

Washington State Department of Ecology

Environmental Assessment Program

Standard Operating Procedure for the Collection and Field Processing of Metals Samples

Version 1.5

Author - William J. Ward

Date -

Reviewer - Jim Ross

Date -

QA Approval - William R. Kammin, Ecology Quality Assurance Officer

Date -

EAP029

Recertified: 10/15/10

Updated and Recertified: 01/09/2015

APPROVED:

Signatures on File

Please note that the Washington State Department of Ecology's Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical and administrative experts. Their primary purpose is for internal Ecology use, although sampling and administrative SOPs may have a wider utility. Our SOPs do not supplant official published methods. Distribution of these SOPs does not constitute an endorsement of a particular procedure or method.

Any reference to specific equipment, manufacturer, or supplies is for descriptive purposes only and does not constitute an endorsement of a particular product or service by the author or by the Department of Ecology.

Although Ecology follows the SOP in most instances, there may be instances in which Ecology uses an alternative methodology, procedure, or process.

SOP Revision History

Revision Date	Rev number	Summary of changes	Sections	Reviser(s)
2/1/2007		Editorial; formatting	All	Bill Ward
		Comments	All	Dave Hallock
2/2/2007	1.1	Edits based on comments	All	Bill Ward
3/21/2007	1.1	Editorial Review	All	Bill Kammin
4/2/2007	1.2	Edits based on comments	All	Bill Ward
4/16/2007	1.2	Final Review	All	Jim Ross
4/25/2007	1.3	Edits based on comments	All	Bill Ward
10/14/2010	1.4	Minor revisions to blank samples	5 & 8	Bill Ward
10/15/10	1.4	Recertified	All	Bill Kammin
4/9/13	1.5	Added new chemical awareness language. Attached the MSDS sheet	5	Bill Ward
12/30/14		Added new Hg methods	All	Bill Ward
1/7/15		Edits Review	2, 6	Howard Christensen and Casey Clishe
1/9/15		Recertified	All	Bill Kammin

Standard Operating Procedure for the Collection and Field Processing of Metals Samples

1.0 Purpose and Scope

- 1.1 This document is the Environmental Assessment Program (EAP), Environmental Monitoring and Trends Section, Freshwater Monitoring Unit, Standard Operating Procedure (SOP) for collecting freshwater metals samples for laboratory analysis. The sample collection and field processing methods generally follow those under Method 1669 (EPA, 1996).

2.0 Applicability

- 2.1 This SOP is intended for the collection of freshwater metals samples to be analyzed by one or more of the following methods:
- 2.2 Dissolved Metals Method – Modified version of EPA Method 200.8 (Using inductively coupled plasma - mass spectrometry (ICP-MS))
- 2.3 Total Recoverable Metals Method –EPA 202.2 (Hotplate Assisted Digestion) and a modified version of EPA 200.7 Method (ICP).
- 2.4 Total Mercury Method –EPA 1631 (Cold Vapor Atomic)

3.0 Definitions

- 3.1 EAP – Environmental Assessment Program.
- 3.2 Ecology – Washington State Department of Ecology.
- 3.3 EIM – Environmental Information Management System. A searchable database developed and maintained by the Washington State Department of Ecology.
- 3.4 FEP – fluorinated ethylene propylene resin
- 3.5 Field Logbook – A weather resistant logbook containing “Rite in the Rain”[®] writing paper used to document any and all field activities, sample data, methods, and observations for each and all collection sites.
- 3.6 MQO’s – Measurement Quality Objectives
- 3.7 MSDS – Material Safety Data Sheets provides both workers and emergency personnel with the proper procedures for handling or working with a particular substance. MSDSes include information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment and spill/leak procedures.
- 3.8 QA – Quality Assurance

4.0 Personnel Qualifications/Responsibilities

- 4.1 Field operations require training specified in EAP's Field Safety Manual (Ecology, 2006) such as First Aid, CPR, and Defensive Driving.
- 4.2 Boat operations require that staff meet specific training requirements as described in EAP's Field Safety Manual, such as an EAP Boating Course and an approved Boating Safety Course.
- 4.3 Because the procedure requires the use of hazardous materials, training is required as per the Ecology Chemical Hygiene Plan and Hazardous Material Handling Plan (Section 1) (WA State Department of Ecology, 2006), which include Laboratory Safety Orientation, Job-Specific Orientation and Chemical Safety Procedures. The Standard Operating Procedures in Section 16 of the Chemical Hygiene Plan and Hazardous Material Handling Plan for handling chemicals must also be followed.

