --	579
Ethanoyl Chloride -----	452
Ethene -----	457
1,2-Ethenedicarboxylic Acid, trans. -----	545
Ethenylbenzene -----	351
Ethenyl Ethanoate -----	509
Ethenyl Trichloride -----	312
Ether -----	343
Ethoxyethane -----	343
2-Ethoxyethanol -----	319
1-Ethoxy-2-(-Ethoxyethoxy) Ethane -----	565
2-Ethoxyethyl Acetate -----	321

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2-(2-Ethoxyethoxy)Ethanol -----	460
ETHYL 701 -----	1208
Ethyl Acetate -----	437
Ethyl Acetic Ester -----	437
Ethyl Acetoacetate -----	553
Ethyl Acetone -----	305
Ethyl Acetyl Acetate -----	553
Ethyl Acetylacetonate -----	553
Ethyl Alcohol -----	361
Ethyl Alcohol, Denatured -----	1073, 1242
Ethylaldehyde -----	535
Ethylamine -----	540
Ethyl Amyl Ketone -----	480
ETHYL ANTIOXIDANT 701 -----	1208
Ethyl Benzene (Ethyl Benzol) --	385
Ethyl Butyl Ketone or	
Ethyl n-Butyl Ketone -----	306
Ethyl Carbinol -----	494
Ethyl Chloride -----	538
Ethylene -----	457
ETHYLENE/ACRYLIC COPOLYMER,	
ELASTOMERIC -----	1104
Ethylene Aldehyde -----	573
Ethylenecarboxamide -----	577
Ethylene Carboxylic Acid -----	449
Ethylenediamine -----	325
Ethylene Dibromide -----	492
trans-1,2-Ethylenedicarboxylic	
Acid -----	545
Ethylene Dichloride -----	359
Ethylene Dipropionate -----	578
Ethylene Glycol -----	323
Ethylene Glycol Ethers:	
n-Butyl (or Monobutyl) Ether -	320
Ethyl (or Monoethyl) Ether ---	319
Ethyl Ether Acetate -----	321
Methyl (or Monomethyl) Ether -	352
Methyl Ether Acetate -----	526
Ethylene Oxide -----	433
Ethylene Propionate -----	578
Ethylene Tetrachloride -----	313
ETHYLENE THIOUREA (ETU) -----	1187
Ethylene Trichloride -----	312
N-Ethyl-Ethanamine -----	453
Ethyl Ethanoate -----	437
Ethyl Ether -----	343
Ethyl Formate -----	502
2-Ethylhexanol (2-Ethyl-1-	
hexanol) -----	367
2-Ethylhexyl Acrylate -----	345
Ethylhexyl Alcohol -----	367
2-Ethylhexyl-2-Propenoate -----	345
Ethyl Hydrosulfide -----	510
Ethylidenlactic Acid -----	546
Ethyl Mercaptan -----	510
Ethyl Methanoate -----	502
Ethyl Methyl Ketone -----	303
Ethyl Orthosilicate -----	446
Ethyl Oxide -----	343
Ethyl-3-Oxobutanoate -----	553
Ethyl-3-Oxobutyrate -----	553
Ethyl Silicate -----	446
Ethyl Sulphydrate -----	510
Ethyne -----	403
EVANS 7050 HOT MELT -----	1097
(No longer commercially available)	
EXPRAY-541 -----	1186

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EXXON AROMATIC #100 -----	1061
#150 -----	1061A
VM&P Naphtha -----	391
F	
FACTOQUENCH 74 -----	1067
FC 11 -----	309
12 -----	308
22 -----	307
113 -----	314
FC12CCCIF2 -----	314
FEL PRO C-102 -----	1225
FEL309 -----	142
FeN309 -----	142
FEP -----	1010
Ferric Chloride 42oBe -----	19
FeCl3 -----	19
Ferric Nitrate -----	142
Ferric Oxide -----	175
Fe2O3 -----	175
Ferric Perchlorate -----	19
FeSO4 7H2O -----	57
Ferric Trichloride -----	19
FERRO Naphthenate 6% Cobalt ---	363
24% Lead -----	384
Ferrous Sulfate Heptahydrate --	57
Fibrous Glass (Fiberglass) ----	46
Film, Adhesive, Modified Epoxy	
Resin with Curing Agent -----	1126B
FIREX RX-2373 -----	1189
Flaxseed Oil -----	476
FLEXISEAL, 2-Part Polysulfide	
Sealant -----	1102A, 1102B
Flint -----	71
Flour, Wood -----	376
Flowers of Sulfur -----	56
Flowers of Zinc -----	45
Fluorinated Ethylene Propylene	
Copolymer (FEP) -----	1010
Fluorocarbon 11 -----	309
12 -----	308
22 -----	307
113 -----	314
Fluoroelastomer Gum, Unfilled -	1107
FLUOROLUBE OIL -----	388
FLUOROLUBE S-30 -----	388
Fluorosilicic Acid -----	89
Fluorotrichloromethane -----	309
Fluosilicic Acid -----	89
Flux, Activated-Rosin	
(KESTER 197) -----	1022
Flux, ALPHA 811 -----	1050
Flux, ALPHA 815 -----	1079
Flux, ALPHA MELROSE 611 -----	1080
FM-123-5 ADHESIVE FILM -----	1126B
FM 203W Catalyst Powder -----	1168
Formagene -----	462
Formaldehyde, Aqueous -----	360
Formalin (37-50%) -----	360
Formamide -----	390
Formic Acid -----	416
Ethyl Ester -----	502
FORNVAR 12/85 and 85T, 5/95E,	
6/95E, 15/95E and 95SS -----	399

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FORMVAR/Phenolic Wire Enamel	1040
FREON	572
11	309
12	308
22	307
30	310
113	314
MF	309
TE & FREON TES	1213
TF	314
TMC	1212
TMS	1211
FREUND 6060 GLUE	1134
FRIGEN 113 TR-T	314
Fuel Oil Additive, Mn-Based	1196
Fuel Oil No. 1	468
Fuel Oil No. 2	469
Fuel Oil (Diesel) No. 2-D	470
Fuel Oil No. 5	473
Fuel Oil No. 6	474
Fumaric Acid	545
Fumed Silica	1064
Fuming Sulfuric Acid	9A
2-Furaldehyde	413
2-Furancarbonsal	413
2,5-Furandione	438
Furanidine	379
2-Furan Methanol	479
Furfural	413
Furfural Alcohol	479
Furfuraldehyde	413
Furfuryl Alcohol	479
Furnace Black	51
2-Furylcarbinol	479
FYRQUEL 150 R+0	1282
FYRQUEL 550	1175

G

GALAXY THREAD CUTTING OILS	1099
Gasoline, Lead-free	467
GE A50A262, Epoxy Varnish	1075
GE MU-124	1025
GE RTV-577, Polymer	1006
GE RTV-9811, Curing Agent	1007
GE RTV Grades (One Component, Acetoxy-Cure)	1142
GE SF-96, SF-97	349
GE SS-4004, Primer	1008
GE SS-4155 Primer	1151

Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

GE 2PV-4, Hand Cleaner	1088
GE 2PV-32, Epoxy Resin	1089
GE 10 and 10C Oils (Discontinued Designation)	393
GE 1500 Thinner	1173
GE 9522 and 9637 (ALKANEX Varnish)	1163
GE 73039 Wire Enamel	1040

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GE 73156 Wire Enamel	1005
GE 73517, PERMAFIL Polyester	1024
GE 74023 Epoxy Varnish	1026
GE 113011 (Parts A & B)	1072A, B
GELVATOL	539
GENAL (see PLENCO)	1254, 1254A
GENEPOXY 925	335
GENESOLV D	314
GENETRON 11	309
12	308
22	307
113	314
114	572
141	307
GETTY A-150	1286
GETTYSOLVE B	1274
GETTYSOLVE C	1275
GLASKYD 1901	1279
Glass Fiber	46
GLUCINIUM	59
GLUCINUM	59
Glue, 6060, Emulsion-Type	1134
Glutaral, 1,5-Pentanedial	548
Glutaraldehyde	548
Glycidal Ethers	559
Glycol	323
Glycol Butyl Ether	320
Glycol Monoethyl Ether	319
GLYPTAL C-1103	1194
GLYPTAL C.E. 514	1192
GLYPTAL 1500 Alkyd Thinner	1173
GLYPTAL 7815	1193
GORSENOL	539
Grain Alcohol	361
Green Vitriol	57
Gum Rosin	377

H

H2	65
H2-3404, HYSOL TETA	1035
H2-3416, HYSOL DETA	1034
Halocarbon Solvent Blend	1170
HAND CLEANER, GE 2PV-4	1088
HANDY FLUX	1144
HASTALLOY "X"	164
HATCOL-101	414
HAVILAND ND 68G ETCH	1041
H3BO3	4
He	98
HEC (Hydroxyethyl Cellulose)	401
Helium	98
Heptane	464
n-Heptane	464
2-Heptanone	302
3-Heptanone	306
1,4,5,6,7,7-Hexachlorobicyclo (2.2.1) 5-heptene-2,3-dicarboxylic Anhydride	339
HERCO Pine Oil	484
HET Acid	511
Hexachloroendomethylenetetrahydrophthalic Acid	511
Hexachloroendomethylenetetrahydrophthalic Anhydride	339

MSDS#	MSDS#
Hexafluoropropylene-Vinylidene Fluoride Copolymer ----- 1107	Hydrogen Arsenide ----- 178
Hexafluorosilicic Acid ----- 89	Hydrogen Borate ----- 4
Hexahydroaniline ----- 537	Hydrogen Carboxylic Acid ----- 416
Hexahydro-2H-Azepin-2-One ----- 580	Hydrogen Chloride, Anhydrous -- 30
Hexahydro-2-Azepinone ----- 580	Hydrogen Fluoride ----- 6
Hexahydrobenzene ----- 389	Hydrogen Fluoride, Anhydrous -- 6
Hexahydrophenol ----- 489	Hydrogen Gas ----- 65
Hexahydrophthalic Anhydride --- 482	Hydrogen Hexafluorosilicate --- 89
Hexamethyldisilazane ----- 513	Hydrogen Nitrate ----- 7
Hexamethylene ----- 389	Hydrogen Peroxide (60%) ----- 44A
Hexanaphthene ----- 389	Hydrogen Peroxide (27-52%) --- 44B
Hexanedinitrile ----- 549	Hydrogen Phosphate (75-85%) --- 8
Hexanedioic Acid ----- 400	Hydrogen Phosphide ----- 63
Hexanedioic Acid, Dinitrile --- 549	Hydrogen Sulfate ----- 9
Hexane (n-Hexane) ----- 397	Hydrogen Sulfide ----- 52
Hexane Isomers (Other than n-Hexane) ----- 397A	Hydronium Perchlorate ----- 102
6-Hexane Lactam ----- 580	Hydroquinone Monomethyl Ether - 455
2-Hexanone ----- 425	p-Hydroxyanisole ----- 455
Hexanone Isoxime ----- 580	Hydroxybenzene ----- 355
1,6 Hexolactam ----- 580	2-Hydroxy Benzoic Acid ----- 543
Hexone ----- 304	1-Hydroxybutane ----- 337
NF (Hydrogen Fluoride) ----- 6	2-Hydroxybutane ----- 442
Hg ----- 26	Hydroxycyclohexane ----- 489
HgCl2 ----- 146	1-Hydroxyethanecarboxylic Acid 546
Hg(NO3)2 ----- 169	Hydroxyethyl Cellulose ----- 401
HgO ----- 170	-Hydroxyethyl dimethylamine --- 566
NHPA ----- 482	n-Hydroxyethyl-1,2-
HI-POINT 90 ----- 329A	Ethanediamine ----- 555
HI-THERM BC-350 ----- 1184	n-(2-Hydroxyethyl)
HI-SIL ----- 1253	Ethylenediamine ----- 555
HI-TRI ----- 312	n(- -Hydroxyethyl)
HLi ----- 160	Ethylenediamine ----- 555
HMDS ----- 513	2-Hydroxymethylfuran ----- 479
HNO3 ----- 7	4-Hydroxy-4-Methylpentanone-2 - 353
H2O2 ----- 44A, B	1-Hydroxymethyl propane ----- 398
Household Bleach ----- 115	2-Hydroxypropanoic Acid ----- 546
HOT MELT ADHESIVE, EVANS 7050 - 1097	alpha-Hydroxypropionic Acid --- 546
H.S. 188 ----- 163	2-Hydroxypropionic Acid ----- 546
H2S ----- 52	2-Hydroxy-1,2,3-propanetri-
H2S1F6 ----- 89	carboxylic acid ----- 533
H2SO4 ----- 9	Hydroxytoluene (Cresol)----- 409
HTH ----- 68	o-Hydroxytoluene ----- 560
Humiseal 1A20 ----- 1222	-Hydroxytricarballic Acid -- 533
HYCAR 4031-50 ----- 1086	Hypnon ----- 567
Hydrargyrum ----- 26	Hypnone ----- 567
Hydrated Lime ----- 39	Hypochlorite Solution ----- 115
Hydraulic Fluid	HYSOL DK 0295 ----- 1179
(Triaryl Phosphate) ----- 1175	HYSOL EA 934 (Parts A & B) --- 1011A, B
Hydrazine, Anhydrous ----- 126	H2-3404 TETA ----- 1035
Hydrazine, Aqueous ----- 127	H2-3416 DETA ----- 1034
Hydrazine, Methyl ----- 552	PC 17 (Parts A & B) ----- 1255A, B
Hydrazine Monobromide or	PC 18 ----- 1066
Hydrazine Monohydrobromide -- 10	
Hydrazomethane ----- 552	
Hydrobenzene ----- 355	
Hydrocarbon Solvent,	
Light Aliphatic ----- 1280	IBA ----- 398
Hydrochloric Acid ----- 30A	2-Imidazolidinethione ----- 423
Hydrochloric Acid, Anhydrous -- 30	IMIDEX E, 73156 ----- 1005
Hydrochloric Ether ----- 538	IMMUNOL S-6 ----- 1093
Hydroxytoluene (Benzyl	IMKRON M,M, ENAMEL, White (817U) 1117
Alcohol) ----- 536	INCO ----- 164
Hydrofluoric Acid, Anhydrous -- 6	INCONEL ----- 164
Hydrofluoric Acid (47-70%) --- 6A	INDUSTRIAL CLEANER 68-A ----- 1096
Hydrofluosilicic Acid ----- 89	INHIBISOL ----- 311

