

Nevada Division of Environmental Protection

Bureau of Water Pollution Control

(775) 687-9418

WASTEWATER SAMPLING PLAN

WTS-50

September 2014 (Version No. 1)

I. Introduction:

This guidance document provides an overview of the wastewater sampling plan used by the Bureau of Water Pollution Control (BWPC) when conducting a Compliance Sampling Inspection (CSI) at a regulated wastewater treatment facility. The specific wastewater panels/tests, preservation methods, sample containers and hold times are applicable for those analyses performed at the Nevada State Public Health Laboratory. The telephone numbers for this laboratory are (775) 688-1335 (Phone), (775) 688-1460 (Fax). For a list of other State certified laboratories, the reader is referred to the NDEP Laboratory Certification Program (LCP) website: <http://ndep.nv.gov/bsdw/labservice.htm>. The website includes a downloadable Microsoft Excel spreadsheet entitled *Nevada Certified Lab List*.

II. Safety:

BWPC personnel sampling wastewater discharge facilities must exercise appropriate caution in the sampling workplace to protect themselves from potential hazards including exposure to: disease-causing bacteriological/viral agents, mechanical equipment (e.g. rotary auger screens) and limited footing traction (e.g. wastewater holding basins). Personal Protective Equipment (PPE) that is available includes disposable nitrile (latex-free) gloves, hardhats (construction zones) and safety shoes (e.g. waterproof/water resistant, steel-toed). In addition, protective eyewear is recommended when using chemicals (e.g. acids). Sampling supplies in the NDEP Carson City office are stocked in the BWPC Copy Room (3rd Floor Bryan Building) and the Bureau of Water Quality Planning (BWQP) Laboratory (1st Floor Bryan Building). The NDEP Las Vegas office also has a supply room where the BWPC sampling supplies and refrigerator (samples and ice packs) are maintained.



Fig. 1 - BWPC Supplies



Fig. 2 - BWQP Laboratory



Fig. 3 - NDEP Las Vegas

III. Influent Sampling:

An influent (e.g. untreated) wastewater sample is collected to assess the incoming wastewater strength (e.g. biochemical oxygen demand) and/or determine the overall removal efficiency of pollutants including 5-Day Biochemical Oxygen Demand (BOD₅) and Total Suspended Solids (TSS). Since influent samples are not disinfected, the bacteriological/viral hazard is greatest to the sampling personnel, and therefore, appropriate PPE such as disposable gloves must be worn. Also, particulate respirators are available for sampling in confined spaces (wet wells). To avoid cross-contamination, separate dippers and transfer funnels should be used or otherwise cleaned and disinfected (e.g. soap and bleach) prior to switching between influent and effluent samples. BWPC maintains sample dippers in pint (16 oz.) and liter (33 oz.) volume sizes.



Fig. 4 - Influent Sampling

IV. Effluent Sampling:

An effluent (treated) wastewater sample is collected to assess the compliance of the facility with the effluent limitations specified in its groundwater (NS) or NPDES (NV) discharge permit. Effluent sampling is conducted annually by BWPC at Major NPDES POTWs rated for capacity of ≥ 1.0 MGD. Although effluent samples are treated to meet standards considered "safe" for discharge to the aquatic and groundwater environment, appropriate PPE and workplace practices must still be exercised.



Fig. 5 - Effluent Sampling

V. Discrete Samples:

Discrete or “grab” samples are collected in a timeframe not to exceed fifteen (15) minutes. Discrete sampling is used for both influent and effluent samples. In its sampling inspections, BWPC personnel attempt to collect samples at the appropriate sampling outfall; sample spigot or other sample collection point to match the Permittee’s sampling procedure for collecting a representative compliance sample.



Fig. 6 - Discrete Sampling

VI. Composite Samples:

A composite sample is collected over a defined time period (e.g. 24-hr.) with an automatic sampler or by manually blending two or more samples into one sample container.

A time composite sample is obtained by collecting equal volumes of sample (e.g. aliquot) at a specified time interval into a single sample container. For example, NDEP's automatic samplers are programmable to collect a 450-ml (15 oz.) aliquot each hour for 24-hr. Time composite samples are used to assess the performance of treatment facilities, which are flow-equalized to avoid the diurnal flow variance in municipal wastewater collection systems. Upon breakdown of its automatic sampler,

BWPC will offer the POTW's lab a split of the remaining sample in the composite bottle once the BWPC sample bottles have been filled and preserved.

Flow proportional samples also use a single collection bottle but vary the volume of the discrete sample (e.g. aliquot) proportional to the measured flow rate. For these samples, BWPC uses an automatic sampler in communication with an open-channel flow sensor (ultrasonic). Flow proportional samples adjust for the diurnal flow variance over the 24-hour sample collection period.



Fig. 7 - Time Composite Sample



Fig. 8 - Flow Proportional Sample

VII. Annual Sampling:

A Compliance Sampling Inspection (CSI) is conducted at the following Major NPDES Permittee's.

- Truckee Meadows Water Reclamation Facility (NV0020150)
- City of Fallon Wastewater Treatment Plant (NV0020061)
- Clark County Water Reclamation District (NV0021261)
- Laughlin Water Reclamation Facility (NV0021563)
- City of North Las Vegas Wastewater Treatment Facility (NV0023647)
- City of Las Vegas Water Pollution Control Facility (NV0020133)
- City of Henderson Water Reclamation Facility (NV0022098)

The typical effluent panels analyzed include:

- BOD₅
- CBOD (e.g. if per the permit & also for lagoon systems)
- Routine Pollution
- Total Metals
- Dissolved Metals (e.g. for a silver or Ag analysis)
- Bacteriological

Table 1 - Parameters Commonly Analyzed for Inspections¹

Analytical Parameter	Analytical Method Number	Laboratory Reporting Limits
BIOCHEMICAL OXYGEN DEMAND:		
BOD ₅	SM 5210 B	2 mg/l
CBOD (nitrification-inhibited)	SM 5210 B	2 mg/l
BACTERIA:		
Total Coliform	MPN Standard 9221 B	1 MPN/100 mL
<i>E. Coli</i>	MPN Standard 9221 F	1 MPN/100 mL
Fecal Coliform	MPN Standard 9221 E	1 CFU/100 mL
ROUTINE PARAMETERS:		
Alkalinity as CaCO ₃	SM 2320 B	20 mg/L
Ammonia-N	SM 4500 NH ₃ D	0.1 mg/L
Bicarbonate	SM 2320 B	25 mg/L
Carbonate	SM 2320 B	12 mg/L
Chloride	EPA 300.0	5 mg/L
Color	SM 2120 B	5 CU
Electrical Conductivity	SM 2320 B	10 µmhos/cm
Fluoride	EPA 300.0	0.1 mg/l
Hydroxide	SM 2320 B	7 mg/L
Ortho-Phosphate	SM 4500 P E	0.01 mg/L
pH	SM 4500 H+B	0.0 to 14.0 S.U.
pH Temperature	SM 4500 H+B	N/A
Sulfate	EPA 300.0	5 mg/L

Total Dissolved Solids	SM 2540 C	25 mg/L
Total Kjeldahl Nitrogen (TKN)	SM 4500 NH ₃ D	0.2 mg/L
Nitrite	SM 4500 NO ₂ B	0.01 mg/L
Nitrate + Nitrite	EPA 300.0	0.5 mg/L
Total Phosphorus	SM 4500 P E	0.01 mg/L
Total Suspended Solids	EPA 160.2	10 mg/L
Turbidity	SM 2130 B	0.4 NTU