5.0 Equipment, Reagents, and Supplies

- 5.1 Metals sampler
- 5.2 Sampling ropes 1 @ 10 ft., 1 @ 35 ft., and 2 @ 55 ft.
- 5.3 Extension pole with bottle clamp
- 5.4 Cooler containing ice
- 5.5 Hand vacuum pump with hose
- 5.6 500mL Teflon FEP bottles pre-filled with DI water by the lab
- 5.7 125 mL narrow mouth poly bottle containing H₂S₀4 preservative for hardness sample
- 5.8 Disposable 0.45 micron cellulose nitrate filter unit (pre-cleaned Nalgene #450-0045, type S)
- 5.9 Small Teflon vials containing 5 ml concentrated nitric acid preservative (see Attachment A for MSDS). *Danger* this acid causes severe burns by all exposure routes.
- 5.10 Powder free vinyl disposable gloves

Metals sampler
w/sample bottle



6.0 Summary of Procedure

- 6.1 Sampling procedures generally follow EPA Method 1669. Samples are collected as single grabs in a 500ml Teflon FEP bottle using the stainless steel metals sampler or by hand. Care must be used at all times when collecting and processing metals samples to avoid contaminating the inside of the sample bottle or cap with debris or ambient air. Also, samples need to be preserved with acid and placed in ice in a cooler as soon as possible after collection. The holding time prior to analysis for all metals, except mercury, is six months. The holding time for mercury is 28 days.

- 6.2 Metals Sampler Method. This method is typically used to collect samples from a bridge or from the stream bank through the use of a rope.
- 6.2.1 Invert the Teflon sample bottle, remove the cap, pick up the metals sampler, and rinse the sampler with the deionized water that empties out of the bottle.
- 6.2.2 After the bottle empties, set the sampler down and replace the bottle cap.
- 6.2.3 Then fit the sample bottle into the base of the stainless steel metals sampler.
- 6.2.4 Completely loosen the bottle cap while it is kept on the bottle opening. Gently lower the sampler-lifting-arm hose clamp over the cap, and then tighten the clamp to secure it.
- 6.2.5 Attach the sampling rope.
- 6.2.6 Move to a well-mixed location such as the deepest part of the active channel where a representative sample may be collected.
- 6.2.7 Check to make sure the sampler lifting arm can move up freely.
- 6.2.8 Carefully lower the sampler to the water surface, taking care to not dislodge bridge debris onto it. Allow the bottom of the sampler to touch the water surface, and then raise the sampler off the water for a few moments to allow any debris from the bottom of the sampler to drop off and float away. Note: This minimizes the sampling of any debris from the bottom of the sampler.
- 6.2.9 Lower the sampler about 15 cm (6 inches) into the water. Allow the current to reorient the sampler so the sample bottle is on the upstream side of the sampler. Then rapidly lower the sampler about 0.5 meters to completely submerge it. This minimizes the sampling of surface film. Note: At about 25 cm under the water surface, the sampler should automatically raise the bottle cap and allow the bottle to fill. Also, it may take more than 45 seconds for the bottle to fill.
- 6.2.10 Retrieve the filled bottle taking care to not dislodge bridge debris onto it or the sampler.
- 6.2.11 Remove the filled sample bottle from the sampler, hold the bottle cap down on the bottle opening, carefully loosen the lifting arm hose-clamp, screw on the cap until it is tight, and place the bottle back in the Ziploc bag it shipped in.
- 6.2.12 Repeat the procedure to obtain the second metals sample.
- 6.2.13 Put on a pair of gloves from the special Hg metals bottle bag and repeat procedures 6.2.1 – 6.2.4 to secure the bottle in the sampler.
- 6.2.14 Remove the gloves, and follow procedures 6.2.5 – 6.2.10 to collect the sample.
- 6.2.15 Put on another pair of the gloves, hold the bottle cap down on the bottle opening, carefully loosen the lifting arm hose-clamp, screw on the cap until it is tight, remove

and tag the bottle, and place it back in the Ziploc bag it shipped in. **Note: Do not acidify this sample.**