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Ink Cleaning Solvent -----	1152
Insulating Oil, Electrical ----	393
Insulating Varnish Phenolic resin-modified polyester) ---	1002
Intumescent Coating (2-part epoxy) -----	1189
Iodine -----	114
I2 -----	114
IONOL -----	456
IPA -----	324
IPE -----	541
IPN -----	575
IPS TR 250 (Component A) -----	1202A
IPS TR 250 (Component B) -----	1202B
IR-75 Developer System -----	1049
(6 part) (A to F)	
Iron (III) Chloride -----	19
Iron Nitrate -----	142
Iron (III) Nitrate, Anhydrous -	142
Iron (III) Oxide -----	175
Iron Sesquioxide -----	175
Iron (II) Sulfate -----	57
Iron Trinitrate -----	142
Iron Vitriol -----	57

Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

Isobutenyl Methyl Ketone -----	454
Isobutyl Acetate -----	396
Isobutyl Alcohol (Isobutanol) -	398
Isobutyl Methyl Ketone -----	304
Isocyanate Solution, Pigmented	1127
Isohexane -----	397A
Isobol -----	324
ISOMID "B" -----	1085
[SONEL 31-66 (XV-503) -----	1002
"Isooctane" -----	383
ISOPAR L -----	1259
ISOPAR M -----	1260
Isopentyl Alcohol Nitrite ----	575
Isopentyl Nitrite -----	575
Isophorone -----	357
Isoprene -----	341
Isopropanol -----	324
2-Isopropoxy Propane -----	541
Isopropyl Acetate -----	496
Isopropyl Alcohol -----	324
Isopropyl Amine -----	483
Isopropyl Carbinol -----	398
Isopropyl Ether -----	541
Isopropylbenzene -----	395
4,4-Isopropylidene-bis phenol -	369
4,4-Isopropylidenediphenol ---	369
p,p-Isopropylidenediphenol ---	369
1-Isopropyl-4-Methylbenzene ---	557
4-Isopropyl-1-Methylbenzene ---	557
p-Isopropyltoluene -----	557
ISOTRON 11 -----	309
12 -----	308
22 -----	307
113 -----	314
Isovalerone -----	501

J

MSDS#

J-1345 Basic Zinc Chromate ----	1130
JDM F2A2 GREEN ALKYD RESIN ENAMEL (Exempt Solvent) -----	1174

K

KA12Si3O10(OH)2 -----	24
KANO KROIL -----	1050
KAYNIDE -----	312
KCN -----	13
K2Cr2O7 -----	168
Kerosene (Kerosine) Burner Fuel	488
Kerosene (Kerosine) Solvent ---	387
Kerosine No. 1-K -----	488
2-K -----	488
KESTER 108 THINNER -----	1023
197 RESIN FLUX -----	1022
Ketocyclopentane -----	570
2-Ketohexamethylenimine -----	580
Ketone Propane -----	300
Ketopentamethylene -----	570
Kieselguhr -----	69
Klinger 61 -----	15B
KMnO4 -----	95
KODAFLEX DOP -----	414
KODAFLEX TXIB -----	1039
KODAK Metal Etch Resist (KMER) Developer -----	1204
KODAK Metal Etch Resist Thinner	1201
KODAK Photo Resist Developer --	1203
KODAK Photo Resist, KPR -----	1277
KODAK Photo Resist Thinner, Type 4 -----	1217
KOH -----	2
KPR 4 -----	1217
KROIL -----	1050
KRYLON CRYSTAL CLEAR SPRAY COATING (1300-1305) (Aerosol)	1059
KURIFLOCK PN-147 (Cancelled) --	1119
KURIFLOCK PN-161 -----	1119A
KWICK KASE -----	1045

L

L605 -----	163
LACO M-A Flux (La-Co-M-A Flux)	1018
Lacquer, Wood (MOBIL 2609) ----	1165
Lactic Acid -----	546
DL-Lactic Acid -----	546
LAMINAC 4146 -----	1009
Lanthana -----	145
Lanthanium Sesquioxide -----	145
Lanthanum Oxide -----	145
Lanthanum Trioxide -----	145
La2O2 -----	145
Lanthana -----	145
Lanthanum Oxide -----	145

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Lanthanum Sesquioxide -----	145
Lanthanum Trioxide -----	145
Lard Oil -----	512
Laughing Gas -----	109
Lauryl tri(oxyethyl Sulfate	
Ammonium Salt -----	490
Layout Fluid (DYKEM) -----	1154
Lead Chloride -----	150
Lead (II) Chloride -----	150
Lead Dichloride -----	150
Lead Chloride -----	150
Lead (II) Chloride -----	150
Lead Dichloride -----	150
Lead Monoxide -----	38
Lead Naphthenate Solution ---	384
Lead (II) Oxide -----	38
LECTON ACRYLIC RK6323 &	
RK6327 -----	1060
LiBr -----	149
LiF -----	105
Light Aliphatic Solvent Naphtha	530
Lignite Oil -----	525
Ligroin(e), Light -----	518
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Lime, Hydrated, High Calcium --	39
Lime, Slaked -----	39
Liquefied Petroleum Gas:	
Butane Based -----	481
Propane Based -----	380
Liquid Caustic Soda -----	3A
Liquid Metal (NaK Alloy) -----	16
Linseed Oil, Raw -----	476
Litharge -----	38
Lithium Bromide -----	149
Lithium Bromide -----	149
Lithium Fluoride -----	105
Lithium Hydride -----	160
LORD ACCELERATOR #4 -----	1001B
LPG & LP-Gas -----	380,481
LUCIDOL-98 -----	500
LUNAR CAUSTIC -----	81
LUPERSOL DDM and DELTA-X -----	329
LUPERSOL DDM-9 and DELTA-X9 ---	329A
Lye -----	2, 3
Lye Solution (50%) -----	3A

M

M-A Soldering Flux -----	1018
MAGNAFLUX SKC-NF SPOTCHECK	
CLEANER -----	1031
MAGNAFLUX ZC-7 -----	1031
MAGNAFLUX ZYGLO DEVELOPER	
ZP-9 -----	1071
Magnesia -----	94
Magnesium Carbonate -----	97
Magnesium Oxide -----	94
Magnesium Silicate, Hydrous	
(asbestiform) -----	15A
MAGNUS 26-N -----	1108
92-S -----	1109
215D -----	1111
614 -----	1113
617 -----	1114
763-NF -----	1176

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Water Wash 402 -----	1112
MAGNU-SPRAY 105 -----	1069
MAKON NF-5 -----	1122
Maleic Anhydride -----	438
MALLORY 100 (obsolete) -----	32
Manganese Binoxide -----	122
Manganese Black -----	122
Manganese Carbonate -----	135
Manganese Dioxide -----	122
Manganese Metal/Powder -----	148
Manganese Oxide -----	122
Manganese Sulfate -----	151
Manganese (II) Sulfate -----	151
Manganous Carbonate -----	135
Manganous (II) Sulfate -----	151
MARKEM 320 CLEANER -----	1152
Marsh Gas -----	440
Massicot -----	38
MBK -----	425
MC -----	311
MDA (Methylenedianiline) -----	346
MDI -----	1105
MEA -----	418
MEK (Methyl Ethyl Ketone) -----	303
MEK Peroxide Solution -----	329
MEK Peroxide Solution	
(9wt% max "active oxygen") --	329A
Mequinol -----	455
Mercaptoacetic Acid -----	574
2-Mercaptoacetic Acid -----	574
Mercaptoethane -----	510
Mercaptolutane -----	504
Mercaptoimidazoline -----	423
Mercuric Bichloride -----	146
Mercuric Chloride -----	146
Mercuric Nitrate -----	169
Mercuric Oxide -----	170
Mercuric Oxide, Red -----	170
Mercuric Oxide, Yellow -----	170
Mercury (II) Nitrate -----	169
Mercury (II) Oxide -----	170
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Mercury (II) Salt -----	169
Mercury -----	26
Mercury (II) Chloride -----	146
Mesityl -----	581
Mesityl Oxide -----	454
Metaformaldehyde -----	462
Methacetone -----	478
Methacrylic Acid, Butyl Ester -	554
Methacrylic Acid, Methyl Ester	441
Methanal, Aqueous -----	360
Methanamide -----	390
Methane -----	440
Methane Carboxylic Acid -----	321
Methane Dichloride -----	310
Methane Tetrachloride -----	410
Methanethiol -----	465
Methanoic Acid -----	416
Methanol -----	354
p-Menthenols (tertiary) -----	493
Methoxycarbonylethylene -----	551
2-Methoxyethanol -----	352
Methoxymethane -----	342
2-Methoxyethyl Acetate -----	526
4-Methoxyphenol -----	455

	MSDS#
p-Methoxyphenol -----	455
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Methyl Acetate -----	503
beta-Methyl Acrolein -----	578
Methyl Acrylate -----	551
Methyl Alcohol -----	354
Methyl Aldehyde Solution -----	360
Methyl n-Amyl Ketone -----	302
Methylbenzene -----	317
Methyl-bicyclo 2.2.1 heptene-	
2,3-dicarboxylic anhydride --	1062
2-Methyl-1,3-Butadiene -----	341
3-Methylbutanol Nitrite -----	575
3-Methyl-2-Butanone -----	466
2-Methyl-Butylacrylate -----	554
3-Methyl Butyl Ester Nitrous	
Acid -----	575
4-Methyl-2,6-di-t-butyl Phenol	456
Methyl i-Butyl Ketone -----	304
Methyl n-Butyl Ketone -----	425
3-Methylbutyl Nitrite -----	575
Methyl CELLOSOLVE -----	352
Methyl CELLOSOLVE Acetate -----	526
Methyl Chloride -----	373
Methyl Chloroform -----	311
p-Methyl Cumone -----	557
Methyl Cyanide -----	499
4,4'-Methylene	
bis(2-Chloroaniline) -----	372
Methylene bis(Phenylisocyanate)	1105
Methylene Chloride -----	310
Methylenedianiline -----	346
Methylene Diphenylisocyanate --	1105
Methylene Oxide Solution -----	360
Methyl Ethanoate -----	503
Methyl Ether -----	342
Methyl Ethyl Carbinol -----	442
Methyl Ethyl Ketone -----	303
Methyl Ethyl Ketone Peroxide	
(9%) -----	329A
Methyl Ethyl Ketone Peroxide	
Solution -----	329
Methyl Formate -----	432
5-Methyl-3-Heptanone -----	480
Methyl Hydrazine -----	552
1-Methylhydrazine -----	552
Methyl Hydride -----	440
Methyl Hydroxide -----	354
Methyl Isobutyl Ketone -----	304
p-Methyl Isopropyl Benzene ---	557
1-Methyl-4-Isopropyl Benzene --	557
Methyl Isopropyl Ketone -----	466
Methyl Mercaptan -----	465
Methyl Methacrylate (Monomer) -	441
Methyl Methanoate -----	432
Methyl Oxide -----	342
Methyl OXITOL -----	352
2- and 3-Methylpentane -----	397A
4-Methyl-2-Pentanone -----	304
4-Methyl-3-Pentene-2-One -----	454
Methylphenol -----	409
2-Methylphenol -----	560
o-Methylphenol -----	560
Methyl Phenyl Ketone -----	567
2-Methyl Propanol -----	398
2-Methyl-1-Propanol -----	398
2-Methylpropan-1-ol -----	398

	MSDS#
2-Methyl-2-Propanol -----	497
Methyl Propenate -----	551
Methyl 2-propanoate -----	551
2-Methyl Propenoic Acid Methyl	
Ester -----	441
Methyl Propensate -----	551
1-Methylpropyl Acetate -----	519
b-Methylpropyl Acetate -----	396
2-Methylpropyl Alcohol -----	398
2-Methyl-1-propyl Ethanoate ---	396
Methyl n-Propyl Ketone or	
Methyl Propyl Ketone -----	305
1-Methyl-5-Pyrrolidinone -----	431
N-Methylpyrrolidinone -----	431
N-Methyl-2-Pyrrolidone -----	431
Methylpyrrolidone -----	431
Methylstyrene -----	336
Methyl Sulphydrate -----	465
Methyl Sulfoxide -----	428
Methyl Tetrahydrophthalic	1091B
Anhydride, Epoxy Curing Agent	1101
Methylvinylbenzene -----	336
MgCO3 -----	97
MgO -----	94
MLBK -----	304
Mica Powder (Muscovite) -----	24

Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

Mineral Oil -----	525
Mineral Oil, White -----	525,
	1137
Mineral Oil with Detergents,	
"Soluble" in Water -----	1132,
	1183
Mineral Oil with Lube Additives	1140,
	1141
Mineral Powder Slurry (PROTECT-	
O-METAL No. 2) -----	1044
Mineral Seal Oil -----	525
Mineral Spirits -----	334,
	1257,
	1258
Mineral Spirits Cleaning	
Compound -----	1095
MME -----	441, 455
Mn -----	148
MnCO3 -----	135
Mn-Based Fuel Oil Additive ---	1196
MnSO4 -----	151
MnO2 -----	122
MO (Mesityl Oxide) -----	454
Mo -----	84
MOBIL Clear Varnish 2609 -----	1164
Mist Lube #27 -----	1141
VACTRA #2 -----	1140
VACTRA #4 -----	1140A
VAPROTEC Conc -----	1267
VAPROTEC Light -----	1266
MOD-EPOX -----	411
MOLD RELEASE #210-SS (Paraffin)	1136