1. Reporting limits per the Nevada State Public Health Laboratory.

Table 1 (continued) - Parameters Commonly Analyzed for Inspections¹

Analytical Parameter	Analytical Method Number	Laboratory Reporting Limits
METALS:		
Antimony, Sb	EPA 200.8	1 µg/L
Arsenic, As	EPA 200.8	3 µg/L
Barium, Ba	EPA 200.7	20 µg/L
Beryllium, Be	EPA 200.8	1 µg/L
Boron, B	EPA 200.7	100 µg/L
Cadmium, Cd	EPA 200.8	1 µg/L
Calcium, Ca	EPA 200.7	5 mg/L
Chromium (total), Cr	EPA 200.8	1 µg/L
Copper, Cu	EPA 200.8	1 µg/L
Fluoride, F ⁻	EPA 300.0	100 µg/L
Iron, Fe	EPA 200.7	50 µg/L

Lead, Pb	EPA 200.8	1 µg/L
Magnesium, Mg	EPA 200.7	5 mg/L
Manganese, Mn	EPA 200.7	20 µg/L
Mercury, Hg	EPA 245.2	0.2 µg/L
Molybdenum, Mo	EPA 200.8	10 µg/L
Nickel, Ni	EPA 200.8	1 µg/L
Selenium, Se	EPA 200.8	1 µg/L
Silver, Ag	EPA 200.8	2 µg/L
Sodium, Na	EPA 200.7	5 mg/L
Thallium, Tl	EPA 200.8	0.5 µg/L
Zinc, Zn	EPA 200.8	10 µg/L

1. Reporting limits per the Nevada State Public Health Laboratory.

VIII. BOD₅ or CBOD Panel:

Table 2 - BOD₅ or CBOD Panel

Analytical Parameter	Analytical Method Number	Container	Preservation Requirements	Maximum Holding Times
BOD ₅	SM 5210 B	(1) 0.5 gallon HDPE bottle per each BOD ₅ or CBOD analysis with blue cap.	Secure with blue cap. Bottle is chilled to 4° C.	48 hours
CBOD (nitrification-inhibited)	SM 5210 B			48 hours

- In a labeled 0.5 gallon sample bottle, collect the BOD₅ or CBOD sample. Do not overfill the bottle.
- Cap tightly with one blue screw cap. Wipe bottle clean.
- Store bottle in a chilled cooler or refrigerator to 4°C (39°F).
- Complete applicable Chain of Custody Form.
- Transport sample to the lab within the specified hold time (i.e. the elapsed time from the time of the sample collection until start of the lab analysis).
- Use separate bottles if conducting both the BOD₅ and CBOD analyses.



Fig. 9 - BOD₅ or CBOD Sample Bottle & Blue Cap

IX. Routine Pollution Panel:

Table 3 - Preserved Routine Pollution Parameters

Analytical Parameter	Analytical Method Number	Container	Preservation Requirements	Maximum Holding Times
Ammonia-N	SM 4500 NH ₃ D	(1) 0.5 gallon HDPE bottle per each acidified Routine Pollution analysis with red cap.	Bottle is preserved with 5-ml sulfuric acid (96%) immediately after collection. Secure with red cap. Chill bottle to 4°C.	28 days
Nitrite + Nitrate	EPA 300.0			28 days
Total Kjeldahl Nitrogen	SM 4500 N B			28 days
Total Phosphorus	SM 4500 P E			28 days

- For the above parameters, in a labeled 0.5 gallon sample bottle, collect the preserved portion of the Routine Pollution sample. Do not overfill the bottle. Leave sufficient room in the bottle for addition of the acid preservative.
- Using disposable gloves and eye protection (recommended), carefully add the contents of one vial (5-ml sulfuric acid) into the sample. Properly dispose of the empty acid vial.
- Cap tightly with one red screw cap. Invert (mix) the bottle several times to distribute the preservative. Wipe the bottle clean. Use baking soda to neutralize any acid spill.
- Store bottle in a chilled cooler or refrigerator to 4°C (39°F).
- Complete applicable Chain of Custody Form.
- Transport sample to the lab within the specified sample hold time.

Table 4 - Non-Preserved Routine Pollution Parameters

Analytical Parameter	Analytical Method Number	Container	Preservation Requirements	Maximum Holding Times
Alkalinity	SM 2320B	(1) 0.5 gallon HDPE bottle per each non-acidified Routine Pollution analysis with blue cap.	Secure with blue cap. Chill bottle to 4°C.	14 days
Cl ⁻ , F ⁻ , NO ₃ ⁻ , and SO ₄ ²⁻	EPA 300.0			28 days
Color	SM 2120 B			48 hours
Electrical Conductivity	SM 2510			28 days
Nitrite	SM 4500 NO ₂ B			48 hours
Orthophosphate	SM 4500 P E			48 hours
pH	SM 4500 H+B			24 hours
pH Temperature	SM 4500 H+B			N/A
Sulfate	EPA 300.0			28 days
Total Dissolved Solids	SM 2540 C			7 days
Total Suspended Solids	EPA 160.2			7 days
Turbidity	EPA 180.1			48 hours

- For the above parameters, in a labeled 0.5 gallon sample bottle, collect the non-preserved portion of the Routine Pollution sample. Do not overfill the bottle.
- Cap tightly with one blue screw cap. Wipe the bottle clean.
- Store bottle in a chilled cooler or refrigerator to 4°C (39°F).
- Complete applicable Chain of Custody Form. Transport sample to the lab within the specified sample hold time.



Fig. 10 - Routine Pollution Sample Supplies

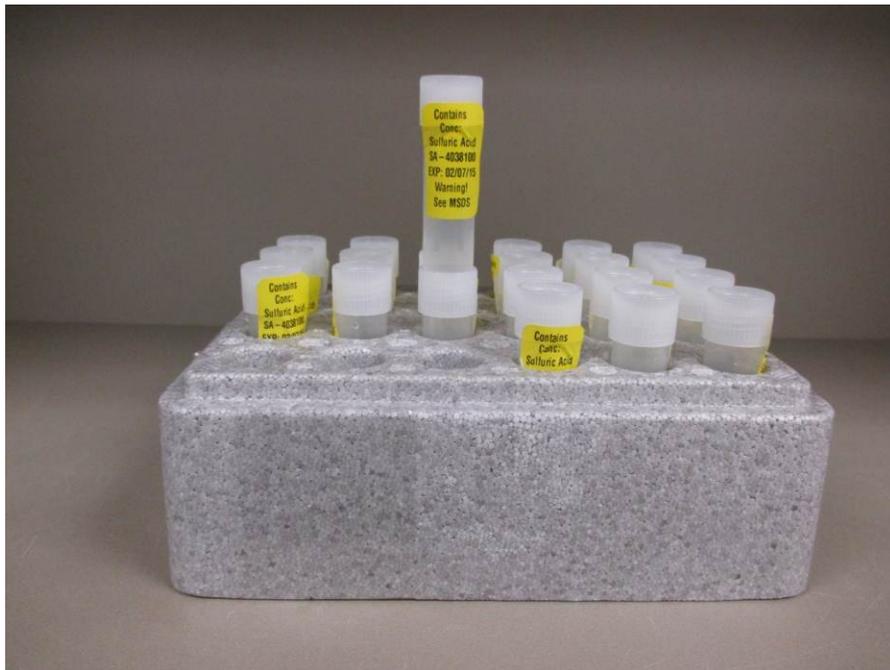


Fig. 11 - H₂SO₄ Acid Vials (24/container)