- 6.2.16 Return to the van with the samples and sampling gear.
- 6.3 Hand Dip Method. This method is typically used to collect samples from a small or shallow stream, or near the bank of a large stream.
 - 6.3.1 Move to a well mixed location such as the deepest part of the active channel or another location where a representative sample may be collected. **Note: Do not contaminate the sample location by wading upstream of it or collect a sample from an eddy that has been waded.**
 - 6.3.2 Grab the base of the sample bottle with one hand, invert the Teflon sample bottle, remove the cap, and let the deionized water empty out of the bottle.
 - 6.3.3 Reach upstream, and plunge the bottle into the water about 15 cm (6 inches), and then tip the bottle mouth up toward the water surface.
 - 6.3.4 Allow the bottle to fill and then take it out of the water.
 - 6.3.5 Replace the cap in a way that avoids contamination to the inside of the bottle and place the bottle in the Ziploc bag it shipped in.
 - 6.3.6 Repeat the procedure to obtain the second metals sample.
 - 6.3.7 Put on a pair of gloves from the special metals bottle bag, repeat procedures 6.3.1 – 6.3.5 to collect the new Hg metals sample, tag the bottle with the new Hg tag, and place it back in the Ziploc bag it shipped in. **Note: Do not acidify this sample.**
 - 6.3.8 Return to the van with the samples and sampling gear.
- 6.4 Extension Pole Method. This method is typically used to reach a more representative or undisturbed sample location from the stream bank or when wading in a lake or slow moving stream.
 - 6.4.1 Secure the metals sample bottle in the extension pole clamp.
 - 6.4.2 Move to a well mixed location where a representative sample may be reached with the pole. **Note: Do not contaminate the sample location by wading upstream of it or collect a sample from an eddy that had been waded.**
 - 6.4.3 Invert the Teflon sample bottle, remove the cap, and let the deionized water empty out of the bottle. Also, put the cap into the Ziploc bag the bottle shipped in and put the bag in a location that will prevent contamination to the inside of the cap.
 - 6.4.4 Position the bottle over the desired sample location.

- 6.4.5 Invert the bottle and, in one quick motion, plunge the mouth of the bottle into the water about 15 cm (6 inches). Then slowly move the bottle upstream with the bottle mouth tipped toward the water surface until the bottle has filled. In lakes, slowly move the tipped bottle away from the bottle entry point until it completely fills.
- 6.4.6 Take the filled bottle out of the water and then replace the bottle cap in a way that avoids contamination to the inside of the cap and bottle.
- 6.4.7 Repeat the procedure to obtain the second metals sample.
- 6.4.8 Put on a pair of gloves from the special metals bottle bag, remove the cap, collect the new Hg metals sample, replace the cap, tag the bottle with the new Hg tag, and place it back in the Ziploc bag it shipped in. **Note: Do not acidify this sample or set the cap down.**
- 6.4.9 Return to the van with the samples and sampling gear.
- 6.5 Field Processing - Total Recoverable Metals
- 6.4.1 Put on the vinyl gloves.
- 6.4.2 Remove the disposable filter unit from the large Ziploc bag, and set the bag and filter unit aside.
- 6.4.3 Remove the cap from the first sample bottle. Do not set the cap down.
- 6.4.4 If necessary, gently squeeze the side of the sample bottle to displace about 5 ml of sample to make room for the nitric acid preservative.
- 6.4.5 Carefully uncap the small Teflon vial containing 1:1 nitric acid, and add the acid to the sample. Screw the cap on the sample and then re-cap the nitric acid vial.
- 6.4.6 Attach the Total Metals and Total Recoverable Mercury sample tag to the sample bottle.
- 6.4.7 Place the tagged sample in its original Ziploc bag along with the empty (capped) Teflon vial, eliminate air from the Ziploc bag, and seal it. Then put it in the large Ziploc bag that contained the filter unit.
- 6.4 Field Processing - Dissolved Metals
- 6.5.1 Attach the hand-pump hose to the filter unit.
- 6.5.2 Remove the cap from the second sample bottle; lift up one side of the filter unit lid about 3 cm (1 inch), and pour the sample into the top of the unit. Note: Avoid touching or contaminating the inside of the filter unit.
- 6.5.3 Cap the empty sample bottle, and put it into the large Ziploc bag that also contains the tagged total metals sample.