MSDS#	MSDS#
Mold Release, Silicone (aerosol) ----- 1198	NH2NH2 H2O ----- 127
Molybdenum Metal/Powder ----- 84	NH2NH3Br ----- 10
MONDUR M ----- 1105	NH4NO3 ----- 79
Mono-aluminum Phosphate ----- 11	(NH4)2S2O8 ----- 33
Monobromobenzene ----- 564	NH2SO3H ----- 72
Monobutylamine ----- 569	Nickel Borofluoride ----- 128
Monochlorobenzene ----- 366	Nickel Dichloride ----- 36
Monochlorodifluoromethane ----- 307	Nickelous Chloride Hexahydrate ----- 36
Monochlorosulfuric Acid ----- 544	Nickel Fluoborate ----- 128
Monoethanolamine ----- 418	Nickel (II) Chloride ----- 36
Monoethanolethylenediamine ----- 555	Nickel (II) Nitrate ----- 20
Monoethylamine ----- 540	Nickel Salt, Hexahydrate ----- 37
Monofluorotrichloromethane ----- 309	Nickel (II) Sulfate ----- 37
Monohydroxy Methane ----- 354	Nickel (II) Tetrafluoroborate ----- 128
Monomethylhydrazine ----- 552	Nickelous Chloride Hexahydrate ----- 36
Mono-n-Butylamine ----- 569	Nickelous Nitrate Hexahydrate ----- 20
Morpholine ----- 356	Nickelous Sulfate Hexahydrate ----- 37
MOWIOL ----- 539	Nickel, Spongy or Porous, Powder ----- 1118
MPK (Methyl Propyl Ketone) ----- 305	NiCl2 6H2O ----- 36
M-PYROL ----- 431	Ni(NO3)2 ----- 20
MULTILITH DEGLAZING SOLVENT ----- 310	NIPAR S-20 ----- 448
MULTRATHANE M - MDI ----- 1105	NiSO4 6H2O ----- 37
Muriatic Acid ----- 30A	Nitramyl ----- 575
Muriatic Ether ----- 538	Nitratine ----- 101
Muscovite Mica, Powdered ----- 24	Nitric Acid (55-70%) ----- 7, 159
Muthmann's Liquid ----- 562	Nitric Acid, Ammonium Salt ----- 79
	Iron (3+) Salt ----- 142
	Nitric Acid-Based Cleaning Solution ----- 1017
	Nitric Acid Barium Salt ----- 173
	Nitric Acid, Cadmium Salt ----- 171
	Nitric Acid, Copper II Salt, Trihydrate ----- 174
	Nitrobarite ----- 173
	2,2',2" Nitriлотriethanol ----- 427
	Nitrobenzene ----- 439
	Nitrobenzol ----- 439
	Nitrocarbol ----- 508
	Nitrocellulose Lacquer (DYKEM) ----- 1154
	Nitroethane ----- 436
	Nitrogen ----- 61
	Nitrogen Dioxide ----- 47
	Nitrogen Monoxide ----- 109
	Nitrogen Peroxide ----- 47
	Nitrogen Tetroxide ----- 47
	Nitroisopropane ----- 448
	Nitromethane ----- 508
	2-Nitropropane ----- 448
	Nitroxanthic Acid ----- 534
	Nitrous Acid, Sodium Salt ----- 116
	Nitrous Oxide ----- 109
	NMH ----- 552
	NMP ----- 431
	N2O ----- 109
	Non-ionic Surfactant, Liquid ----- 1094
	Nonmetal Hydride ----- 178
	Nonylphenoxy(polyethanoxy) ethanol ----- 1094
	Norvalamine ----- 569
	NO-TARN ----- 1043
	NOVACITE 325, 1250, L-207A ----- 1021
	NOZZLE KLEEN (Aerosol) ----- 1164
	2-NP ----- 448
	Nujol ----- 525

N

N155 ----- 163
N2 ----- 61
NaBH4 ----- 93
NaCN ----- 58
Na2CO3 ----- 48
Na2 Cr7 2H2O ----- 153
NADIC METHYL ANHYDRIDE ----- 1062
NaHS ----- 87
NaNO2 ----- 111, 116
NaNO3 ----- 101
NaOC1 ----- 115
NaK-78 ----- 16
NaK Alloy ----- 16
Naphtha, Aromatic High Solvency High Flash ----- 1061, 1061A
Naphtha, VM&P (Rule 66 Exempt) ----- 391
Naphthenate Soap Solution: 6% Cobalt Catalyst ----- 363
24% Lead Catalyst ----- 381
Na2SiF6 ----- 31
Na2SiO3 ----- 85
Natural Camphor ----- 531
Natural Gas ----- 440
NAVEE 42 ----- 1057
Navy Special Fuel Oil ----- 473
NE ----- 436
Neohexane ----- 397A
NEOSOL ----- 1073
NEU-TRI Solvent ----- 1156
NH3 ----- 1
NH4Cl ----- 21
NH42Cr207 ----- 129
NH4F ----- 111
NH4HF2 ----- 49
NH2NH2 ----- 126

MSDS#

NUODEX Naphthenate Catalyst	
6% Cobalt -----	1268
24% Lead -----	384
NYAD G, 325, or 400 -----	55
NYLATRON GS-63 -----	1209

O

02 -----	62
03 -----	34
OAKITE 32 -----	1214
56 -----	1224
67 -----	1167
90 -----	1226
94 -----	1228
98 -----	1183
160 -----	1032
Crysoat 247 -----	1244
Deoxidizer 34 -----	1247
Stripper ANP -----	1042
Stripper 156 -----	1182
Octadecanoic Acid -----	415
Octadecanoic Acid Calcium Salt -----	445
Octyl Acrylate -----	345
"Octyl" Alcohol -----	367
Octylphenoxypolyethoxyethanol -----	1291
Odorless Mineral Spirits -----	334B
Odorless Petroleum Spirits -----	334B
Odorless Solvent -----	334B
Oil of Mirbane -----	439
Oil of Pine -----	484
Oil of Vitriol -----	9
Oil, Transformer (or Electrical Insulating) -----	393
Olefiant Gas -----	457
Oleum -----	9A
Oleum Abietis -----	484
Oracetic Ether -----	553
Orthoboric Acid -----	4
Orthodichlorobenzene -----	358
Orthophosphoric Acid (75%) -----	8
Orthohydroxybenzoic -----	543
Oxacyclopentane -----	379
Oxalic Acid -----	328
OXIRANE -----	433
OXITOL -----	319
3-Oxo-, Ethyl Ester -----	553
3-Oxo-1-Heptanol -----	320
2-Oxo-Hexamethyleneimine -----	580
2-Oxohexamethyleneimine -----	580
Oxolane -----	379
Oxybenzene -----	355
1,1'-Oxybis (2-Chloro) Ethane -----	571
2,2'-Oxybis (Propane) -----	541
Oxygen -----	62
o-Oxytoluene -----	560
Ozone -----	34

Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

P

MSDS#

PACO Solvent T.R. 590 -----	1073
Paint, Alkyd, Air-Drying, Gloss Black -----	1193
Paint Flocculant -----	1021
Paint Remover, Alkaline, Solvent-Type -----	1182
Paracymene -----	557
Paracymol -----	557
Paradichlorobenzene -----	514
Paraffinic Min. Oil Lubricant -----	1264
Paraffin Oil -----	525
Paraffin Wax in Min. Sp. -----	1136
Paraform -----	462
Paraformaldehyde -----	462
PARAPLEX P-49 -----	1038
(No longer commercially available)	
PARK KASE 5C -----	1045
PAS -----	1253
PbCl2 -----	150
PbO -----	38
PC 18, Printed Circuit Coating -----	1066
PCB -----	1200
PCP -----	517
PC13 -----	110
PD680 Cleaning Compound -----	1095
PDCB -----	514
P.D.GEORGE #946, Epoxy Bond Coat -----	1129
PEACOCK BRAND (Lard Oil) No. 1 -----	512
EWS -----	512
Prime -----	512
PEDIGREE Wire Enamel #357 -----	1125
#946 -----	1129
PEG 4000 -----	364
PEG Hand Solution -----	1087
PENESOLVE 5 -----	1053
PENETONE 2389 -----	1054
PENETONE Type S -----	1055
Penetrant, Non-destructive Testing -----	1048
PENNWALT CLEANER K-2 -----	1261
Penta -----	517
Pentachlorophenol -----	517
n-Pentane -----	523
Pentanedione -----	556
1,5-Pentanedione -----	548
2,4-Pentanedione -----	556
Pentanol -----	506
2-Pentanone -----	305
3-Pentanone -----	478
Pentyl Alcohol -----	506
1-Pentyl Acetate -----	487
Pentyl Acetate, Primary -----	486
N-Pentyl-1-Pentanamine -----	582
Pentyl Pentylamine -----	582
PERCHLOR -----	313
Perchloric Acid 70-72% -----	102
Perchloroethylene -----	313
Perchloromethane -----	410

MSDS#	MSDS#
PERCLEN E ----- 313	Phosphoric Acid (>75%) ----- 8
PERCLEN E D ----- 313	Phosphorous Acid, Triphenyl Ester ----- 411
2-Perhydroazepinone ----- 580	Phosphorous Chloride ----- 110
Perhydronaphthalene ----- 563	Phosphorus ----- 25
Periclast ----- 94	Phosphorus Oxychloride ----- 117
PERK ----- 313	Phosphorus Trichloride ----- 110
PERMABOND QUICK FILLER/SETTER - 1188	Phosphorus Trihydride ----- 63
PERM-A-CLOR ----- 312	Phosphoryl Chloride ----- 117
PERM-A-CLOR NA ----- 312	Photo Resist (see KODAK)
PERMAFIL 73517 ----- 1024	Phthalandione ----- 417
Peroxide, Benzoyl ----- 500	o-Phthalic Acid, Diallyl Ether 527
Peroxide (MEK Peroxide) ----- 329	Phthalic Anhydride ----- 417
Peroxybenzoic Acid, t-Butyl Ester ----- 406	Picric Acid ----- 534
Petrohol ----- 324	Picronitro Acid ----- 534
Petrol ----- 467	Pigment, Basic Zinc Chromate -- 1130
Petroleum Distillate ----- 530	Chrome Yellow Med. --- 1124
Petroleum "Ether" ----- 518,1280	Muscovite Mica ----- 24
Petroleum Naphtha, C ----- 1274	Pimelic Ketone ----- 301
Petroleum Naphtha, C ----- 1275	Pinenes (dicyclic) ----- 375
Petroleum Spirit ----- 518	Pine Oil ----- 484
Petroleum Spirits ----- 334, 334A	Plasticizer, KODAFLEX TX1B ---- 1039
PEX SPRAY 66 ----- 1019	PHOSFLEX 112 ---- 1081
PGME ----- 522	PLENCO 04300 Phenolic Cmpds --- 1254
PH3 ----- 63	PLENCO 02000 BLACK (Inj Mold) - 1254A
Phenchlorol ----- 517	PLENCO 0720C BLACK (Inj Mold) - 1254A
Phene ----- 316	PLENCO 07203 BLACK (Comp. Mold) 1254A
Phenic Acid ----- 355	PLENCO 12983, 4300 ----- 1254
Phenol ----- 355	PLENCO 4000, 4200, 14015 ----- 1254A
Phenol-formaldehyde Resin, Two- stage, Unfilled ----- 1103	Plumbous Chloride ----- 150
Phenolic Modified Polyester Resin in Xylene ----- 1184	Plumbous Oxide ----- 38
Phenolic Molding Compound - Cellulose Filled ----- 1254A	POC13 ----- 117
Phenolic Molding Compound - Mineral Filled ----- 1254	Polyacrylamide Powder ----- 1119
Phenolics (mainly C7 to C9) --- 409A	Polyacrylate Adhesive (2-part) 1150
Phenyl Alcohol ----- 355	Polyacrylic Elastomer ----- 1086
Phenylamine ----- 407	Poly(amide-imide) Wire Enamel - 1037
m-Phenylaniline ----- 461	Polyamide Resin, Liquid, Reactive ----- 394
Phenylbenzene ----- 451	Polychlorinated Biphenyl ----- 1200
Phenyl Bromide ----- 564	Poly(Dimethylsiloxane) Fluid -- 349
Phenyl Carbinol ----- 536	Polyester Resin in Xylene Solution (ALKANEX) ----- 1163
Phenyl Carboxylic Acid ----- 402	Polyester Resin, Phenolic Modified, Solution ----- 1184
Phenyl Chloride ----- 366	Polyester Resin, Unsaturated: Styrene-Type ----- 1024, 1038
N-Phenyldiethylamine ----- 348	Styrene-Type, Catalyzed ---- 1070, 1123
Phenylethane ----- 385	Polyester-imide: Resin Solution ----- 1125
Phenylethylene ----- 351	Wire Enamel ----- 1005, 1085
1-Phenylethanone ----- 567	Polyethylene Glycol, Alcohol Solution ----- 1087
1-Phenyl Ethanone ----- 567	Polyethylene Glycol, Solid mole. wt. ca (6000-7500) ---- 364
Phenylformic Acid ----- 402	Polyglycol E-6000 ----- 364
Phenyl Hydrate ----- 355	Polyimide Resin Solution, PTFE Filled ----- 1143
Phenylhydride ----- 316	POLYISOCYANATE ACTIVATOR 192-S 1116
Phenyl Hydroxide ----- 355	Polyoxymethylene ----- 462
Phenylic Acid ----- 355	POLY-SOLV DB ----- 322
Phenylmethane ----- 317	DE ----- 460
Phenol Methyl Ketone ----- 567	EB ----- 320
2-Phenylpropane ----- 395	EE ----- 319
1-Phenyl-1(3,4-Xylyl)Ethane --- 1216	Polystyrene Beads, Expandable - 1276
PHOSFLEX 4 ----- 521	Polysulfide Sealant, 2 Part --- 1120A, B
PHOSFLEX 112, Plasticizer ----- 1081	POLY-TERGENT B-300 ----- 1094
(Discontinued by Manufacturer)	
See MSDS #450	
Phosgene ----- 66	
Phosphine ----- 63	