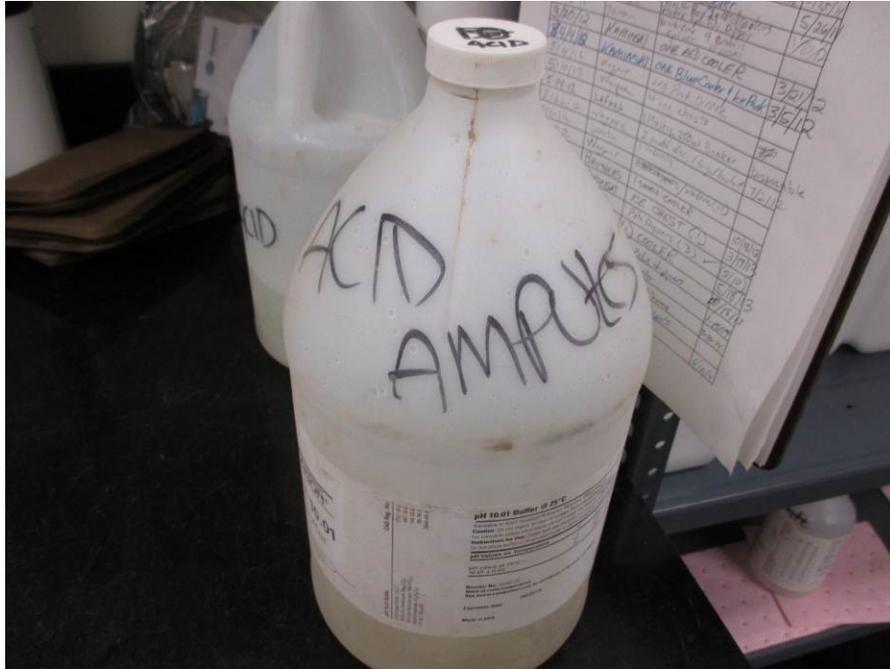


Fig. 12 - Discarded Vials (Ampules) @ BWQP Lab

X. Metals Samples:

Table 5 - Total Recoverable Metals

Analytical Parameter	Analytical Method Number	Container	Preservation Requirements	Maximum Holding Times
Ba, B, Fe, Mn and K	EPA 200.7	(1) 500-ml HDPE bottle per each Total Metals analysis.	Bottle contains 5-ml of nitric acid (15%) before sample addition and 0.15% nitric acid after addition. Secure with white cap. Chill bottle to 4°C within 15 minutes of sample addition.	6 months
Sb, As, Be, Cd, Cr, Cu, Mo, Ni, Pb, Se, Tl and Zn	EPA 200.8			6 months
Fluoride	EPA 300.0			28 days
Mercury	EPA 245.2			28 days

Table 6 - Dissolved Metals

Analytical Parameter	Analytical Method Number	Container	Preservation Requirements	Maximum Holding Times
Ca, K, Mg, and Na	EPA 200.7	(1) 500-ml HDPE bottle per each Dissolved Metals analysis.	Bottle contains 5-ml of nitric acid (15%) before sample addition and 0.15% nitric acid after addition. Secure with white cap. Chill bottle to 4°C within 15 minutes of sample addition.	6 months
Ag, As, Cd, Cr, Cu, Pb, Ni, Se, and Zn	EPA 200.8			6 months
Mercury	EPA 245.2			28 days

- For the above parameters, use one sample bottle per each Total or Dissolved Metals sample. Using a labeled 500-ml HDPE sample container supplied by the lab with 5-ml of the nitric acid (15%) preservative, carefully transfer the wastewater sample into the sample bottle without overfilling the bottle. Due to the narrow neck opening on this bottle, a clean transfer funnel is suggested during filling of the bottle to prevent spillage and loss of preservative. Use disposable gloves and eye protection (recommended) when filling this bottle.
- Cap tightly with the supplied white screw cap and gently invert (mix) the bottle several times to distribute the preservative into the sample. Wipe the bottle clean. Use baking soda to neutralize any acid spill.
- Store bottle in a chilled cooler or refrigerator to 4°C (39°F).
- Complete applicable Chain of Custody Form. Transport sample to the lab within the specified sample hold time.



Fig. 13 - Metals Bottle (w/HNO₃ acid preservative)



Fig. 14 - Filling a Metals Bottle with a Funnel

XI. Bacteriology Sample:

The procedure in Table 7 below is for a Clean Water Act (CWA) Bacteriology analysis conducted at the Nevada State Public Health Laboratory. To meet the sample hold time of six (6) hours, it is recommended that coliform samples be collected by mid-morning and delivered same-day to the lab by lunchtime to allow the chemist to start the analysis within two hours from receipt of the sample. To avoid cross-contamination, coliform samples should be collected directly into a sterile sample bottle (120-ml) via attachment to the swing-sampler (O-ring or rubber band) or from an open sample spigot running for 10 minutes prior to sample collection. Avoid collection of a coliform sample from an automatic sampler due to potential bio-film buildup within the plastic pump tubing between sample pulses. The coliform sample bottle includes a visual fill line to ensure collection of at least 100-ml of the sample.

Table 7 - Bacteriology Panel Parameters (State Health Lab)

Analytical Parameter	Analytical Method Number	Container	Preservation Requirements	Maximum Holding Times
Total Coliform	MPN Standard 9221 B	(1) 120-ml sterile polyethylene coliform bottle. Break sterile seal just before sample collection. Wear clean gloves when handling bottle. Collect 100-ml of sample.	Chill bottle to 4° C after collection. Record free Cl ₂ level (mg/l) in effluent flow upon sample collection.	6 hours (collection to lab receipt);
<i>E. Coli</i>	MPN Standard 9221 F			2 hours (receipt to analysis).
Fecal Coliform	MPN Standard 9221 E			

- Collect coliform sample in a labeled, sterile 120-ml coliform bottle attached to a swing sampler or from a free-flowing spigot.
- Collect at least 100-ml of sample using the fill mark line as a visual aid. Wear clean gloves when collecting a coliform sample. Do not over fill the bottle. Wipe clean any surface spillage.
- Cap tightly with the attached white screw cap. When tightly capped, invert (mix) the sample bottle several times to distribute the white dechlorination powder (e.g. sodium thiosulfate) into the sample.
- Store bottle in a chilled sample cooler or refrigerator to 4°C.
- Complete applicable sample Chain of Custody Form (see Appendices). Return coliform sample and Chain of Custody Form to the Nevada State Public Health Laboratory in Reno within the designated six (6) hour sample hold time from the time of the sample collection until receipt by the lab.
- Schedule sample delivery accordingly to allow the lab two (2) hours to begin the coliform analysis from the time of the sample receipt.
- At the time of the sample collection, record the effluent's free chlorine residual (mg/l) on the chain of custody form.



Fig. 15 - Swing Sampler (O-ring Attachment)



Fig. 16 - Sampling an Open Tap



Fig. 17 -120-ml Coliform Bottle w/Dechlorination Powder



Fig. 18 - Example of a Chlorine Colorimeter



Fig. 19 - Example of an Online Chlorine Analyzer

The procedure in Table 8 below is for a Clean Water Act (CWA) Bacteriology analysis conducted at the Silver State Analytical Laboratories in Las Vegas, which BWPC uses for the coliform analyses conducted in Clark County. Due to the six hour sample hold time, BWPC uses a local lab in Las Vegas for coliform samples. Silver State Laboratories has its own chain of custody form and 120-ml sterile sample bottles, which are picked up by BWPC prior to inspections in Clark County. A separate sample bottle is used for each Total or Fecal Coliform analysis.

Table 8 - Bacteriology Panel Parameters (Silver State Laboratories)

Analytical Parameter	Analytical Method Number	Container	Preservation Requirements	Maximum Holding Times
Fecal Coliform	Colilert-18	(1) 120-ml sterile polyethylene coliform bottle.	Chill sample to 4° C after collection. Bottle contains sodium thiosulfate powder (dechlorination).	6 hours (sample collection to lab receipt); 2 hours (lab receipt to analysis).
Total Coliform	Colilert-18	Break sterile seal just before sample collection. Wear clean gloves when handling bottle.		

- Collect sample in a labeled, sterile 120-ml coliform bottle attached to a swing sampler or from a free-flowing spigot. Use a separate bottle for each Fecal or Total Coliform analysis.
- Collect at least 100-ml of sample using the fill mark line as a visual aid. Wear clean gloves when collecting a coliform sample. Do not over fill the bottle. Wipe clean any surface spillage.
- Cap tightly with the attached white screw cap. When tightly capped, invert (mix) the sample bottle several times to distribute the white dechlorination powder (e.g. sodium thiosulfate) into the sample.
- Store in a chilled sample cooler or lab refrigerator to 4°C.
- Complete applicable sample Chain of Custody Form (see Appendices). Return coliform sample and Chain of Custody Form to the Silver State Lab in Las Vegas within the designated six (6) hour sample hold time from the time of the sample collection until lab receipt of sample.