- 6.5.4 Hold on to the filter unit with one hand, and use the other hand to squeeze and release the hand-pump lever to create a vacuum to filter the sample.
- 6.5.5 Filter as much of the sample as possible (at least half).
- 6.5.6 Empty deionized water from an unused Teflon bottle, and put the cap on the bottle opening.
- 6.5.7 Unscrew the bottom of the filter apparatus, remove the cap from the top of the unused Teflon sample bottle (do not set the cap down), pour the filtered sample into the Teflon bottle, and put the cap on the bottle opening.
- 6.5.8 Carefully uncap the small Teflon vial containing 1:1 nitric acid, lift the cap off the bottle containing the filtered sample, and add the acid to the sample. Screw the cap on the sample, and then recap the nitric acid vial.
- 6.5.9 Attach the Dissolved Metals sample tag to the sample bottle.
- 6.5.10 Place the tagged sample in its original Ziploc bag along with the empty (capped) Teflon vial.
- 6.5.11 Eliminate air from the Ziploc bag, seal it, and put it in the large Ziploc bag that contains the tagged total metals sample and the empty Teflon bottle.
- 6.6 Field Processing – New Hg Metals
- 6.6.1 Eliminate air from the Ziploc bag, seal it, and put it in the large Ziploc bag that contains the: tagged total metals sample, dissolved metals sample, and the empty Teflon bottle.
- 6.6.2 Eliminate air from the large Ziploc bag, and place the bagged metals samples on ice in a cooler.
- 6.7 Field Processing – Hardness
- 6.6.1 Hardness samples are sub-sampled from the 1 L bottle used to collect nutrient samples or the 1 L bottle used to collect pH/conductivity samples (See Stream Sampling SOP). The 1 L total suspended solids (TSS) or 0.5 L general chemistry samples may also be used if the other grab samples are unavailable.
- 6.6.2 Pour approximately 100 mL of the field grab sample into the 125 mL hardness sample bottle (wide-mouth poly bottle containing H2S04 preservative).
- 6.6.3 Cap and invert the hardness sample bottle to ensure that the acid gets mixed into the sample. *Note: Avoid contact with the acid.*

6.6.4 Label the hardness sample, and place the sample in ice in a cooler. *Do not put this bottle in with the metals samples.*

7.0 Records Management

7.1 All hardcopy documentation of the data, such as completed Field Logbook and Field Data Report Forms are kept and maintained by the project lead. These documents are organized in binders or in expanding files. After about six years, hardcopies are boxed and moved to EAP archives.

7.2 Data collected for Ecology's Ambient River and Stream Monitoring Program will be entered into our Access-based database, reviewed and verified following the Quality Control and Quality Assurance procedures (see 8.1 below), uploaded into EIM, and posted on our webpage: www.ecy.wa.gov/programs/eap/fw_riv/rv_main.html.

7.3 Data collected for special project studies will be reviewed, verified, and stored based on the QAPP for the project.

8.0 Quality Control and Quality Assurance

8.1 The data QA program for field sampling consists of three parts: (1) adherence to the SOP procedures for sample/data collection and periodic evaluation of sampling personnel, (2) consistent instrument calibration methods and schedules, and (3) the collection of field quality control (QC) samples based on the study Quality Assurance Project Plan requirements. Our QA program is described in detail in Hallock and Ehinger (2003).

8.2 True Process Field Blank Samples. These field QC samples are subject to the sample site collection and dissolved metals sample processing conditions. The expected value for this analyzed result is the reporting limit. Higher results would indicate that sample contamination had occurred during field processing or laboratory analysis.

8.2.1 Load the sampler with a metals bottle (do not empty the special DI water out of the bottle). Go to the sample site, remove the bottle cap, and put the cap in a dry Ziploc bag to avoid any contamination. Lower the Metals Sampler to the water surface (do not immerse anything into the stream), retrieve the sampler, and cap the bottle.

8.2.2 Return to the van, and follow the Dissolved Metals processing procedure (see procedure 6.5 above), refill the original sample bottle, and attach the dissolved metals QC tag.

9.0 Safety

9.1 Safety is the primary concern when collecting samples. Since most sample sites are located on highway bridges, road and pass conditions should always be checked before departure (especially in winter). If roadside hazards, weather, accidents, construction, etc. make sample collection dangerous, then skip that station. Note the reason on the Field Data Report Form, and notify your supervisor of the hazard when you return to the office. If the hazard is a permanent condition, relocation of the station may be

necessary. Review Ecology's Safety Program Manual periodically to assist with these safety determinations.