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Poly(Tetrafluoroethylene-Hexafluoropropylene) Copolymer	1010
Polytrifluorochloroethylene, Liquid	388
Polyurethane-Based Caulk, Airborne Moisture Cure	1100
Polyurethane Black Insulator Varnish	1146
Polyurethane Coating, One-Component, Moisture Cure	1187
Polyurethane Enamel, White	1117
Polyurethane Rubber (One Component)	1139
(SEE ALSO URETHANE)	
Polyvinyl Alcohol	539
Polyvinyl Formal Resins (FORMVAR)	399
Pond Sludge	156
Potash Lye	2
Potash, Red Prussiate of	140
Potassium Acid Phthalate	475
Potassium Bichromate	168
Potassium Biphthalate	475
Potassium Cyanide	13
Potassium Dichromate	168
Potassium Ferricyanide	140
Potassium Hexacyanoferrate (III)	140
Potassium Hydrogen Phthalate	475
Potassium Hydroxide	2
Potassium Permanganate	95
POVAL	539
Powdered Aluminum Oxide	1000
Powdered Wood	376
PR-420	1127
PR-1527	1139
Precipitated Amorphous Silica	1253
Precipitated Calcium Phosphate	137
Primer, Alkyd, Corrosion Resisting	1194
Primer, Alkyd, Red Oxide	1192
Primer for RTV Silicone Rubber:	
SS-4004	1008
SS-4155	1151
Printed Circuit Coating	1066
Prolamine	498
Propane, Liquified Gas	380
n-Propanol	494
2-Propanol	324
Propanone	300
Propellant 11	309
12	308
22	307
2-Propenal	573
Propenamide	577
2-Propenamide	577
Propenenitrile	381
Propenoic Acid	449
Propenoic Acid, Methyl Ester	551
2-Propenoic Acid, Butyl Ester	547
2-Propenoic Acid, Methyl Ester	551
2-Propenoic-2-Methyl Butyl Ester	554
2-Propen-1-ol	505
2-Propenol-one	573
2-Propenol	505
Propenyl Alcohol	505

	<u>MSDS#</u>
2-Propenyloxy Methyl Oxirane	576
Proprietary Solvent #1	1242
Proprietary Solvent #3	1073
2-Propyl Acetate	496
n-Propyl Acetate	515
1-Propyl Alcohol	494
n-Propyl Alcohol	494
sec-Propyl Alcohol	324
2-Propylamine	483
Propylcarbinol	337
Propylene Aldehyde	578
Propylene Carbonate	447
Propylene Glycol Monomethyl Ether	522
PROTECT-O-METAL No. 2	1044
PROTEXULATE	1082
PtX (PbO)	38
PVA	539
PVAL	539
PVOH	539
PXE	1216
PYNOL	484
PYRANOL	1200
PYRE-ML WIRE ENAMEL	
RC 5863	1120
Type I (RC 5877)	1121
Pyridine	405
2-Pyridylamine	568
Pyroacetic Acid	300
Pyroacetic Ether	300
Pyrogenic Silica (discontinued term)	1064
Pyrolusite	122
Pyromucic Aldehyde	413
Pyro Powder	100
Pyrosulfuric Acid	9A
Pyrrolidine	498
Pyrrolyene	463

Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

Q

Q-CLEAN SE-67	1195
QUANTOR IR-75 Developer System (6 Part)	1049 (A to F)
Quartz	71
Quartz, Natural, Micro-crystalline (NOVACITE)	1021
Quench Oil (Hydrocarbon)	1067
Quicklime	22
QUICKSET 90	329A

R

	<u>MSDS#</u>
RACK STRIP C -----	1017A
RACK STRIP C Cleaning Solution	1017
RAM MOLD RELEASE 225 -----	1046A
RAM MOLD RELEASE 225 (Aerosol)	1046
RANEY NICKEL CATALYST #28 -----	1118
Range Oil -----	488
RC 577 PYRE-ML Wire Enamel ----	1121
RC 5863 PYRE-ML Wire Enamel ----	1120
Red Iron Oxide -----	175
REFRIGERANT 11 -----	309
12 -----	308
22 -----	307
113 -----	314
114 -----	572
RELIASOLV NO. 564 -----	1249
1001 -----	1207
Remover, Thinner (DYKEM) -----	1153
REMOVER 1112A -----	1015
Rene 41, 77, 95 -----	163
Resin Flux 197 -----	1022
RESIN-NT -----	1047
REZ-N-BOND #1 -----	1131
Rh -----	147
Rhodium Metal/Powder -----	147
Rhodochrosite -----	135
RISTON II DEVELOPER 2000 (Concentrate) -----	1013
RISTON II DEVELOPER 2000 (Use Concentration) -----	1013A
RISTON II STRIPPER 1000X -----	1012
RODINE 85 -----	1248
RODINE 92A -----	1083
ROLFITE 404 -----	1196
Rosin (Gum or Wood) -----	377
RTV-102,103,106,108,109, 112,116,118,157,158,159 -----	1142
RTV-577 (Silicone Polymer) -----	1006
RTV Silicone Rubber, Acetoxy-Cure -----	1142
RTV-9811 (Catalyst) -----	1007
Rubber Solvent -----	371
Rubber, Uncured, Polyacrylic --	1086
RUBILENE Oil -----	1264
Rust Inhibitor for Steel -----	1098
Rust Inhibitor, Alkaline -----	1108

S

Sal Ammonia -----	21
Sal ammonite -----	21
Salicylic Acid -----	543
Salmiac Sal Ammoniac -----	21
Sal Soda -----	48
Sand -----	71
SANTICIZER 9 -----	1068
SARTOMER SR-297 -----	1106
Sawdust, Wood -----	376
Saxol -----	525

MSDS#

Sb -----	70
Sb203 -----	28
S.B.A. -----	442
Sb2 O3 -----	28
SC 3700 -----	513
SCOTCHCAST #8 (Parts A & B) ---	1181
SCOTCHKOTE RESIN K2006 & K2008	1003
(No longer commercially available)	
SCOTCHWELD STRUCTURAL ADHESIVE 2216, Parts A & B -----	1157A, B
SDA-3A -----	579
SD No. 3A Alcohol -----	579
Se (Selenium) -----	136
SE-75 Degreasing Solvent -----	1251
SECURITY Oil -----	1264
Selenium (Metal Powder) -----	136
Selenium Dioxide -----	152
Selenium Oxide -----	152
Selenious Anhydride -----	152
SeO2 -----	152
Serpentine Asbestos -----	15A
SF6 -----	27
SF-96, SF-97 -----	349
Shellac, White, Alcohol-Based Solution -----	370
SHELL BPA 154 or 157 -----	369
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OMALA OILS -----	1270
PD680 Cleaning Compound -	1095
Rubber Solvent -----	371
TELLUS OILS -----	1272
TURBO OILS -----	1271
VM&P Naphtha EC -----	391
SHIPLEY CATALYST 9F -----	1227
SiCl4 -----	106
SiH4 -----	107
SIKAFLEX 1A -----	1100
Signal Oil -----	525
Silane -----	107
SILASTIC RTV (Acetoxy-Cure) ---	1288
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Silicane -----	107
Silicic Acid Disodium Salt ----	85
Silicic Anhydride -----	71
Silicofluoric Acid -----	89
Silicon Dioxide: Amorphous -----	69
Amorphous, fumed -----	1064
Crystalline -----	71
Flour -----	71
Natural, microcrystalline ---	1021
Silicone Fluid (Dimethyl) -----	349
Silicone Polymer (Fluid) for 2-Part RTV Rubber -----	1006
Silicone Resin Solution: DOW CORNING GP-77 -----	1171
DOW CORNING 1090 Varnish ---	1169
Silicone Rubber -----	1142
Silicon Tetrachloride -----	106
Silicon Tetrahydride -----	107
SILVALOY 45, Brazing Alloy ----	41
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"Silver Brazing Flux" -----	1144
Silver Nitrate -----	81
SiO2 -----	69
SKELLYSOLVE F -----	1280
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(Formula B) -----	1031
SKD-NF SPOTCHECK DEVELOPER ----	1071
Sn -----	74
SnCl2 -----	67
SnSO4 -----	14
SO2 -----	50
SOC12 -----	86, 90
Soda Ash -----	48
Soda Bleach Liquor -----	115
Soda Lye -----	3
Soda Niter -----	101
Sodium Bichromate -----	153
Sodium Bisulfide (Commercial) --	87
Sodium Borohydride -----	93
Sodium Carbonate, Anhydrous ---	48
Sodium Cyanide -----	58
Sodium Dichromate (Dihydrate) -	153
Sodium Fluoride -----	138
Sodium Fluosilicate -----	31
Sodium Hydrogen Sulfide -----	87
Sodium Hydrosulfide -----	87
Sodium Hydroxide -----	3
Sodium Hydroxide, 50% -----	3A
Sodium Hypochlorite (5-12%) ---	115
Sodium Metasilicate, Anhydrous	85
Sodium Nitrate -----	101
Sodium Nitrite -----	116
Sodium Phosphate Tribasic ----	43
Sodium-Potassium Alloy -----	16
Sodium Silicate (40-43 deg Be)-	99
Sodium Silicofluoride -----	31
Sodium Tetraborate Pentahydrate	112
Sodium Tetrahydroborate -----	93
Solder Flux, Acid -----	19
Solder Flux, Alcohol-Rosin Type,	
Activated -----	1022, 1080
Solder Flux Thinner -----	1023
SOLKA-FLOC -----	507
Soluble Glass -----	85, 99
SOLUBLE OIL "C" -----	1132
SOLVATONE A (discontinued name)	420
Solvent, Light Aliphatic	
Hydrocarbon -----	1280
Solvent, saturated hydrocarbon,	
synthetic -----	1259, 1260
SOLVLESSO 100 and 150 (Obsolete	
Tradenames; see EXXON -----	1061,
Aromatic 100 and 150) -----	1061A
Soya Oil -----	477
Soybean Oil -----	477
Specially Denatured Alcohol	
No. 3A -----	579
SPRAY 66 -----	1019
Spirit of Hartshorn -----	1A
SPIRITS Mold Release -----	1198
Sr(NO3)2 -----	159
SrCO3 -----	120
SS-4004 Primer -----	1008
SS-4044 Primer -----	1281
SS-4155 Primer -----	1151
STAFLEX DOP -----	414
Stainless Steel/Cobalt Base ---	163
Stainless Steel/Nickel Base ---	164
Stannous Chloride -----	67
Stannous Sulfate -----	14
Stannum -----	74

	MSDS#
Starch (Corn) -----	472
Stator Compound, Putty-Like	
Polyester -----	1147
STAYSILV-45 -----	41
STEAM KLEEN -----	1056
Stearic Acid -----	415
STEELGARD 1505B -----	1098
STERLING U-300-20 -----	1191
Stibium -----	70
Stoddard Solvent, Type I -----	334
Stoddard Solvent, Type II	
(140 deg F min FP) -----	334A
Stoddard Solvent, Type III ----	334B
Stokes V-Lube F -----	1285
Strippable Coating for Metal --	1110
Stripper, Alkaline,	
Solvent-Type -----	1182
Stripper Compound for Metal	
(Alkaline Cyanide-Based) ----	1145
Stripper for Photoresists,	
Acidic Methylene Chloride ---	1199
Strontium Carbonate -----	120
Strontium Nitrate -----	159
Strontium Salt -----	159
STRYPP NF -----	1016
STYROPOR (BR Grades) -----	1276
Styrene Monomer (Styrol) -----	351
Sulfamic Acid -----	72
Sulfonic Acid, Monochloride ---	544
Sulfonyl Chloride -----	90
Sulfur (Sulphur) -----	56
Sulfur Dioxide, Anhydrous ----	50
Sulfur Fluoride -----	27
Sulfur Hexafluoride -----	27
Sulfur Trioxide in Sulfuric	
Acid -----	9A
Sulfuretted Hydrogen -----	52
Sulfuric Acid -----	37
Sulfuric Acid, Aluminum Salt --	92
Sulfuric Acid, Concentrated ---	9
Sulfuric Acid, Fuming -----	9A
Sulfuric Chloride -----	90
Sulfuric Chlorohydrin -----	544
"Sulfuric Ether" -----	343
Sulfuric Oxylchloride -----	90
Sulfurous Acid Anhydride -----	50
Sulfurous Oxylchloride -----	86
Sulfuryl Chloride -----	90
p,p'-Sulfuryl Dianiline -----	1036
SUMINE 2015 -----	326
SUNNY Sol Bleach -----	115
SUNVIS 916 (32) -----	1284
SUN WAY OIL 90 -----	1256
SUPERFLAKE -----	141
SUPER GLUE-3 -----	1065
Surfactant, Non-ionic, Liquid -	1094
SYNASOL PM509 & PM 3224 -----	1073
SYNASOL SOLVENT 190 PM41 ----	1242
Synthetic Camphor -----	531
SYNTHITE EB-41 -----	1146

Can't find the material you need?
Genium recommends that you contact
the manufacturer of the material.