- Deliver sample to lab in a timely manner to allow for the start of the sample's analysis within two (2) hours from the time of receipt of the sample.



Fig. 20 - Coliform Sampling in Henderson (using POTW's dipper)

XII. Other Samples:

On a case-by-case basis, BWPC periodically samples other wastewater parameters, which the Nevada State Public Health Laboratory is either not certified for and/or subcontracts out to another certified lab, e.g. VOCs, BTEX and TPH parameters (e.g. to determine petroleum hydrocarbon presence). For such wastewater samples, contact the Nevada State Public Health Laboratory at (775) 688-1335 for information on where to obtain the sample containers (e.g. 40-ml glass VOA vials), preservatives, and chain of custody forms.



Fig. 21 - Waste Oil Sample



Fig. 22 - 40-ml Volatile Organic Analysis (VOA) Vial

XIII. Field Measurements:

Table 8 - Field Measurements

Analytical Parameter	Analytical Method Number	Sample Hold Time	Alternate (Field)
pH	SM 4500 H+B	24 hours	pH Meter
Dissolved Oxygen	SM 4500 O-C	15 minutes	D.O. Meter
Chlorine Residual	SM 4500 CL-D	15 minutes	Colorimeter

pH: Due to the time constraints for sample transport to and analysis at the Nevada State Public Health Laboratory, the pH parameter is analyzed (reported) out of the specified hold time if more than 24 hours has elapsed since the sample was collected in the field. To measure the wastewater's pH level in the field, calibrated pH probes are commercially available. The BWQP Laboratory stocks reference (calibration) solutions of 4, 7 and 10 S.U. The manufacturers recommend an annual replacement of the instrument's sensor (electrode) to maintain measurement accuracy to ± 0.1 S.U. (pH).



Fig. 23 - Portable pH/Temperature Probe

D.O.: Dissolved Oxygen (D.O.) measurements by the standard reference method (e.g. SM 4500 O-C) are impractical without an on-site lab due to the restriction of the 15 minute sample hold time. The BWQP Laboratory currently maintains an YSI Inc. 550A[®] handheld D.O. probe for field measurement of oxygen levels in state surface waters. This instrument is available for loan to BWPC, but at this time, BWPC requests that the meter's use be limited to surface water measurements. The meter's user manual includes guidelines for conducting a daily one-point calibration check with air-saturated water (well-shaken water).



Fig. 24 - YSI Inc. 550A[®] D.O. Meter

Chlorine: Chlorine (residual or free Cl_2) analyses are used to complete the Nevada State Public Health Laboratory's chain of custody form when submitting coliform samples. In addition, field measurement of the chlorine residual is used to determine compliance with the State's free Cl_2 limit (maximum) of 0.1 mg/l for POTWs discharging dechlorinated effluent to surface waters (e.g. aquatic species standard). As an alternate to the 15 minute sample hold time restriction for the standard reference method (e.g. SM 4500 CL-D), BWPC currently stocks a portable chlorine colorimeter at each of its two offices (HACH[®] Pocket Colorimeter II). The approved method for the colorimetric analysis is U.S. EPA DPD (N,N-Diethyl-p-phenylenediamine sulfate reagent). Instrument resolution (increment) is 0.01 mg/l (low-range). Sample calibration (blank) is performed in the field using a 10-ml aliquot of the dechlorinated effluent. Chlorine readings (free and/or total) are to be completed within 15 minutes of collection of a discrete effluent sample.



Fig. 25 - HACH[®] Pocket Colorimeter II (tap water demo)

XIV. Fieldwork:

In the field, sample outfalls may not always be located in well-lit areas equipped with handrails, stairways and safety grating. Therefore, BWPC personnel should exercise appropriate caution and work in partnership with a two (or more) person sampling crew. Normally, on the CSI inspection, the BWPC sampling is conducted when the operations staff is on-site and able to lend support.



Fig. 26 - Operator (green shirt) Observing BWPC Sampling Crew



Fig. 27 - Operator (red shirt) Observing BWPC Sampler



Fig. 28 - Two-Person BWPC Sampling Crew (surface water sampling)

XV. Sample Transport:

The Nevada State Public Health Laboratory operates on the same 8 AM - 5 PM weekday schedule as NDEP. To allow for timely sample processing, BWPC samples should be delivered no later than Thursday by 1 PM, except for the CWA Bacteriology Analysis (Wednesday by 1 PM). Contact the lab at (775) 688-1335 for other periods including holidays. Generally, samples collected in Tonopah and northward in Nevada are delivered by BWPC or other NDEP courier arrangement directly to the Nevada State Public Health Laboratory in Reno. For overnight sample storage, an iced sample cooler or non-food storage refrigerator should be arranged.

For samples collected in South Nye, Lincoln or Clark Counties, BWPC uses the Southwest Airlines (SWA) Air Cargo location at the McCarran Airport. Although FAA (Federal Aviation Administration) rules are subject to change, the following general guidelines apply to BWPC sample coolers flown on SWA:

- Coolers must be hard-sided (no Styrofoam containers).
- All bagged ice must be maintained in a leak-resistant container (e.g. BWPC stocks heavy-gauge, 1-gallon Ziploc bags for such purpose).
- SWA currently requests that any untreated (influent) wastewater samples not be shipped by air (e.g. potential biological hazard).

- Effluent sample containers shall be leak proof, labeled and not contain any flammable or reactive liquids.
- Dry ice is limited to 5 lbs. per cooler (the cooler must allow the CO₂ gas to escape without container over-pressurization).
- Upon acceptance by SWA personnel, the coolers are to be tightly secured with clear wrapping tape.
- Due to internal condensation, chain of custody forms should be secured to the underside of the cooler lid in a waterproof, plastic bag.
- On the receiving end (Reno SWA Cargo Area), arrangement shall be made in advance to have a BWPC staff member from the Carson City office pick up the overnight cooler shipment by 9 AM and deliver it to the UNR Campus (State Lab).



Fig. 29 - BWQP Lab (O.K. for CWA Samples)



Fig. 30 - BSDW Storage (O.K. for SDWA Samples)



Fig. 31 - Labeled/Preserved Samples Prior to Packing



Fig. 32 - Packing up the Sample Cooler (local delivery)



Fig. 33 - Handling Dry Ice (always wear insulating gloves)

XVI. Cleanup:

BWPC has key-card access to the BWQP Lab in Carson City where used acid vials, dirty gloves and other sampling trash can be safely discarded, and filled sample bottles can be stored overnight in the refrigerator. The BWQP Lab stocks Labtone™ powdered soap and liquid bleach for cleaning up dirty sampling equipment and used sample coolers (Carson City's supply), and also for cleaning those coolers received via air cargo shipment from the NDEP Las Vegas Office. The NDEP Las Vegas Office on Flamingo Rd. is presently occupying a commercial office building, which is without a laboratory sink for NDEP use. Therefore, arrangement (permission) should be made at the POTWs being inspected to use their cleanup sinks for washing any sampling equipment prior to storage in the NDEP Las Vegas Office supply room. Food-grade and/or sanitary hand sinks should not be used for cleaning up sampling equipment. The NDEP Las Vegas Office maintains a compact refrigerator for sample storage and freezing blue (gel) ice packs. Since dry ice evaporates (sublimates) rapidly upon purchase, the Penguin™ dry ice (e.g. grocery stores) should only be purchased in five (5) pounds quantity on the date that the samples are being shipped. Insulated gloves must be worn when handling dry ice to avoid contact (skin) burn.

BWPC personnel should wash their hands thoroughly with warm water and soap when finished collecting the wastewater samples and prior to touching their face, eating or drinking. When sampling remote facilities without access to potable water, it is advisable to stock the agency vehicles with hand towelettes and/or sanitizing liquid (alcohol gel), liquid bleach and an ample supply of potable water for cleanup. The recommended bleach to water mixing ratio for sanitizing hard (plastic) surfaces is 1:30 or approximately ½ cup household bleach per gallon of water.