10.0 References

- 10.1 Ecology, 2006. Environmental Assessment Program Safety Manual. Olympia, WA.
- 10.2 Ecology, 2006. Chemical hygiene plan and hazardous material handling plan. Olympia, WA.
- 10.3 Ecology, 2007. Standard Operating Procedures for the Collection and Processing of Stream Samples. Olympia, WA.
- 10.4 EPA, 1996. Method 1669, Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels. Washington, D.C.
- 10.5 Hallock, D. and W. Ehinger, 2003. Quality Assurance Monitoring Plan: Stream Ambient Water Quality Monitoring. Washington State Department of Ecology, Olympia, WA. 27 pp. Publication No. 03-03-200.
<https://fortress.wa.gov/ecy/publications/summarypages/0303200.html>

Attachment A



Fisher Scientific

Part of Thermo Fisher Scientific

Material Safety Data Sheet

Creation Date 12-Mar-2009

Revision Date 27-Sep-2011

Revision Number 3

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name Nitric acid, Trace Metal Grade

Cat No. A509-212; A509-500; A509P212; A509P500; A509SK212

Synonyms Azotic acid; Engraver's acid; Aqua fortis

Recommended Use Laboratory chemicals

Company Fisher Scientific One
Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview

Oxidizer: Contact with combustible/organic material may cause fire. Causes severe burns by all exposure routes. May cause pulmonary edema.

Appearance Clear Colorless, Light yellow

Physical State Liquid

odor strong Acrid

Target Organs

Eyes, Respiratory system, Skin, Teeth, Kidney, Gastrointestinal tract (GI)

Potential Health Effects

Acute Effects

Principle Routes of Exposure

Eyes

Causes severe burns. May cause blindness or permanent eye damage.

Skin

Causes severe burns. May be harmful in contact with skin.

Inhalation

Causes severe burns. May cause pulmonary edema. May be harmful if inhaled.

Ingestion

Ingestion causes burns of the upper digestive and respiratory tract. May be harmful if swallowed.

Chronic Effects

Chronic exposure to corrosive fumes/gases may cause erosion of the teeth followed by jaw necrosis. Bronchial irritation with chronic cough and frequent attacks of pneumonia are common. Gastrointestinal disturbances may also be seen. May cause adverse kidney effects. Experiments have shown reproductive toxicity effects on laboratory animals.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions Preexisting eye disorders. Skin disorders.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Haz/Non-haz

Component	CAS-No	Weight %
Nitric acid	7697-37-2	65 - 70
Water	7732-18-5	30 - 35

4. FIRST AID MEASURES

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.
Ingestion	Do not induce vomiting. Call a physician or Poison Control Center immediately.
Notes to Physician	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flash Point	Not applicable
Method	No information available.
Autoignition Temperature	No information available.
Explosion Limits	
Upper	No data available
Lower	No data available
Suitable Extinguishing Media	Substance is nonflammable; use agent most appropriate to extinguish surrounding fire..
Unsuitable Extinguishing Media	No information available.
Hazardous Combustion Products	No information available.
Sensitivity to mechanical impact	No information available.
Sensitivity to static discharge	No information available.

Specific Hazards Arising from the Chemical

Oxidizer: Contact with combustible/organic material may cause fire. Corrosive Material. Causes severe burns by all exposure routes. Thermal decomposition can lead to release of irritating gases and vapors.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear

NFPA **Health** 4 **Flammability** 0 **Instability** 0 **Physical hazards** OX

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Wear self-contained breathing apparatus and protective suit. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing.

Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable and closed containers for disposal. Keep away from clothing and other combustible materials.

7. HANDLING AND STORAGE

Handling Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Keep away from clothing and other combustible materials. Do not breathe vapors/dust. Do not ingest. Contents under pressure.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Do not store near combustible materials

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Nitric acid	TWA: 2 ppm STEL: 4 ppm	(Vacated) TWA: 2 ppm (Vacated) TWA: 5 mg/m ³ (Vacated) STEL: 4 ppm (Vacated) STEL: 10 mg/m ³ TWA: 2 ppm TWA: 5 mg/m ³	IDLH: 25 ppm TWA: 2 ppm TWA: 5 mg/m ³ STEL: 4 ppm STEL: 10 mg/m ³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Nitric acid	TWA: 2 ppm TWA: 5.2 mg/m ³ STEL: 4 ppm STEL: 10 mg/m ³	TWA: 2 ppm TWA: 5 mg/m ³ STEL: 4 ppm STEL: 10 mg/m ³	TWA: 2 ppm STEL: 4 ppm