T

	MSDS#
T-200X (Xylene) -----	1148
Ta -----	167
TA -----	443
Talc (Talcum) -----	42
Tall Oil, Fatty Acids -----	495
Tantalum Powder -----	167
Tape, Woven, Asbestos, unsized	15
Tarnish Remover (NO-TARN) -----	1043
TBE -----	562
TBP -----	521
TCA -----	524
TCE (Trichloroethylene) -----	312, 1156
TCP (Tricresyl Phosphate) -----	332
TDI -----	331
Te -----	108
TEA (Triethanolamine) -----	427
TECSOL-3 -----	1073
TECTYL Rust Preventatives	
511M -----	1283
511HF -----	1283
848D -----	1283
848D-HF -----	1283
890 -----	1229
TEFLON FEP -----	1010
Tellurium Metal/Powder -----	108
TERASOD #357 -----	1125
Terephthalic Acid -----	443
Terpene Achols/Mixtures -----	484
Terpenes -----	375
Terpineol -----	493
Tertiary Calcium Phosphate -----	137
Tertiary Sodium Phosphate -----	43
TETA (Triethylenetetramine) -----	1035
Tetrabromoacetylene -----	562
1,1,2,2-Tetrabromoethane -----	562
Tetrachloroethylene -----	313
Tetrachloromethane -----	410
Tetrachlorosilane -----	106
Tetraethyl Orthosilicate -----	446
1,2,3,4-Tetrahydrobenzene -----	516
Tetrahydrofuran -----	379
Tetrahydro-2-furanmethanol -----	520
Tetrahydrofurfuryl Alcohol -----	520
Tetrahydrofuryl Carbinol -----	520
Tetrahydropyrrole -----	498
Tetramethylene Cyanide -----	549
Tetramethylene Glycol -----	485
Tetramethylene Oxide -----	379
Tetramethylenimine -----	498
Tetramethylguanidine -----	419
TEXACO 2228 CLEARTEX B -----	1162
1157 TRANSULTEX F -----	1161
2234 CLEARTEX 140X -----	1137
CLEARTEX 120 Cutting Oil	1162
SOLUBLE OIL "C" -----	1132
TEXSOLVE B -----	1274
TEXSOLVE C -----	1275
TEXSOLVE F -----	1280
Th -----	76
THALLIUM Metal/Powder -----	80

MSDS#

THEIC (Obsolete Tradename; see RESIN-NT) -----	1047
Thermal Black -----	51
THERMOPOXY COMPOUND U-300-20 --	1191
THF (Tetrahydrofuran) -----	379
THFA -----	520
Thinner, ALPHA 413-F -----	1077
Thinner, ALPHA 810 -----	1078
Thinner, ALPHA 812 -----	1252
Thinner, GLYPTAL 1500 -----	1173
Thinner 108 -----	1023
Thinner and Remover (DYKEM) ---	1153
Thiobutyl -----	504
Thioethanol -----	510
Thioglycolic Acid -----	574
2-Thioglycolic Acid -----	574
Thiomethyl Alcohol -----	465
Thionyl Chloride -----	86
Thiovanic Acid -----	574
THORIUM Metal/Powder and cmpds	76
THOXENE TA-12B -----	1027A
(No longer commercially available)	
THREE M, TYPE R DEVELOPER -----	1180
Ti -----	75,80
Tin (II) Chloride -----	67
Tin Metal/Powder -----	74
Tin Protochloride -----	67
Tin (II) Sulfate -----	14
TiO2 -----	118
Titania -----	118
Titanic Anhydride -----	118
Titanium-Based Alloy -----	166
Titanium Dioxide -----	118
TITANIUM Metal/Powder -----	75
Titanium Oxide -----	118
Tl -----	80
TMG -----	419
Toluene (Toluol) -----	317
Toluene-2,4-diisocyanate -----	331
Toluenesulfonamide (o- and p- isomers) -----	1068
Tolylene-2,4-diisocyanate -----	331
Toxic Anhydride -----	438
TPP (Triphenyl Phosphate) -----	333
Transformer Oil -----	393
TRANSULTEX F (1557) -----	1161
TRIAD E -----	312
Triaryl Phosphate Hydraulic Fluid -----	1175
Tricalcium Orthophosphate -----	137
Triatomic Oxygen -----	34
Tributyl Phosphate -----	521
Tricalcium Phosphate -----	137
TRICHLOR -----	312
Trichloroacetic Acid -----	524
Trichlorobenzene, Dielectric Grade -----	365
-Trichloroethane -----	311
1,1,1-Trichloroethane -----	311
Trichloroethylene -----	312, 1156
Trichlorofluoromethane -----	309
Trichloromethane -----	315
Trichlorotrifluoroethane -----	314
1,1,2-Trichloro-1,2,2-trifluoro- ethane -----	314
TRICLENE D -----	312
MD -----	312

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Tricresyl Phosphate -----	332
TRI-ETHANE -----	311
Triethanolamine -----	427
Triethylamine -----	392
Triethylenetetramine -----	1035
Trifluoroborane -----	91
Trimellitic Acid-1,2-Anhydride	330
Trimellitic Anhydride -----	330
Trimethylcarbinol -----	497
3,5,5-Trimethyl-2-cyclohexen-1- one -----	357
Trimethylene -----	529
2,2,4-Trimethylpentane -----	383
2,2,4-Trimethyl-1,3-pentanediol Diisobutyrate Ester -----	1039
2,4,6-Trimethyl Phenol -----	581
TRIM TAP HEAVY -----	1058
2,4,6-Trinitrophenol -----	534
Triphenyl Phosphate -----	333
Triphenyl Phosphite -----	411
Triple Carbonate Coating Media	1273
Tripoli (SiO2) -----	1021
Tripotassium Hexakisicyanoferrate (3-) ---	140
2,4,6-tris(Dimethylaminomethyl) Phenol -----	378
tris(2-Hydroxyethyl)amine -----	427
tris(2-Hydroxyethyl) Isocyanurate -----	1047

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the manufacturer of the material.

tris-(2-Hydroxyethyl)-s- Triazine-2,4,6-Trione -----	1047
Trisodium Phosphate Dodeca- hydrate (TSP) -----	43
Trisodium Orthophosphate -----	43
TRITHENE -----	311
TRITHERM 981 WIRE ENAMEL -----	1037
Tritolyl Phosphate -----	332
TRITON X-100 SURFACTANT -----	1291
Trodaloy #1 -----	32
Tungsten Carbide (Cemented w/ Cobalt Binder) -----	177
Tungsten Carbide Powder -----	123
TUN-O-WASH CLEANER -----	1170
Turpentine, Spirit or Oil of --	375
Type 6 Nylon -----	1209
TYPE R DEVELOPER (3M) -----	1180

U

UCON -----	572
11 -----	309
12 -----	308
22 -----	307
113 -----	314

MSDS#

Department of Transportation "proper shipping names" of materials (49CFR 172.101, 172.102) are included as a cross reference where an appropriate Material Safety Data Sheet is available.

"UN" numbers are appropriate for both international and domestic shipments. Those preceded by "NA" are designated for North American shipments only, including between U.S. and Canada.

UN# (DOT I.D. No.)	
1001 Acetylene -----	403
1005 Ammonia, Anhydrous (see 2672, Ammonia solution Solution) -----	1
1006 Argon, compressed (see UN1951 Argon, liquid) ---	64
1008 Boron Trifluoride ----	91
1010 Butadiene, Inhibited -	463
1011 Butane or Butane Mixtures (see UN1075) ---	481
1013 Carbon Dioxide (see UN1845, 2187) -----	54
1016 Carbon Monoxide -----	35
1017 Chlorine -----	53
1018 Chlorodifluoromethane	307
1027 Cyclopropane -----	529
1028 Dichlorodifluoro- methane -----	308
1033 Dimethyl Ether -----	342
1036 Ethylamine -----	540
1037 Ethyl Chloride -----	538
1038 Ethylene, Liquid (see UN1962) -----	457
1040 Ethylene Oxide (0.2% max N) -----	433
1046 Helium, Compressed (see UN1963 Helium, Liquid) -----	98
1049 Hydrogen, Compressed -	65
1050 Hydrogen Chloride Anhydrous (see UN1789 Hydrochloric Acid) -----	30
1052 Hydrofluoric Acid Anhydrous -----	6
1053 Hydrogen Sulfide -----	52
1063 Methyl Chloride -----	373
1064 Methyl Mercaptan ---	465
1066 Nitrogen, Compressed (see UN1977 Nitrogen, Liquid) -----	61
1067 Nitrogen Dioxide -----	47
1070 Nitrous Oxide -----	109
1072 Oxygen, Compressed ---	62
1073 Oxygen, Refrigerated Liquid -----	62
1075 Liquefied Petroleum Gas (Propane Based) -----	380
(Butane Based) -----	481
1076 Phosgene -----	66
1079 Sulfur Dioxide -----	50
1080 Sulfur Hexafluoride --	27
1086 Vinyl Chloride -----	382
1090 Acetone -----	300
1092 Acrolein -----	573
1093 Acrylonitrile -----	381

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1095 Alcohol (see specific alcohol) ----- --	1247 Methyl Methacrylate Monomer, Inhibited (Uninhibited NA 1247) --- 441
1096 Alcohol (see specific alcohol) ----- --	1249 Methyl Propyl Ketone - 305
1098 Allyl Alcohol ----- 505	1255 Petroleum Naphtha ---- 334,334A, 530,1274, 1275
1100 Allyl Chloride ----- 374	1261 Nitromethane ----- 508
1104 Amyl Acetate ----- 486,487	1262 Isooctane (2,2,4 Trimethylpentane) ----- 383
1105 n-Amyl Alcohol ----- 506	1265 n-Pentane ----- 523
1110 Methyl Amyl Ketone --- 302	NA1268 Naphtha Distillate --- 530
1114 Benzene ----- 316	1268 Mineral Seal Oil ---- 525
1115 Benzine ----- 530	1268 Petroleum Distillate - 334,334A
1120 Butyl Alcohol ----- 337	1271 Petroleum Spirit ----- 518,1280
Isobutyl Alcohol ---- 398	1271 Petroleum "Ether" ---- 518
1121 sec-Butanol ----- 442	1272 Pine Oil ----- 484
1120 t-Butanol ----- 497	1274 n-Propyl Alcohol ---- 494
1123 Butyl Acetate ----- 338	1282 Pyridine ----- 405
1124 sec-Butyl Acetate ---- 519	1292 Ethyl Silicate ----- 446
1125 n-Butylamine ----- 569	1294 Toluene ----- 317
1129 N-Butyraldehyde ----- 542	1296 Triethylamine ----- 392
1131 Carbon Disulfide or Bisulfide ----- 350	1299 Turpentine ----- 375
1134 Chlorobenzene ----- 366	1301 Vinyl Acetate ----- 509
1145 Cyclohexane ----- 389	1307 Xylenes ----- 318A,B,C
1147 Decahydronaphthalene - 563	1309 Aluminum Powder Coated (see UN1383, 1396) ----- 100
1148 Diacetone Alcohol ---- 353	1344 Picric Acid ----- 534
1154 Diethylamine ----- 453	1350 Sulfur, Lump or Powder 56
1155 Diethyl Ether ----- 343	1352 Titanium Metal Powder, Wetted (see UN2546) ---- 75
1156 Diethyl Ketone ----- 478	1358 Zirconium Metal, Powder, Wet (see UN1308, 1932, 2008) ----- 17
1157 Diisobutyl Ketone ---- 501	NA1361 Coal,Ground Bituminous 491
1159 Isopropyl Ether ----- 541	1381 Phosphorus, White or Yellow, Dry or Wet ----- 25
1165 Dioxane (1,4-Dioxane) 412	1383 Pyrophoric Metals, n.o.s. ----- 17,73,76, 100
1170 Ethyl Alcohol ----- 361	1396 Aluminum, Powder, Uncoated (see UN1309, 1383) ----- 100
1171 2-Ethoxyethanol ----- 319	1402 Calcium Carbide ----- 78
1172 2-Ethoxyethyl Acetate 321	1414 Lithium Hydride ----- 160
1173 Ethyl Acetate ----- 437	1422 Sodium-Potassium Alloy 16
1175 Ethyl Benzene ----- 385	1426 Sodium Borohydride --- 93
1184 Ethylene Dichloride -- 359	1436 Zinc, Metal, Powder or Dust (Non-Pyrophoric) (see UN1383) ----- 73, 176
1188 Ethylene Glycol Monomethyl Ether ----- 352	1446 Barium Nitrate ----- 173
1189 Acetaldehyde ----- 535	1439 Ammonium Dichromate -- 129
1190 Ethyl Formate ----- 502	1444 Ammonium Persulfate -- 33
1193 Methyl Ethyl Ketone (MEK) ----- 303	NA1463 Chromic Acid, Solid (see UN1755) ----- 5
1198 Formaldehyde Soln. (see UN2209) ----- 360	1466 Ferric Nitrate ----- 142
1199 Furfural ----- 413	NA1477 Nitrate Compounds ---- 174, 168
1203 Gasoline ----- 467	NA1479 Sodium Dichromate, (Dihydrate) ----- 153
1206 Heptane ----- 464	1490 Potassium Permanganate 95
1208 n-Hexane ----- 397	1493 Silver Nitrate ----- 81
1208 Neohexane (2,2-Dimethylbutane) and hexane isomers (see UN2457,2462) 397A	1498 Sodium Nitrate ----- 101
1212 Isobutyl Alcohol ---- 398	1500 Sodium Nitrate ----- 116
1213 Isobutyl Acetate ---- 396	1507 Strontium Nitrate ---- 159
1218 Isoprene ----- 341	1547 Aniline ----- 407
1219 Isopropyl Alcohol ---- 324	1564 Barium Carbonate ---- 119
1220 Isopropyl Acetate ---- 496	1564 Barium Chloride ----- 132
1221 Isopropyl Amine ----- 483	
1223 Kerosine (Kerosene) -- 387,488	
1229 Mesityl Oxide ----- 454	
1230 Methyl Alcohol ----- 354	
1231 Methyl Acetate ----- 503	
1243 Methyl Formate ----- 432	
1244 Methyl Hydrazine ---- 552	
1245 Methyl Isobutyl Ketone (MIBK) ----- 304	