Fig. 34 - BWQP Lab (bleach & acid storage - separate compartments)



Fig. 35 - BWQP Lab Sink

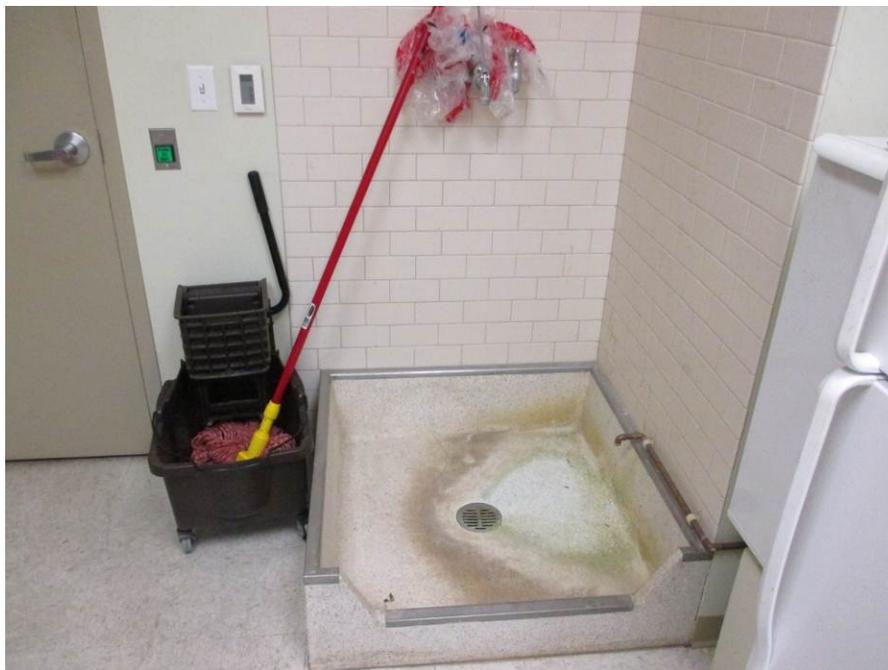


Fig. 36 - BWQP Mop Sink (for cleaning coolers)

XVII. Sampling Supplies:

Clean sample bottles, lids (caps) and acid preservatives for the BOD₅/CBOD, Routine Pollution, Metals and CWA Bacteriology Analyses are stocked in Carson City in the BWQP Lab. Annually, a season's worth of sampling supplies are packaged and shipped by ground transport to the NDEP Las Vegas Office. Other sampling bottles are obtained upon request from the Nevada State Public Health Laboratory such as the 40-ml VOA glass vials. It is advisable that a spare, clean set of sampling bottles is included on each sampling inspection to replace any leaking or otherwise damaged sample containers.

The employee's work duties generally determine what standard PPE are provided to that employee upon hire such as steel-toed boots, reflective clothing, hard hats, and safety glasses. If additional PPE or sampling equipment is needed, that is not stocked by the BWPC Bureau, please contact your supervisor for a purchase request. The approved BWPC vendor list is subject to change, but the following list of vendors has been used in the past for ordering PPE and other miscellaneous sampling supplies (contact BWPC Purchasing for current list and/or vendor contact information):

- USA Blue Book
- Grainger Industrial Supply
- Office Max (Office Depot)
- HACH Co.

XVIII. Acid Storage:

An MSDS sheet for the sulfuric and nitric acid sample preservatives is attached to this document in the appendices. The BWQP Lab maintains these chemicals away from the workspace (cubicles). For the NDEP Las Vegas Office supply room, the NDEP Health and Safety Officer shall provide guidance to BWPC whether a separate acid (corrosive) storage cabinet is required for storing the acid vials and metals bottles. Compact, polyethylene cabinets furnished with locking doors and adjustable trays are available for such chemical storage purpose (see below).



Fig. 37 - Poly-Cabinet for Acid Storage

XIX. Acronyms:

BOD ₅	5-Day Biochemical Oxygen Demand
BSDW	Bureau of Safe Drinking Water
BTEX	Benzene, Toluene, Ethyl-Benzene & Xylene
BWPC	Bureau of Water Pollution Control
BWQP	Bureau of Water Quality Planning
CBOD	Carbonaceous Biochemical Oxygen Demand
Cl ₂	Chlorine Residual
CSI	Compliance Sampling Inspection
CWA	Clean Water Act
CO ₂	Carbon Dioxide (i.e. from Dry Ice)
Division	Nevada Division of Environmental Protection
FAA	Federal Aviation Administration
FOG	Fats, Oils & Grease
MG	Million Gallons
MGD	Million Gallons per Day
mg/l	Milligrams per liter
N	Nitrogen
NDEP	Nevada Division of Environmental Protection
NH ₃	Ammonia
NH ₄	Ammonium
NO ₂	Nitrite
NO ₃	Nitrate
NPDES	National Pollutant Discharge Elimination System
pH	Potential of Hydrogen
P	Phosphorus
POTW	Publicly Owned Treatment Works
SDWA	Safe Drinking Water Act
SM	Standard Methods
S.U.	Standard Units (pH)
SWA	Southwest Airlines
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
UNR	University of Nevada-Reno
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
WTS	Water Technical Sheet

XX. References:

- i. *Nevada Quality Assurance Program Plan for Surface Water Sampling* (Dec. 2013), Nevada Division of Environmental Protection, Bureau of Water Quality Planning.
- ii. *Guidelines Establishing Test Procedures for the Analysis of Pollutants* (Aug. 2014 e-CFR version), Title 40 Code of Federal Regulations Part 136.
- iii. *National Environmental Methods Index* (<https://www.nemi.gov/home/>).
- iv. *Standard Methods for the Examination of Water and Wastewater* (22nd ed. - Jan. 2012), American Public Health Association et al.
- v. *Handbook for Sampling and Sample Preservation of Water and Wastewater* (Sep. 1982), EPA-600/4-82-029, U.S. EPA.
- vi. *HACH® Corporation Website*, (<http://www.hach.com/>).

XXI. Appendices:

Chain of Custody forms are lab specific, but attached, please find the current forms used by BWPC for sampling the standard suite of analyses discussed in this guidance document. Blank chain of custody forms should be carried in the field to correct for multiple error cross-outs, or to account for the spillage of wastewater sample onto paperwork, which occasionally occurs during field work events. Representative analyses from several of the POTWs in Nevada are attached as an illustration for the reader to see how the data is presented. Upon delivery of a sample to the lab, the front-counter receptionist should request a signature and be able to provide the courier with a proof-of-delivery copy. Turnaround times do vary by lab, so be sure to communicate your request ahead of time.