NIOSH IDLH: Immediately Dangerous to Life or Health

Personal Protective Equipment

Eye/face Protection

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Clear Colorless, Light yellow
odor	strong Acrid
Odor Threshold	No information available.
pH	1.0 (0.1M)
Vapor Pressure	0.94 kPa (20°C)
Vapor Density	No information available.
Viscosity	No information available.
Boiling Point/Range	120.5°C / 248.9°F
Melting Point/Range	-41°C / -41.8°F
Decomposition temperature	No information available.
Flash Point	Not applicable
Evaporation Rate	No information available.
Specific Gravity	1.40
Solubility	No information available.
log Pow	No data available
Molecular Weight	63.02
Molecular Formula	HNO ₃

10. STABILITY AND REACTIVITY

Stability	Oxidizer: Contact with combustible/organic material may cause fire.
Conditions to Avoid	Incompatible products. Combustible material. Excess heat.
Incompatible Materials	Strong bases, Reducing agents, Organic materials, Aldehydes, Alcohols, Cyanides, Metals, Powdered metals, Ammonia
Hazardous Decomposition Products	Nitrogen oxides (NO _x)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions .	None under normal processing..

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Nitric acid	Not listed	Not listed	130 mg/m ³ (Rat) 4 h 7 mg/L (Rat) 1 h

Irritation Causes severe burns by all exposure routes

Toxicologically Synergistic Products No information available.

Chronic Toxicity

Carcinogenicity There are no known carcinogenic chemicals in this product

Sensitization No information available.

Mutagenic Effects No information available.

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects No information available.

Teratogenicity Teratogenic effects have occurred in experimental animals..

Other Adverse Effects See actual entry in RTECS for complete information.

Endocrine Disruptor Information No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity

Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Nitric acid	Not listed	72 mg/L LC50 96 h	Not listed	Not listed

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available

Mobility .

Component	log Pow
Nitric acid	-2.3

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. TRANSPORT INFORMATION

DOT

UN-No UN2031
 Proper Shipping Name NITRIC ACID
 Hazard Class 8
 Subsidiary Hazard Class 5.1
 Packing Group II

TDG

UN-No UN2031
 Proper Shipping Name NITRIC ACID
 Hazard Class 8
 Subsidiary Hazard Class 5.1
 Packing Group II

IATA

UN-No UN2031
 Proper Shipping Name NITRIC ACID
 Hazard Class 8
 Subsidiary Hazard Class 5.1
 Packing Group II

IMDG/IMO

UN-No UN2031
 Proper Shipping Name NITRIC ACID
 Hazard Class 8
 Subsidiary Hazard Class 5.1
 Packing Group II

15. REGULATORY INFORMATION

All of the components in the product are on the following Inventory lists:

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	CHINA	KECL
Nitric acid	X	X	-	231-714-2	-		X	X	X	X	X
Water	X	X	-	231-791-2	-		X	-	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
 P - Indicates a commenced PMN substance
 R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
 S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
 T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
 XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).
 Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
 Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Nitric acid	7697-37-2	65 - 70	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard Yes
 Chronic Health Hazard No
 Fire Hazard No
 Sudden Release of Pressure Hazard No
 Reactive Hazard Yes

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Nitric acid	X	1000 lb	-	-

Clean Air Act

Not applicable

OSHA

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Nitric acid	-	TQ: 500 lb

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Nitric acid	1000 lb	1000 lb

California Proposition 65

This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Nitric acid					

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Nitric acid	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
 DOT Marine Pollutant N
 DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product contains the following DHS chemicals:

Component	DHS Chemical Facility Anti-Terrorism Standard
Nitric acid	2000 lb STQ

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class

- C Oxidizing materials
- E Corrosive material



16. OTHER INFORMATION

Prepared By Regulatory Affairs
 Thermo Fisher Scientific
 Tel: (412) 490-8929

Creation Date 12-Mar-2009

Print Date 27-Sep-2011

Revision Summary (M)SDS sections updated 3

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

**E
n
d
o
f
M
S
D
S**