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1564 Barium Fluoride ----- 132	1791 Hypochlorite Solution, 115
1564 Barium Hydroxide ----- 40	NA1791 Hypochlorite Solution,
1567 Beryllium, Metal Powder 59	(Corrosive Material
1587 Copper Cyanide ----- 12	Class) ----- 115
1591 o-Dichlorobenzene ---- 358	NA1791 Hypochlorite Solution,
1592 p-Dichlorobenzene ---- 514	(ORM-B Class) ----- 115
1593 Dichloromethane	1802 Perchloric Acid
(Methylene Chloride) ---- 310	(see UN1873) ----- (see 102)
1595 Dimethyl Sulfate ----- 344	1805 Phosphoric Acid ----- 8
1604 Ethylenediamine ----- 325	1809 Phosphorus Trichloride 110
1605 Ethylene Dibromide --- 492	1810 Phosphorus Oxychloride 117
1624 Mercuric Chloride ---- 146	1813 Potassium Hydroxide,
1625 Mercury (II) Nitrate - 169	Solid ----- 2
1641 Mercury (II) Oxide --- 170	1818 Silicon Tetrachloride 106
1648 Methyl Cyanide ----- 499	1823 Sodium Hydroxide, Solid 3
NA1648 Acetonitrile ----- 499	1824 Sodium Hydroxide,
1662 Nitrobenzene ----- 439	Solution ----- 3A
1671 Phenol (see UN2312,	1830 Sulfuric Acid ----- 9
NA2821) ----- 355	NA1831 Oleum ----- 9A
1680 Potassium Cyanide ---- 13	1834 Sulfuryl Chloride ---- 90
1689 Sodium Cyanide ----- 58	1836 Thionyl Chloride ---- 86
1690 Sodium Fluoride ----- 138	1839 Trichloroacetic Acid
1710 Trichloroethylene ---- 312, 1156	(Solid) ----- 524
1715 Acetic Anhydride ----- 434	1840 Zinc Chloride,
1717 Acetyl Chloride ----- 452	Solution ----- 18
1727 Ammonium Hydrogen	1842 Acetic Acid (see UN2789,
Fluoride, Solid ----- 49	2790) ----- 327
1736 Benzoyl Chloride ----- 459	1845 Carbon Dioxide, Solid
1744 Bromine ----- 77	(see UN1013, 2187) ----- 54
1748 Calcium Hypochlorite,	1846 Carbon Tetrachloride - 410
Dry, ----- 68	1866 Resin Solution ----- 1133A
1749 Chlorine Trifluoride - 125	1868 Decaborane ----- 104
2754 Chlorosulfonic Acid -- 544	1873 Perchloric Acid (50-72%)
1755 Chromic Acid, Solution	(see UN1802) ----- 102
(see UN1463) ----- 5	1888 Chloroform ----- 315
NA1759 Stannous Chloride,	1896 SD No. 3A Alcohol ---- 579
Solid ----- 67	NA1896 SD No. 3A Alcohol ---- 579
1760 Aminoethylethanolamine 555	1910 Calcium Oxide ----- 22
Dimethylamino Ethanol 566	1911 Diborane ----- 103
NA1760 Aluminum Phosphate	1915 Cyclohexanone ----- 301
Solution ----- 11	1919 Methyl Acrylate ----- 551
NA1760 Nitric Acid, 40% or Less	1922 Pyrrolidine ----- 498
(see UN2031) ----- 7	1932 Zirconium Scrap (see
NA1760 Morpholine Aqueous	1308, 1358, 2008, 2009, 2858) 17
Mixture (see UN2054) ---- 356	1940 Thioglycolic Acid ---- 574
NA1760 Lactic Acid ----- 546	1942 Ammonium Nitrate (0.2%
1773 Ferric Chloride,	Max Combustibles) ----- 79
Anhydrous or Soda ----- 19	1951 Argon, Refrigerated
1778 Fluorosilicic Acid --- 89	Liquid (see UN1006) ---- 64
NA1778 Hydrofluorosilicic	1958 Dichlorotetra-
Acid ----- 89	fluoroethane ----- 572
1779 Formic Acid ----- 416	1962 Ethylene, Compressed
1789 Hydrochloric Acid	(see UN1038) ----- 457
(see UN1050) ----- 30A	1963 Helium, Liquid
NA1789 Hydrochloric Acid	(see 1046) ----- 98
Mixtures ----- 1043, 1199	1965 Hydrocarbon Gas,
1214, 1245	Liquified ----- (see 380,
1790 Hydrofluoric Acid	440, 481)
Solution ----- 6A	1971 Methane or Natural Gas,
	with a High Methane Content,
	Compressed ----- 440
	1972 Methane or Natural Gas,
	with a High Methane Content,
	Refrigerated Liquid ---- 440
	1977 Nitrogen, Refrigerated
	Liquid (see UN1066) ---- 61

Can't find the material you need?
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the manufacturer of the material.

MSDS#	MSDS#
1978 Propane or LPG (see UN1075) ----- 380	2357 Cyclohexylamine ----- 537
1986 Alcohols, Toxic n.o.s. 1073,1242	2363 Ethyl Mercaptan ----- 510
NA1986 Denatured Alcohol ---- 1073,1242	2369 Ethylene Glycol
1993 Flammable Liquid, n.o.s. ----- 1151,1281	Monobutyl Ether ----- 320
NA1993 Diethyl Carbitol ----- 565	2432 N,N-Diethylaniline --- 348
NA1993 Fuel Oil 1 ----- 468	2457 2,3-Dimethylbutane (see UN1208) ----- 397A
NA1993 Fuel Oil 2 ----- 469	2462 Methylpentanes (see UN1208) ----- 397A
NA1993 Fuel Oil 5 ----- 473	2489 Diphenylmethane
NA1993 Fuel Oil 6 ----- 474	Diisocyanate (MDI) ----- 1105
2008 Zirconium, Metal, Powder, dry (see UN1358,1932) - 17	2491 Monoethanolamine or ethanolamine and solutions thereof ----- 418
2009 Zirconium, Metal, Sheet, Wire (see UN1932, 2858) - 17	2504 Acetylene Tetrabromide 562
2014 Hydrogen Peroxide (8-40% Oxidizer Class) ----- 44B	2505 Ammonium Fluoride ---- 111
2014 Hydrogen Peroxide(40-60% Oxidizer, Corrosive) ---- 44B	2546 Titanium Metal Powder, Dry (see UN1352) ----- 75
2015 Hydrogen Peroxide, Stabilized ----- 44A	2550 Methyl Ethyl Ketone Peroxide Solution ----- 329A
NA2020 Pentachlorophenol ---- 517	NA2556 Nitrocellulose, wet with Alcohol or Solvent ---- 1154
2022 Cresylic Acid ----- 409A	2564 Trichloroacetic Acid (Soln) ----- 524
2029 Hydrazine, Anhydrous - 126	2570 Cadmium Compounds ---- 171
2030 Hydrazine, Aqueous --- 127	Cadmium Metal Powder - 154
2031 Nitric Acid, Other Than Red Fuming (see UN1760) - 7	Cadmium Oxide ----- 133
2048 Dicyclopentadiene ---- 340	NA2570 Cadmium Chloride, Anhydrous ----- 144
2054 Morpholine(see NA1760) 356	2582 Ferric Chloride Soln - 19
NA2054 Morpholine, Aqueous Mixture ----- 356	2608 Nitropropanes ----- 448
2055 Styrene Monomer, Inhibited ----- 351	2619 Benzylidimethylamine -- 326
2056 Tetrahydrofuran ----- 379	2658 Selenium Metal Powder 136
2073 Ammonia Solution, ---- 1A	2671 2-Aminopyridine ----- 568
2076 Cresol ----- 409, 560	2672 Ammonia Solution (10-35 wt % NH) ----- 1A
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MSDS#	(1 to 299)	
1	Anhydrous Ammonia	8/85
1A	Ammonium Hydroxide (28-30%)	5/80
2	Potassium Hydroxide	2/84
3	Sodium Hydroxide	8/85
3A	Sodium Hydroxide, 50% Liquid	8/85
4	Boric Acid	3/83
5	Chromic Acid, Solid	8/85
6	Hydrofluoric Acid (Anhydrous)	5/81
6A	Hydrofluoric Acid (47-70%)	5/81
7	Nitric Acid	10/80
8	Phosphoric Acid	3/83
9	Sulfuric Acid	2/86
9A	Oleum	2/86
10	Hydrazine Monohydrobromide	7/79
11	Mono-Aluminum Phosphate	10/77
12	Cuprous Cyanide	5/84
13	Potassium Cyanide	5/80
14	Stannous Sulfate	9/84
15	Asbestos Tape	11/79
15A	Chrysotile Asbestos	11/79
15B	Asbestos-Rubber Sheet & Gaskets	10/82
16	Sodium-Potassium Alloy	2/84
17	Zirconium Metal/Powder	9/80
18	Zinc Chloride Soldering Flux	5/84
19	Ferric Chloride Solution	2/84
20	Nickel Nitrate	5/84
21	Ammonium Chloride	8/85
22	Calcium Oxide	9/78
23	Cadmium Metal	12/80
24	Mica Powder (Muscovite)	9/77
25	Phosphorus (Yellow)	9/77

VOLUME I - INORGANIC MATERIALS			VOLUME I - INORGANIC MATERIALS		
MSDS #	1 to 299	Dated (a)	MSDS #	1 TO 299	Dated (a)
90	Sulfuryl Chloride	7/81	156	Pond Sludge	11/85
91	Boron Trifluoride	10/81	157	Copper I Oxide	12/85
92	Aluminum Sulfate, Liquid	10/81	158	Copper II Oxide	12/85
93	Sodium Borohydride	10/81	159	Strontium Nitrate	12/85
94	Magnesium Oxide	10/81	160	Lithium Hydride	12/85
95	Potassium Permanganate	10/81	161	Carbon Steel (Scrap)	12/85
96	Zinc Sulfate	10/81	162	Copper (Scrap)	12/85
97	Magnesium Carbonate	11/81	163	Stainless Steel-Cobalt Base	12/85
98	Helium	3/82	164	Stainless Steel-Nickel Base	12/85
99	Sodium Silicate Solution	5/82	165	Beryllium-Copper Alloy (Scrap)	12/85
100	Aluminum Metal/Powder	5/84	166	Titanium-Based Alloy	12/85
101	Sodium Nitrate	4/82	167	Tantalum Powder	1/86
102	Perchloric Acid (70-72%)	10/85	168	Potassium Dichromate	1/86
103	Diborane	3/82	169	Mercury (II) Nitrate	1/86
104	Decaborane	10/82	170	Mercury (II) Oxide	1/86
105	Lithium Fluoride	10/82	171	Cadmium Nitrate Tetrahydrate	1/86
106	Silicon Tetrachloride	9/82	172	Bromine Pentafluoride	2/86
107	Silane	11/82	173	Barium Nitrate	2/86
108	Tellurium Metal/Powder	10/82	174	Copper (II) Nitrate, Trihydrate	2/86
109	Nitrous Oxide	10/82	175	Iron (III) Oxide	2/86
110	Phosphorus Trichloride	10/82	176	Zinc Metal Powder	3/86
111	Ammonium Fluoride	10/82	177	Tungsten Carbide	3/86
112	Borax Pentahydrate	11/82	178	Arsine	3/86
113	Boron Nitride Powder	11/82	MSDS #'s 179 to 299 are reserved for future use.		
114	Iodine	12/82			
115	Sodium Hypochlorite Aqueous Solution (5-12%)	2/83			
116	Sodium Nitrite	7/83			
117	Phosphorus Oxychloride	7/83			
118	Titanium Dioxide	10/83			
119	Barium Carbonate	10/83			
120	Strontium Carbonate	10/83			
121	Cupric Chloride	10/83	MSDS#	VOLUME I - ORGANIC MATERIALS	DATED
122	Manganese Dioxide	10/83	300	(300 to 999)	
123	Tungsten Carbide Powder	10/83	301	Acetone	9/85
124	Vanadium Metal/Powder	10/83	302	Cyclohexanone	8/79
125	Chlorine Trifluoride	12/83	303	Methyl n-Amyl Ketone	9/79
126	Hydrazine, Anhydrous	6/84	304	Methyl Ethyl Ketone	9/79
127	Hydrazine, Aqueous	6/84	305	Methyl Isobutyl Ketone	9/79
128	Nickel Fluoborate	4/85	306	Methyl n-Propyl Ketone	9/79
129	Ammonium Dichromate	12/85	307	Methyl n-Butyl Ketone	9/79
130	Ammonium Metavanadate	4/85	308	Chlorodifluoromethane	2/86
131	Barium Fluoride	4/85	309	Dichlorodifluoromethane	2/86
132	Barium Chloride	4/85	310	Fluorotrichloromethane	2/86
133	Cadmium Oxide	5/85	311	Methylene Chloride	9/85
134	Yttrium Oxide	6/85	312	1,1,1-Trichloroethane	8/83
135	Manganese Carbonate	6/85	313	Trichloroethylene	7/79
136	Selenium	6/85	314	Perchloroethylene	11/78
137	Tricalcium Phosphate	7/85	315	Trichlorotrifluoroethane	2/86
138	Sodium Fluoride	8/85	316	Chloroform	8/79
139	Ammonium Acetate	8/85	317	Benzene	11/78
140	Potassium Ferricyanide	9/85	318	Toluene	8/79
141	Calcium Chloride, Anhydrous	8/85	318A	Xylene	10/80
142	Ferric Nitrate	8/85	318B	o-XYLENE	11/80
143	Boron Oxide	8/85	318C	m-XYLENE	11/80
144	Cadmium Chloride, Anhydrous	8/85	319	p-XYLENE	11/80
145	Lanthanum Oxide	8/85	320	2-Ethoxyethanol	R-10/79
146	Mercuric Chloride	8/85	321	2-Butoxyethanol	9/85
147	Rhodium Metal/Powder	8/85	322	2-Ethoxyethyl Acetate	R-11/79
148	Manganese Metal/Powder	9/85	323	Diethylene Glycol Monobutyl Ether	9/78
149	Lithium Bromide	9/85	324	Ethylene Glycol	11/80
150	Lead Chloride	9/85	325	Ethyl Alcohol	9/85
151	Manganese Sulfate	9/85	326	Isopropyl Alcohol	9/85
152	Selenium Dioxide	10/85	327	Ethylenediamine	5/84
153	Sodium Dichromate	10/85	327A	Benzyl dimethylamine	2/84
154	Cadmium Metal Powder	10/85	328	Acetic Acid, Glacial	12/80
155	Bottom Ash	11/85	329	Acetic Acid, 28%	10/80
			329A	Oxalic Acid	2/81
				MEK Peroxide Solution	R-4/80
				MEK Peroxide Solution, 9% Max	11/80