- Item #1: State Health Laboratory (Chain of Custody Form)
- Item #2: State Health Laboratory (List of Panels/Tests)
- Item #3: State Health Laboratory (Bacteriology Analysis Form)
- Item #4: State Health Laboratory (POTW Analysis)
- Item #5: Silver State Laboratories (Chain of Custody Form)
- Item #6: Silver State Laboratories (Coliform Analysis)
- Item #7: MSDS Sheets

NEVADA STATE HEALTH LABORATORY
CHAIN OF CUSTODY FORM FOR WATER CHEMISTRY ANALYSIS
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

University of Nevada School of Medicine
 1660 North Virginia Street, Reno, NV 89503-1738
 Phone: (775) 688-1335 Fax: (775) 688-1460

FOR COMPLIANCE

NOT FOR COMPLIANCE

OWNER INFORMATION			REPORT TO INFORMATION			DELIVERED ON ICE			BILL TO INFORMATION								
Owner: Bureau of Water Quality Planning Address: 901 S. Stewart St., Ste. 4001 City, St, Zip: Carson City NV 89701 Phone: 687-9444 FAX: 687-5856			Owner: BWQP ATTN: John Heggeness Address: 901 S. Stewart St., Ste. 4001 City, St, Zip: Carson City, NV 89701 Phone: 687-9444 Fax: 687-5856			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Initials (Lab) <input type="text"/> Shipped Samples: <input type="text"/> °C			Owner: BWQP Address: 901 S. Stewart St. City, St, Zip: Carson City, NV 89701 Phone: 687-9444 Fax: 687-5856								
SOURCE OF WATER			SAMPLE TYPE			REASON FOR ANALYSIS			USE OF WATER								
<input type="checkbox"/> Spring <input type="checkbox"/> Filter <input type="checkbox"/> Surface <input type="checkbox"/> Depth (ft.) <input type="checkbox"/> Well <input checked="" type="checkbox"/> WWTP			<input type="checkbox"/> SDWA <input checked="" type="checkbox"/> CWA <input type="checkbox"/> Other			<input type="checkbox"/> Public Water Supply <input type="checkbox"/> Private Residence <input checked="" type="checkbox"/> Other <u>Compliance Inspection</u>			<input type="checkbox"/> Domestic Drinking Water <input type="checkbox"/> Geothermal <input type="checkbox"/> Irrigation <input type="checkbox"/> Industrial or Mining <input checked="" type="checkbox"/> Other: _____								
HYDROGRAPHIC BASIN: (SPECIFY)																	
Line Item	Date Collected	Time	Station ID	Control Point	State	County	Remarks	Routine Pollution	NDEP Trace Metals	NDEP Total Recoverable Metals	NDEP Dissolved Metals	COD	BOD ₅	CBOD (Inhibited BOD ₅)			
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	

Collected By: _____ Sampler Signature: _____

FOR LAB USE ONLY:
 How sample was delivered: _____ Courier _____ Drop Off _____ Fed Ex _____ UPS _____ U.S. Postal _____ Campus Mail _____

Delivered By _____ Date _____ Received By _____ Date _____

Sample is tested as received. Analytical results associated with this requisition and generated by NSHL are representative only of the sample submitted to this laboratory.
 NOTE: This document will be destroyed at NSHL after 12 years, unless Client requests otherwise Page 1 of 1

Item #1 - State Health Laboratory (Chain of Custody Form)

PANEL/TESTS

Routine Pollution

- Electrical conductivity
- Color
- pH Lab
- Alkalinity
- Total Kjeldahl Nitrogen
- Nitrate+Nitrite as N
- Nitrite as N
- Ammonia-N
- Ortho-Phosphate
- Total Phosphate
- Chloride
- Sulfate
- TDS
- Turbidity
- TSS

NDEP Trace Metals

- Cadmium
- Chromium
- Copper
- Iron
- Lead
- Mercury
- Selenium
- Zinc
- Arsenic
- Boron
- Hardness
- Calcium
- Magnesium
- Sodium

NDEP Total Recoverable Metals

- Antimony
- Arsenic
- Barium
- Beryllium
- Boron
- Cadmium
- Chromium
- Copper
- Fluoride
- Iron
- Lead
- Manganese
- Nickel
- Selenium
- Thallium
- Zinc

NDEP Dissolved Metals

- Arsenic
- Cadmium
- Calcium
- Chromium
- Copper
- Lead
- Magnesium
- Mercury
- Nickel
- Selenium
- Silver
- Sodium
- Zinc

Item #2: State Health Laboratory (List of Panels/Tests)



NEVADA STATE HEALTH LABORATORY
 University of Nevada School of Medicine
 1660 North Virginia Street, Reno, NV 89503-1738
 Phone: (775) 688-1335

WATER BACTERIOLOGY ANALYSIS **ACCESSION NUMBER: 252049**
 NOTE: FORM MUST BE FILLED OUT IN INK (NO PENCIL ENTRIES)

OWNER INFORMATION		REPORT TO INFORMATION Same As Owner <input type="checkbox"/>	
Owner: NDEP / BWQP		Report To: _____	
Address: 901 SOUTH STEWART STREET, SUITE 4001		Attn: _____	
City, St, Zip: CARSON CITY NV 89701		Address: _____	
Phone: (775) 687-9444 Fax: (775) 687-5856		City, St, Zip: _____	
<input type="checkbox"/> For Compliance <i>If no box is checked, compliance testing applies and results are sent to BHPS</i>		Phone: _____ Fax: _____	
<input type="checkbox"/> Not For Compliance			
BILL TO INFORMATION Same As Owner <input type="checkbox"/>		SOURCE OF WATER	
Bill To: NDEP / BWQP		Public Water System ID Number: _____	
Address: 901 SOUTH STEWART STREET, SUITE 4001		Public Water System ID Name: _____	
City, St, Zip: CARSON CITY NV 89701		Chlorine Residual: _____	
SAMPLE INFORMATION		SAMPLE TYPE	
Date Collected: _____		<input type="checkbox"/> SDWA (Drinking Water)	
Time Collected: _____		<input type="checkbox"/> CWA (Pollution)	
Source Address: _____		<input type="checkbox"/> Other _____	
Sample Taken From: _____		REASON FOR ANALYSIS	
City: _____		<input type="checkbox"/> Public Water Supply	
State: _____ County: _____		<input type="checkbox"/> Private Residence	
<input type="checkbox"/> Other _____		<input type="checkbox"/> Other _____	
Sample is tested as received. Analytical results associated with this requisition and generated by NSHL are representative only of the sample submitted to this laboratory.		PAYMENT INFORMATION	
I attest to the validity and authenticity of this sample. I am aware that tampering with or intentionally mislabeling the sample location, date or time is considered fraud and may be grounds for legal action.		Fee: _____	
Sampler Name (Print): _____		Paid By: _____	
Sampler Signature: _____ Date: _____		Payment: _____	
		Payment Method: _____	
		Check or Money Order Number: _____	
		Payment Date: _____	
		Receipt Number: _____	
		Payment Received By: _____	

Tests: SDWA - Drinking Water Analysis

Sources: public or private water systems, wells, swimming pools, or chill water

- Total Coliform SDWA – Qualitative Total Coliform/E. Coli Presence Absence 9223 B
- Total Coliform SDWA – Quantitative Total Coliform/E. Coli Quanti-Tray 9223 B

CWA - Raw or Waste Water Analysis

Sources: surface water (ponds, streams, rivers, lakes, etc.)

- Fecal Coliform CWA – Quantitative Membrane Filter 9222 D Recommended Dilution _____
- Fecal Streptococci CWA – Quantitative Membrane Filter 9230 C Recommended Dilution _____
- Total Coliform CWA – Quantitative Total Coliform/E. Coll Quanti-Tray 9223 B

Sources: chlorinated effluent

- 10 Tube MPN CWA – Quantitative Recommended Dilution _____
- Total Coliform MPN Standard 9221 B
- E. Coll MPN Standard 9221 F
- Fecal Coliform MPN Standard 9221 E

Sources: public or private water systems, wells, swimming pools, chill water or DI systems

- Heterotrophic Plate Count – Quantitative Heterotrophic Plate Count Pour Plate

Each sample bottle should be returned accompanied by a sample analysis requisition form, indicating the type of test(s) needed. If bottles are not returned, a supply charge may be assessed. Submission incurs obligation for payment of fees. NOTE: This document will be destroyed at NSHL after 5 years, unless Client requests otherwise.

Delivered By: _____ Received By: _____

Item #3: State Health Laboratory (Bacteriology Analysis Form)



NEVADA STATE HEALTH LABORATORY
 University of Nevada School of Medicine
 1660 North Virginia Street, Reno, NV 89503-1738
 Phone: (775) 688-1335

WATER CHEMISTRY REPORT
 STATUS: FINAL

Report To:

ATTN: JOHN HEGGENESS
 NDEP / BWQP
 901 SOUTH STEWART STREET, SUITE 4001
 CARSON CITY, NV 89701

Accession Number: 251760
 Sampled By: MARK KAMINSKI
 Date/Time Collected: 02/12/14 11:30
 Date/Time Received: 02/12/14 15:25
 Report Date and Time: 04/23/14 0:00

Analysis Type: CWA
 General Location: CITY OF FALLON WWTP (INFLUENT)
 Source Address: NV0020061
 City: FALLON
 State: NV
 County: CHURCHILL

PWS ID:
 Public Water System:
 Township: Range: Section:
 For Compliance
 Not For Compliance
 Not Indicated

Test:	Method:	Results:	RL	Analysis Date:	Analyst:
ROUTINE POLLUTION Panel					
Alkalinity as CaCO3	SM 2320 B	369 mg/L	20	02/12/14	SRice
Ammonia-N	SM 4500 NH3 D	29 mg/L	0.1	02/14/14	GBrewster
Bicarbonate	SM 2320 B	450 mg/L	25	02/12/14	SRice
Carbonate	SM 2320 B	<12 mg/L	12	02/12/14	SRice
Chloride	EPA 300.0	150 mg/L	5	02/25/14	Vmiller
Color	SM 2120 B	95 CU	5	02/13/14	Dbaker
Electrical Conductivity	SM 2510	1600 umhos/cm	10	02/12/14	SRice
Hydroxide	SM 2320 B	<7 mg/L	7	02/12/14	SRice
Nitrate+Nitrite as N	EPA 300.0	<0.1 mg/L	0.1	02/25/14	Vmiller
Sample analyzed out of hold time					
Nitrite-N	SM 4500 NO2 B	0.04 mg/L	0.01	02/13/14	Dbaker
Ortho-Phosphate	SM 4500 P E	3.6 mg/L	0.1	02/13/14	GBrewster
pH	SM 4500 H B	7.76 SU		02/12/14	SRice
pH Temperature	SM 4500 H B	20.8 DegC		02/12/14	SRice

P = Pending Result
 RL = Reporting Limit
 MCL = Maximum Contaminant Level
 ND = Not Detected

NOTE: This document will be destroyed at NSHL after 12 years, unless Client requests otherwise.

Item #4: State Health Laboratory (POTW Analysis)

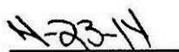
Accession Number: 251760

Sulfate	EPA 300.0	210 mg/L	5	02/25/14	Vmiller
Total Dissolved Solids	SM 2540 C	939 mg/L	25	02/13/14	abobadilla
Total Suspended Solids	EPA 160.2	159 mg/L	10	02/13/14	Dbaker
Total-Phosphorous	SM 4500 P E	5.4 mg/L	0.25	02/25/14	GBrewster
Turbidity	SM 2130 B	90 NTU	4	02/18/14	SRice
Sample analyzed out of hold time					
NDEP TOTAL RECOVERABLE					
Panel					
Antimony	EPA 200.8	<5 ug/L	5	03/05/14	GBrewster
Arsenic	EPA 200.8	43 ug/L	3	03/05/14	GBrewster
Barium	EPA 200.7	40 ug/L	20	02/19/14	SRice
Beryllium	EPA 200.8	<2 ug/L	2	03/05/14	GBrewster
Boron	EPA 200.7	1.3 mg/L	0.1	02/19/14	SRice
Cadmium	EPA 200.8	<1 ug/L	1	03/05/14	GBrewster
Chromium	EPA 200.8	3 ug/L	2	03/05/14	GBrewster
Copper	EPA 200.8	52 ug/L	2	03/05/14	GBrewster
Fluoride	EPA 300.0	0.9 mg/L	0.1	02/25/14	Vmiller
Iron	EPA 200.7	1.5 mg/L	0.05	02/19/14	SRice
Lead	EPA 200.8	2 ug/L	1	03/05/14	GBrewster
Manganese	EPA 200.7	60 ug/L	20	02/19/14	SRice
Mercury	EPA 245.2	<0.2 ug/L	0.2	03/05/14	abobadilla
Molybdenum	EPA 200.8	29 ug/L	10	03/05/14	GBrewster
Nickel	EPA 200.8	<5 ug/L	5	03/05/14	GBrewster
Potassium	EPA 200.7	17 mg/L	5	02/19/14	SRice
Selenium	EPA 200.8	2 ug/L	2	03/05/14	GBrewster
LFM out of acceptable limits for this sample					
Thallium	EPA 200.8	<1 ug/L	1	03/05/14	GBrewster
Zinc	EPA 200.8	120 ug/L	10	03/05/14	GBrewster
Biochemical Oxygen Demand - 5 (BOD-5)	SM 5210 B	215 mg/L	2	02/13/14	abobadilla
Total Kjeldahl Nitrogen (TKN)	SM 4500 N(org)	0 Send Out		04/21/14	Dbaker
Send Out					
Sample analyzed by WET Lab, reference #1404086-002.					

FOR LAB USE ONLY:

EPM: -13.6037 **LSI:** -1.34 **Calc TDS:** 591 **SAR:** 0.0000 **TDS/EC:** 0.59


 Approved By _____


 Date _____

P = Pending Result
 RL = Reporting Limit
 MCL = Maximum Contaminant Level
 ND = Not Detected

NOTE: This document will be destroyed at NSHL after 12 years, unless Client requests otherwise.

Item #4: State Health Laboratory (POTW Analysis - continued)



NEVADA STATE HEALTH LABORATORY
 University of Nevada School of Medicine
 1660 North Virginia Street, Reno, NV 89503-1738
 Phone: (775) 688-1335

WATER CHEMISTRY REPORT

STATUS: FINAL

Report To:

ATTN: JOHN HEGGENESS
 NDEP / BWQP
 901 SOUTH STEWART STREET, SUITE 4001
 CARSON CITY, NV 89701

Accession Number: 251761
 Sampled By: MARK KAMINSKI
 Date/Time Collected: 02/12/14 11:30
 Date/Time Received: 02/12/14 15:31
 Report Date and Time: 03/14/14 0:00

Analysis Type: CWA
 General Location: CITY OF FALLON WWTP (EFFLUENT)
 Source Address: NV0020061
 City: FALLON
 State: NV
 County: CHURCHILL

PWS ID:
 Public Water System:
 Township: Range: Section:
 For Compliance
 Not For Compliance
 Not Indicated

Test:	Method:	Results:	RL	Analysis Date:	Analyst:
ROUTINE POLLUTION Panel					
Alkalinity as CaCO3	SM 2320 B	256 mg/L	20	02/12/14	SRice
Ammonia-N	SM 4500 NH3 D	<0.1 mg/L	0.1	02/14/14	GBrewster
Bicarbonate	SM 2320 B	312 mg/L	25	02/12/14	SRice
Carbonate	SM 2320 B	<12 mg/L	12	02/12/14	SRice
Chloride	EPA 300.0	160 mg/L	5	02/25/14	Vmiller
Color	SM 2120 B	45 CU	5	02/13/14	Dbaker
Electrical Conductivity	SM 2510	1400 umhos/cm	10	02/12/14	SRice
Hydroxide	SM 2320 B	<7 mg/L	7	02/12/14	SRice
Nitrate+Nitrite as N	EPA 300.0	1.3 mg/L	0.1	02/25/14	Vmiller
Sample analyzed out of hold time					
Nitrite-N	SM 4500 NO2 B	0.02 mg/L	0.01	02/13/14	Dbaker
Ortho-Phosphate	SM 4500 P E	0.01 mg/L	0.01	02/13/14	GBrewster
pH	SM 4500 H B	8.07 SU		02/12/14	SRice
pH Temperature	SM 4500 H B	20.6 DegC		02/12/14	SRice

P = Pending Result
 RL = Reporting Limit
 MCL = Maximum Contaminant Level
 ND = Not Detected

NOTE: This document will be destroyed at NSHL after 12 years, unless Client requests otherwise.