VOLUME I - ORGANIC MATERIALS 300 TO 999			VOLUME I - ORGANIC MATERIALS 300 TO 999		
MSDS #		Dated (a)	MSDS #		Dated (a)
330	Trimellitic Anhydride	12/79	392	Triethylamine	9/78
331	Toluene-2,4-Diisocyanate	R-11/78	393	Electrical Insulating Oil	R-9/78
332	Tricresyl Phosphate	11/77	394	Reactive Polyamide Liquid Resins	R-9/78
333	Triphenyl Phosphate	11/82	395	Cumene	9/78
334	Mineral Spirits, Type I	7/84	396	Isobutyl Acetate	10/78
334A	Mineral Spirits, Type II	7/84	397	n-Hexane	8/83
334B	Stoddard Solvent, Type III	11/77	397A	Hexane Isomers	8/83
335	Epoxy Resin, Solid (Unmodified)	1/82	398	Isobutyl Alcohol	8/85
(335A)	None issued	--	399	Polyvinyl Formal Resins	10/78
335B	Epoxy Resin, Liquid (Unmodified)	1/82	400	Adipic Acid	12/79
336	Vinyltoluene	7/79	401	Hydroxyethyl Cellulose	10/78
337	n-Butyl Alcohol	6/84	402	Benzoic Acid	11/78
338	n-Butyl Acetate	5/84	403	Acetylene	7/84
339	Chlorendic Anhydride	10/81	404	Dimethyl Terephthalate	12/78
340	Dicyclopentadiene	2/84	405	Pyridine	12/78
341	Isoprene	11/77	406	t-Butyl Perbenzoate	12/78
342	Dimethyl Ether	4/83	407	Aniline	10/84
343	Diethyl Ether	8/79	408	N-Aminoethyl Piperazine	12/78
344	Dimethyl Sulfate	11/77	409	Cresol	12/78
345	2-Ethylhexyl Acrylate	2/84	409A	Cresylic Acid	12/79
346	Methylenedianiline	10/78	410	Carbon Tetrachloride	12/80
347	N,N-Dimethylaniline	11/77	411	Triphenyl Phosphite	11/84
348	N,N-Diethylaniline	12/79	412	1,4-Dioxane	R-12/78
349	Dimethyl Silicone Fluid	R-12/76	413	Furfural	9/81
350	Carbon Disulfide	9/82	414	Di(2-Ethylhexyl)Phthalate	11/84
351	Styrene Monomer	8/79	415	Stearic Acid	6/79
352	2-Methoxyethanol	R-7/81	416	Formic Acid	6/79
353	Diacetone Alcohol	12/83	417	Phthalic Anhydride	R-6/79
354	Methyl Alcohol	9/85	418	Monoethanolamine	6/79
355	Phenol	9/85	419	Tetramethylguanidine	6/79
356	Morpholine	3/81	420	Acetone Solvent Blend	7/79
357	Isophorone	7/79	421	4-t-Butylcatechol	8/79
358	o-Dichlorobenzene	2/84	422	4-t-Butylphenol	8/79
359	1,2-Dichloroethane	11/78	423	Ethylene Thiourea	10/79
360	Formalin	3/81	424	Dimethylformamide	3/82
361	Ethyl Alcohol	10/81	425	Methyl-n-Butyl Ketone	10/79
362	1,3-Butanediol	10/77	426	Diethanolamine	10/79
363	Cobalt (6%) Naphthenate Solution	8/83	427	Triethanolamine	4/80
364	Polyethylene Glycol	3/82	428	Dimethyl Sulfoxide	4/80
365	Trichlorobenzene, Dielectric Grade	12/79	429	Dibutyl Phthalate	5/80
366	Chlorobenzene	11/82	430	Dimethyl Phthalate	5/80
367	2-Ethylhexanol	2/84	431	N-Methyl-2-pyrrolidone	7/80
368	Diethylene Glycol Monobutyl Ether Acetate	11/77	432	Methyl Formate	5/80
369	Bisphenol A	9/85	433	Ethylene Oxide	5/80
370	White Shellac Solution	1/78	434	Acetic Anhydride	5/80
371	Rubber Solvent	1/78	435	Diethyl Phthalate	7/80
372	4,4'-Methylene Bis(2-chloroaniline)	7/79	436	Nitroethane	5/85
373	Methyl Chloride	8/78	437	Ethyl Acetate	R-7/80
374	Allyl Chloride	8/78	438	Maleic Anhydride	R-7/80
375	Turpentine	10/84	439	Nitrobenzene	7/80
376	Wood Dust	7/79	440	Methane	7/80
377	Rosin (Gum, Wood or Tall Oil)	10/84	441	Methyl Methacrylate	7/80
378	Tris(dimethylaminomethyl) Phenol	8/78	442	2-Butanol	2/86
379	Tetrahydrofuran	9/85	443	Terephthalic Acid	9/80
380	Liquefied Propane	10/84	444	Zinc Stearate	9/80
381	Acrylonitrile Monomer	8/78	445	Calcium Stearate	9/80
382	Vinyl Chloride Monomer	R-8/78	446	Ethyl Silicate	5/81
383	"Isooctane"	8/78	447	Propylene Carbonate	2/81
384	Lead Naphthenate Solution (24% Lead)	8/78	448	2-Nitropropane	5/85
385	Ethyl Benzene	8/78	449	Acrylic Acid	3/81
386	Cycloaliphatic Epoxy Resin	8/83	450	Cresyl Diphenyl Phosphate	3/81
387	Kerosene Solvent	12/82	451	Biphenyl	4/81
388	Polytrifluoroethylene, Liquid	10/78	452	Acetyl Chloride	9/81
389	Cyclohexane	3/84	453	Diethylamine	5/81
390	Formamide	9/78	454	Mesityl Oxide	5/81
391	VM&P Naphtha (Rule 66 Exempt)	9/78	455	4-Methoxyphenol	6/81
			456	2,6-Di-t-Butyl-p-Cresol	8/81

VOLUME I - ORGANIC MATERIALS			VOLUME I - ORGANIC MATERIALS		
MSDS #	300 TO 999	Dated (a)	MSDS #	300 TO 999	Dated (a)
457	Ethylene	11/81	523	n-Pentane	10/83
458	N,N-Dimethyl Acetamide	7/81	524	Trichloroacetic Acid	12/83
459	Benzoyl Chloride	6/81	525	Mineral Oil	11/85
460	Diethylene Glycol Monoethyl Ether	6/81	526	2-Methoxyethyl Acetate	2/84
461	Diphenylamine	9/81	527	Diallyl Phthalate Monomer	2/84
462	Paraformaldehyde	9/81	528	Urea	2/84
463	1,3-Butadiene	9/81	529	Cyclopropane	5/84
464	n-Heptane	9/81	530	Petroleum "Ether," High Boiling	5/84
465	Methyl Mercaptan	10/81	531	Camphor	5/84
466	Methyl Isopropyl Ketone	10/81	532	Cellulose Acetate, Lacquer Grade	10/84
467	Automotive Gasoline, Lead-free	10/81	533	Citric Acid	4/85
468	Fuel Oil #1	3/82	534	Picric Acid	4/85
469	Fuel Oil #2	10/81	535	Acetaldehyde	5/85
470	Diesel Fuel Oil #2-D	10/81	536	Benzyl Alcohol	5/85
471	Coconut Shell Charcoal	12/81	537	Cyclohexylamine	5/85
472	Starch (Corn)	2/82	538	Ethyl Chloride	5/85
473	Fuel Oil #5	10/81	539	Polyvinyl Alcohol	7/85
474	Fuel Oil #6	10/81	540	Ethylamine	5/85
475	Potassium Biphthalate	10/81	541	Isopropyl Ether	5/85
476	Linseed Oil	11/81	542	N-Butyraldehyde	5/85
477	Soya Oil	11/81	543	Salicylic Acid	7/85
478	Diethyl Ketone	3/82	544	Chlorosulfonic Acid	7/85
479	Furfuryl Alcohol	7/82	545	Fumaric Acid	7/85
480	Ethyl Amyl Ketone	4/80	546	Lactic Acid	7/85
481	Liquefied Butane	3/82	547	Butyl Acrylate	7/85
482	Hexahydrophthalic Anhydride	6/82	548	Glutaraldehyde	7/85
483	Isopropyl Amine	8/82	549	Adiponitrile	7/85
484	Pine Oil	8/82	550	Zinc Acetate	8/85
485	1,4-Butanediol	9/85	551	Methyl Acrylate	8/85
486	Amyl Acetate Primary (Mixed Isomers)	3/82	552	Methyl Hydrazine	8/85
487	n-Amyl Acetate	3/82	553	Ethyl Acetoacetate	8/85
488	Kerosine Burner Fuel	11/82	554	n-Butyl Methacrylate	8/85
489	Cyclohexanol	9/82	555	Aminoethylethanolamine	8/85
490	Ammonium Lauryl Ether Sulfate	5/82	556	2,4-Pentanedione	8/85
491	Bituminous Coal Dust	5/82	557	p-Cymene	8/85
492	Ethylene Dibromide	9/82	558	Epoxy Resins (Liquid) Generic	11/85
493	Terpineol	9/82	559	Epoxy Resins (Curing Agents) Generic	11/85
494	n-Propyl Alcohol	9/82	560	o-Cresol	11/85
495	Tall Fatty Acids	9/82	561	2,6-Xylenol	11/85
496	Isopropyl Acetate	10/82	562	Acetylene Tetrabromide	12/85
497	t-Butanol	2/86	563	Decahydronaphthalene	12/85
498	Pyrrrolidine	10/82	564	Bromobenzene	12/85
499	Acetonitrile	10/82	565	Diethyl Carbitol	12/85
500	Benzoyl Peroxide	10/82	566	Dimethylamino Ethanol	12/85
501	Diisobutyl Ketone	10/82	567	Acetophenone	1/86
502	Ethyl Formate	7/85	568	Aminopyridine	1/86
503	Methyl Acetate	12/82	569	Butylamine	1/86
504	Butyl Mercaptan	12/82	570	Cyclopentanone	1/86
505	Allyl Alcohol	2/86	571	Dichloroethyl Ether	1/86
506	n-Amyl Alcohol	12/82	572	Dichlorotetrafluoroethane	12/85
507	Cellulose Flock from Wood	4/82	573	Acrolein	2/86
508	Nitromethane	5/85	574	Thioglycolic Acid	2/86
509	Vinyl Acetate, Monomer, Inhibited	2/83	575	Isopentyl Nitrite	2/86
510	Ethyl Mercaptan	2/83	576	Allyl Glycidyl Ether	2/86
511	Chlorendic Acid	2/83	577	Acrylamide	2/86
512	Lard Oil	3/83	578	Crotonaldehyde	2/86
513	Hexamethyldisilazane	7/83	579	SD No. 3A Alcohol	2/86
514	p-Dichlorobenzene	10/83	580	Caprolactam	2/86
515	n-Propyl Acetate	10/83	581	Mesitol	2/86
516	Cyclohexene	10/83	582	Diamyl Amine	2/86
517	Pentachlorophenol	10/83			
518	Petroleum "Ether"	10/83			
519	sec-Butyl Acetate	10/83			
520	Tetrahydrofurfuryl Alcohol	10/83			
521	Tributyl Phosphate	10/83			
522	Propylene Glycol Monomethyl Ether	10/83			

MSDS #'s 583 to 999 are reserved for future use.

VOLUME II - TRADENAME LISTINGS		VOLUME II - TRADENAME MATERIALS			
MSDS#	(1000-2000)	DATED	MSDS #	1000 AND UP	Dated (a)
	Tradename Index	7/85	1046	RAM MOLD RELEASE 225 (Aerosol)	6/80
1000	AIRBRASIVE POWDER #1	7/79	1046A	RAM MOLD RELEASE 225	6/80
(1001)	None issued	--	1047	RESIN-NT (Formerly THEIC)	11/78
1001A	VERSILOK 528	R-10/78	1048	ZYGLO PENETRANT, ZL-22A and B	10/80
1001B	LORD ACCELERATOR #4	R-10/78	(1049)	None issued	--
1002	ISONEL 31-66 (XV 503)	7/79	1049A	Quantor IR-75, First Developer (Part 1)	12/76
1003	SCOTCHKOTE RESINS (K2006, K2008)	9/78		Quantor IR-75, First Rinse (Part 2)	12/76
(1003)	No longer commercially available)		1049B	Quantor IR-75, Bleach (Part 3)	12/76
(1004)	None issued	--	1049C	Quantor IR-75, Cleaning Bath (Part 4)	12/76
1004A	Conthane CE-1155, Part A	10/84	1049D	Quantor IR-75, Second Developer (Part 5)	12/76
1004B	Conthane CE-1155, Part B	9/84	1049E	Quantor IR-75, Second Rinse (Part 6)	12/76
1005	IMIDEX E, GE 73156	7/79		KANO KROIL	R-1/77
1006	RTV-577	7/79	1049F	DIELEKTROL I	12/80
1007	RTV-9811	7/79	1050	DIELEKTROL II	12/80
1008	SS-4004	8/83	1051	PENESOLVE 5	3/84
1009	LAMINAC 4146	7/79	1052	PENETONE 2389	2/84
1010	TEFLON FEP	7/79	1053	PENETONE TYPE S	2/84
(1011)	None issued	--	1054	STEAM KLEEN	2/84
1011A	HYSOL EA 934, Part A	7/79	1055	NAVEE 42	3/84
1011B	HYSOL EA 934, Part B	7/79	1056	TRIM TAP HEAVY	R-1/77
1012	RISTON II STRIPPER 1000X (Concentrate)	8/79	1057	KRYLON CRYSTAL CLEAR SPRAY COATINGS	R-1/77
1013	RISTON II DEVELOPER 2000 (Concentrate)	8/79	1058	LECTON ACRYLIC RK6323 & RK6327	10/78
1013A	RISTON II DEVELOPER 2000 (Use Conc.)	7/79	1059	(1060 No longer manufactured)	
1014	AZ-111 PHOTO RESIST	8/79	1060	EXXON AROMATIC 100	5/80
			1061	EXXON AROMATIC 150	5/80
			1061A	NADIC METHYL ANHYDRIDE	10/80
			1062	BLANKROLA SOLVENT	R-1/77
			1063	CAB-O-SIL	R-1/81
			1064	SUPERGLUE 3	8/80
			1065	HYSOL PC 18	8/80
			1066	FACTOQUENCH 74	8/80
			1067	SANTICIZER 9	9/80
			1068	MAGNU-SPRAY 105	8/80
			1069	GE MATERIAL A50A206B	10/77
			1070	SKD-NF SPOTCHECK DEVELOPER (Formula B)	12/78
			1071	None issued	---
			(1072)	ASTRO 3069, Part A	10/77
			1072A	ASTRO 3069, Part B	10/77
			1072B	PROPRIETARY SOLVENT (Fed. Formula #3)	9/80
			1073	EPI-CURE 856	10/83
			1074	GE A50A262, EPOXY VARNISH	10/83
			1075	DOWTHERM A	10/80
			1076	ALPHA 413-F THINNER	5/84
			1077	ALPHA 810 THINNER	5/84
			1078	ALPHA 815 FLUX	10/80
			1079	ALPHA MELROSE 611 FLUX	11/78
			1080	PHOSFLEX 112	10/77
			1081	(1081 No longer manufactured)	
			1082	PROTEKULATE	10/77
			1083	RODINE 92A	5/81
			1084	WELWOOD CONTACT CEMENT	2/81
			1085	ISOMID "B"	2/81
			1086	HYCAR 4031-50	10/77
			(1086)	No longer commercially available)	
			1087	PEG Hand Solution	R-10/77
			1088	GE 2PV-4, HAND CLEANER	10/77
			1089	GE 2PV-32, EPOXY RESIN	10/77
			1090	CIM CLEAN 30	3/82
			(1091)	None issued	--
			1091A	BIWAX 142-R (Part A)	3/82
			1091B	BIWAX 142-C (Part B)	3/82
			1092	B&B 3100	10/77
			1093	IMMUNOL s-6	4/83
			1094	POLY-TERGENT SURFACTANTS	2/84
			1095	SHELL PD680 CLEANING COMPOUND	10/77

See Volume I for sheet #'s below 1000.

VOLUME II - TRADENAME MATERIALS			VOLUME II - TRADENAME MATERIALS		
SDS #	1000 AND UP	Dated (a)	MSDS #	1000 AND UP	Dated (a)
1096	INDUSTRIAL CLEANER 68-A	3/82	1145	ENSTRIP A	5/84
1097	EVANS 7050 HOT MELT	10/77	1146	SYNTHITE EB-41	12/83
(1097 No longer commercially available)			1147	DOLPH CW-340-1	8/78
1098	STEELGARD #1505B	2/83	1148	DOLPH T-200X	8/78
1099	GALAXY THREAD CUTTING OILS	10/77	1149	CHLOROWAX, LIQUID	8/78
			1149A	CHLOROWAX RESIN	6/79
			1150	VERSILOK 505	R-9/78
			1151	SS-4155 PRIMER	5/84
			1152	MARKEM 320 CLEANER	9/84
			1153	DYKEM REMOVER AND THINNER	9/78
			1154	DYKEM LAYOUT FLUIDS	9/78
			1155	ELECTRO-BRITE Z-200	10/84
			1156	NEU-TRI SOLVENT	9/78
			(1157)	None issued	--
			1157A	SCOTCHWELD STRUCTURAL ADHESIVE 2216, A	2/84
			1157B	SCOTCHWELD STRUCTURAL ADHESIVE 2216, B	12/83
			1158	BRULIN 815 MX	9/84
			1159	BRULIN 815 QR	9/84
			1160	BLUE GOLD	1/82
			1161	TEXACO 1557, TRANSULTEX F	9/84
			1162	TEXACO 2228, CLEARTEX B	9/84
			1163	ALKANEX INSULATING VARNISH (GE 9522 and GE 9637)	9/78
			1164	NOZZLE KLEEN	9/78
			1165	CLEAR VARNISH 2609	9/78
			1166	ELECTRO-BRITE NAZ-32	9/78
			1167	OAKITE 67	10/78
			1168	BORDEN FM 203W CATALYST POWDER	10/78
			1169	DOW CORNING 1090 VARNISH	11/78
			1170	TUN-O-WASH CLEANER	10/78
			1171	DOW CORNING GP-77 VARNISH	10/78
			1072	UT-100 ADHESIVE (Parts A & B)	10/78
			1173	GLYPTAL 1500 THINNER	11/84
			1174	JDM F2A2 GREEN ALKYD RESIN ENAMEL (Exempt Solvent)	11/78
			1175	FRYQUEL 550	6/84
			1176	MAGNUS 763-NF	12/78
			1177	BARCO BOND MB-100X & MV-12	12/78
			(1178)	No sheet issued, See 1178A and 1178B	--
			1178A	HYSOL PC 29 PART A	2/81
			1178B	HYSOL PC 29 PART B	2/81
			1179	HYSOL DK0295	12/78
			1180	3M BRAND TYPE R DEVELOPER	12/78
			1181	SCOTCHCAST RESIN #8 (Parts A & B)	12/83
			1182	OAKITE STRIPPER 156	7/79
			1183	OAKITE 98	8/79
			1184	HI-THERM BC-350	8/79
			1185	WYANDOTTE B.N.	9/79
			1186	WYANDOTTE EXPRAY-541	9/79
			1187	CHEMGLAZE 2004	R-10/79
			1188	PERMABOND QUICK FILLER/SETTER	10/79
			1189	FIREX RX-2373 (Parts A & B)	10/79
			1190	ASTRO SPECIAL 4017 (A & B)	10/79
			1191	STERLING U-300-20 THERMOPOXY COMPOUND	9/84
			1192	GLYPTAL C.E. 514	10/79
			1193	GLYPTAL 7815	10/79
			1194	GLYPTAL C-1103	10/79
			1195	Q-CLEAN SE-67	11/79
			1196	ROLFITE 404	11/79
			1197	AIRBRASIVE POWDER NO. 3	12/79
			1198	SPRITS MOLD RELEASE	12/79
			1199	SK-4 COLD STRIPPER	4/80
			1200	AROCOLOR 1254	5/80
			1201	KODAK METAL ETCH RESIST THINNER	7/80
			(1202)	None issued	--
			1202A	IPS TR 250 (Component A)	7/80
			1202B	IPS TR 250 (Component B)	7/80

See Volume I for sheet #'s below 1000.

1100	SIKAFLEX 1A	4/83
1101	EPOCAST 2226B	6/84
(1102)	None issued	--
1102A	FLEXISEAL (Part One)	10/77
(1102A No longer commercially available)		
1102B	FLEXISEAL (Part Two)	10/77
(1102B No longer commercially available)		
1103	DURITE LD-5102	10/80
1104	VAMAC B-124	4/83
1105	MONDUR-M	7/80
1106	SARTOMER SR-297	3/83
1107	VITON E-60, E60C	2/84
1108	MAGNUS 26-N	8/83
1109	MAGNUS 92-S	3/83
1110	MAGNUS SC-100	10/83
1111	MAGNUS 215D	10/83
1112	MAGNUS WATER WASH 402	4/83
1113	MAGNUS 614	4/83
1114	MAGNUS 617	R-11/77
1115	URETHANE ENAMEL ACCELERATOR 189-S	10/83
1116	POLYISOCYANATE ACTIVATOR 192-S	10/83
1117	IMRON M, M, ENAMEL WHITE (817 U)	2/84
1118	RANEY NICKEL CATALYST #28	11/77
1119	KURIFLOCK PN-147 (Cancelled)	11/77
1119A	KURIFLOCK PN-161	10/82
1120	PYRE-ML WIRE ENAMEL, RC 5863	10/83
1121	PYRE-ML WIRE ENAMEL, Type I (RC5877)	10/83
1122	MAKON NF-5	8/83
1123	WHITE STAR BODY FILLER	5/84
1124	Y-469-D PIGMENT, YELLOW MED.	11/77
1125	PEDIGREE #357, TERASOD Wire Enamel	9/84
(1126)	None issued	--
1126A	BR-123 PRIMER	4/80
1126B	FM-123-5 ADHESIVE FILM	1/78
1127	PR-420	1/78
1128	EPON RESIN 829	1/78
1129	PEDIGREE #946 Wire Enamel	9/84
1130	J-1345, Basic Zinc Chromate	1/78
1131	REZ-N-BOND #1	12/78
1132	TEXACO SOLUBLE OIL "C"	1/78
(1133)	None issued	--
1133A	ARMSTRONG 520 ADHESIVE	12/83
1133B	ARMAFLEX PIPE INSULATION	1/78
1134	FREUND 6060 GLUE	10/84
1135	CM-154-XTX, Alkaline Soak Cleaner	1/78
1136	MOLD RELEASE #210-SS	9/84
1137	TEXACO 2234 CLEARTEX 140X	1/78
1138	COMPOUNDERS WAX IE-367	1/78
(1138 No longer commercially available 5/85)		
1139	PR-1527	1/78
1140	MOBIL VACTRA #2	4/82
1140A	MOBIL VACTRA #4	4/82
1141	MOBIL MIST LUBE 27	4/83
1142	GE RTV Silicone Rubber, Acetoxo-cure	R-3/82
1143	XYLAN 1010	8/78
1144	HANDY FLUX	8/78

VOLUME II - TRADENAME MATERIALS			VOLUME II - TRADENAME MATERIALS		
MSDS #	1000 AND UP	Dated (a)	MSDS #	1000 AND UP	Dated (a)
1203	KODAK PHOTO RESIST DEVELOPER	7/80	1258	VARSOL 18	5/82
1204	KODAK METAL ETCH RESIST (KMER) DEVELOPER	8/80	1259	ISOPAR L	5/82
1205	AZ 119 THINNER	9/80	1260	ISOPAR M	9/82
1205A	AZ 119S	9/80	1261	PENNWALT CLEANER K-2	9/82
1206	ALKALUME 1744	8/80	1262	DOWTHERM J	10/82
1207	RELIASOLV NO. 1001	8/80	1263	WAYCOAT SC RESIST 100/180/900	11/82
1208	ETHYL ANTIOXIDANT 701	8/80	1264	PARAFFINIC MINERAL OIL LUBRICANT	5/84
1209	NYLATRON GS-63	12/80	1265	ACRYLIC TOUCH-UP LACQUER, AEROSOL	2/83
1210	AGITENE	1/81	1266	MOBIL VAPROTEC LIGHT	3/83
1211	FREON TMS	12/80	1267	MOBIL VAPROTEC CONCENTRATE	3/83
1212	FREON TMC	12/80	1268	NUODEX COBALT NAPHTHENATE SOLUTION, 6% Co	7/83
1213	FREON TE & FREON TES	12/80	1269	EPI-CURE 855	10/83
1214	OAKITE 32	2/81	1270	SHELL OMALA OILS	10/83
1215	DOWTHERM G	R-1/81	1271	SHELL TURBO OILS	10/83
1216	DIELEKTROL III	12/80	1272	SHELL TELLUS OILS	10/83
1217	KODAK PHOTO RESIST THINNER, Type 4	12/80	1273	Triple Carbonate Coating Media	10/83
1218	VINYLOID 160 REDUCER	1/81	1274	TEXSOLVE B (GETTYSOLVE B)	7/84
1219	EASTMAN 910 ADHESIVE	12/80	1275	TEXSOLVE C (GETTYSOLVE C)	7/84
1220	ZINC-PLATE 162 REDUCER	1/81	1276	STYROPOR (BR Grades)	12/83
1221	EPOLON 22 BLACK MASTIC (A & B)	1/81	1277	Kodak Photo Resist, KPR	12/83
1222	HUMISEAL 1A20	2/81	1278	Kodak Photo Resist Developer	12/83
1223	ZINC-PLATE 49 ORGANIC PRIMER	5/81	1279	GLASKYD 1901	2/84
1224	OAKITE 56	4/81	1280	TEXSOLVE F (GETTYSOLVE F)	7/84
1225	FEL PRO C-102	2/81	1281	SS-4044 Primer	5/84
1226	OAKITE 90	2/81	1282	FRYQUEL 150 R&O	6/84
1227	CUPOSIT CATALYST 9F	3/81	1283	TECTYL Rust Preventatives	7/84
1228	OAKITE 94	7/81			
1229	TECTYL 890	6/81			
1230	ENDOX 114	6/81			
(1231)	[FREON 116 (deleted 12/85, see MSDS # G 572)]				
1232	CUPOSIT Y	9/81	1284	SUNVIS 916 (32)	9/84
1233	CUPOSIT 802M	9/81	1285	V-Lube Pump Oil F	9/84
1233A	CUPOSIT 802A	9/81	1286	Aromatic A-150	7/84
1233B	CUPOSIT 802B and 802B-2	9/81	1287	Armstrong D-253	9/84
1233C	CUPOSIT 802R REPLENISHER	9/81	1288	Silastic RTV Adhesive/Sealant (Acetoxy-cure)	9/84
1234	CUPOSIT CP-74A	10/81	1289	DOW CORNING 994 VARNISH	7/85
1235	CUPOSIT Z	10/81	1290	DOW CORNING 997 VARNISH	7/85
1236	CUPOSIT CP-74B	10/81	1291	TRITON X-100 SURFACTANT	7/85
1237	CUPOSIT CP-74H	10/81			
1238	CUPOSIT CP-74M	11/81			
1239	CUPOSIT CP-74Q	10/81			
1240	CUPOSIT CP-74R	11/81			
1241	CHEMLOK 250	R-6/82			
1242	PROPRIETARY SOLVENT (Fed. Formula #1)	10/81			
1243	DAG 154	10/81			
1244	OAKITE CRYSCOAT 247	9/81			
1245	CHLOROCLEAN	9/81			
1246	CIMCOOL FIVE STAR 30	6/82			
1247	OAKITE DEOXIDIZER 34	5/82			
1248	RODINE 85	6/82			
1249	RELIASOLV 564	1/82			
1250	ALPHA 811 FLUX	2/82			
1251	SE-75 DEGREASING SOLVENT	2/82			
1252	ALPHA 812 THINNER	2/82			
1253	HI-SIL 233	2/82			
1254	PHENOLIC MOLDING COMPOUND, MINERAL FILLED	R-3/82			
1254A	PHENOLIC MOLDING COMPOUND, CELLULOSE FILLED	R-3/82			
(1255)	[Cancelled 3/83. Replaced by MSDS #507]	--			
1255A	HYSOL PC17, Part A	2/83			
1255B	HYSOL PC17, Part B	2/83			
1256	SUN WAY OIL 90	4/82			
1257	VARSOL 1	5/82			

See Volume I for sheet #'s below 1000.

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