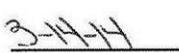
Item #4: State Health Laboratory (POTW Analysis - continued)

Accession Number: 251761

Sulfate	EPA 300.0	220 mg/L	5	02/25/14	Vmiller
Total Dissolved Solids	SM 2540 C	898 mg/L	25	02/13/14	abobadilla
Total Kjeldahl Nitrogen (TKN)	SM 4500 N B, 4500 NH3 D	0.4 mg/L	0.2	02/27/14	Dbaker
Total Suspended Solids	EPA 160.2	<10 mg/L	10	02/13/14	Dbaker
Total-Phosphorous	SM 4500 P E	0.14 mg/L	0.01	02/13/14	GBrewster
Turbidity	SM 2130 B	4.2 NTU	0.4	02/18/14	SRice
Sample analyzed out of hold time					
NDEP TOTAL RECOVERABLE Panel					
Antimony	EPA 200.8	<5 ug/L	5	03/05/14	GBrewster
Arsenic	EPA 200.8	24 ug/L	3	03/05/14	GBrewster
Barium	EPA 200.7	<20 ug/L	20	02/19/14	SRice
Beryllium	EPA 200.8	<2 ug/L	2	03/05/14	GBrewster
Boron	EPA 200.7	1.4 mg/L	0.1	02/19/14	SRice
Cadmium	EPA 200.8	<1 ug/L	1	03/05/14	GBrewster
Chromium	EPA 200.8	<2 ug/L	2	03/05/14	GBrewster
Copper	EPA 200.8	10 ug/L	2	03/05/14	GBrewster
Fluoride	EPA 300.0	0.7 mg/L	0.1	02/25/14	Vmiller
Iron	EPA 200.7	0.08 mg/L	0.05	02/19/14	SRice
Lead	EPA 200.8	2 ug/L	1	03/05/14	GBrewster
Manganese	EPA 200.7	<20 ug/L	20	02/19/14	SRice
Mercury	EPA 245.2	<0.2 ug/L	0.2	02/25/14	abobadilla
Molybdenum	EPA 200.8	23 ug/L	10	03/05/14	GBrewster
Nickel	EPA 200.8	<5 ug/L	5	03/05/14	GBrewster
Potassium	EPA 200.7	16 mg/L	5	02/19/14	SRice
Selenium	EPA 200.8	<2 ug/L	2	03/05/14	GBrewster
LFM out of acceptable limits for this batch					
Thallium	EPA 200.8	<1 ug/L	1	03/05/14	GBrewster
Zinc	EPA 200.8	53 ug/L	10	03/05/14	GBrewster
Biochemical Oxygen Demand - 5 (BOD-5)	SM 5210 B	<2 mg/L	2	02/13/14	abobadilla

FOR LAB USE ONLY:

EPM: -13.9278 LSI: -1.19 Calc TDS: 536 SAR: 0.0000 TDS/EC: 0.64



 Approved By _____ Date _____

P = Pending Result
 RL = Reporting Limit
 MCL = Maximum Contaminant Level
 ND = Not Detected

NOTE: This document will be destroyed at NSHL after 12 years, unless Client requests otherwise.

Item #4: State Health Laboratory (POTW Analysis - continued)



NEVADA STATE HEALTH LABORATORY
 University of Nevada School of Medicine
 1660 North Virginia Street, Reno, NV 89503-1738
 Phone: (775) 688-1335

RECEIVED
 ENVIRONMENTAL PROTECTION

FEB 20 2014

WATER BACTERIOLOGY REPORT

STATUS: FINAL

Report To:

ATTN: JOHN HEGGENESS
 NDEP / BWQP
 901 SOUTH STEWART STREET, SUITE 4001
 CARSON CITY, NV 89701

Accession Number: 247013
 Sampled By: MARK KAMINSKI
 Date/Time Collected: 02/12/14 12:00
 Date/Time Received: 02/12/14 15:16
 Report Date and Time: 02/18/14 12:33

Sample Temperature Deg C

Analysis Type: Raw or Wastewater
 General Location: OUTFALL #1 (1:1)
 Source Address: CITY OF FALLON POTW
 City: FALLON
 State: NV
 County: CHURCHILL

PWS ID:
 Public Water System:

Chlorine Residual: For Compliance
 Not For Compliance
 Not Indicated

Test:	Method:	Results:	Dilution:
Total Coliform - 10 Tube MPN	MPN Standard 9221 B	23	1:1
E. Coli - 10 Tube MPN	MPN Standard 9221 F	<1.1	1:1
Fecal Coliform - 10 Tube MPN	MPN Standard 9221 E	1.1	1:1

Lance Muir _____ 2-18-2014
 Approved By Date

Starlens EN2014 0716

The absence of coliforms meets Nevada State Health Division bacteriological standards for safe drinking water.

NOTE: Results displayed in BOLD, ITALIC TYPE have failed Nevada State health standards

NOTE: This document will be destroyed at NSHL after 5 years, unless Client requests otherwise.

Item #4: State Health Laboratory (POTW Analysis - continued)



NEVADA STATE HEALTH LABORATORY
University of Nevada School of Medicine
1660 North Virginia Street, Reno, NV 89503-1738
Phone: (775) 688-1335

WATER BACTERIOLOGY REPORT
STATUS: FINAL

Report To:

ATTN: JOHN HEGGENESS
NDEP / BWQP
901 SOUTH STEWART STREET, SUITE 4001
CARSON CITY, NV 89701

Accession Number: 247014
Sampled By: MARK KAMINSKI
Date/Time Collected: 02/12/14 12:00
Date/Time Received: 02/12/14 15:20
Report Date and Time: 02/18/14 12:33

Sample Temperature Deg C

Analysis Type: Raw or Wastewater
General Location: OUTFALL #2 (1:10)
Source Address: CITY OF FALLON POTW
City: FALLON
State: NV
County: CHURCHILL

PWS ID:
Public Water System:

Chlorine Residual: For Compliance
 Not For Compliance
 Not Indicated

Test:	Method:	Results:	Dilution:
Total Coliform - 10 Tube MPN	MPN Standard 9221 B	6.9	1:1
E. Coli - 10 Tube MPN	MPN Standard 9221 F	1.1	1:1
Fecal Coliform - 10 Tube MPN	MPN Standard 9221 E	<1.1	1:1

Barie man 2-18-2014
Approved By Date

Stirling SA 2014 0717

The absence of coliforms meets Nevada State Health Division bacteriological standards for safe drinking water.

NOTE: Results displayed in BOLD, ITALIC TYPE have failed Nevada State health standards

NOTE: This document will be destroyed at NSHL after 5 years, unless Client requests otherwise.

Item #4: State Health Laboratory (POTW Analysis - continued)



LABORATORY REPORT

DATE: March 28, 2013	REPORT NUMBER: 13-1339
CLIENT: NDEP 2030 E. Flamingo Road, Suite 230 Las Vegas, NV 89119	PAGE: 1 of 1
PROJECT:	CLIENT PO #:
Sampled By: D. Haile	Submitted by: D. Haile
Date Sampled: 03/27/13	Date Received: 03/27/13
Time Sampled: 1420	Time Received: 1447

Report Attention:

Sample ID	Location	Parameter	Result	Unit	Reporting Limit	Method	Date Analyzed	Analyst
13-1339-1	CLVWPCF-Outfall 001	Total Coliform	10.9	100 mL ⁻¹	1.0	Colilert-18	03/27/13	DC
	CLVWPCF-Outfall 001	Fecal Coliform	<1.0	100 mL ⁻¹	1.0	Colilert-18	03/27/13	DC

ND: non-detect
EPA Flags: None

REVIEWED BY:



 John Sloan
 Laboratory Director

3638 East Sunset Road, Suite 100 • Las Vegas, NV 89120 • Tel: 702-873-4478 Fax: 702-873-7967
 4587 Longley Lane, No. 2 • Reno, NV 89502 • Tel: 775-825-1127 Fax: 775-825-1167
 www.ssalabs.com • www.envirotechnonline.com

Appendices Item #6 - Silver State Lab's Coliform Analysis

MSDS SHEETS
For Acid Preservatives

MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION of the SUBSTANCE or PREPARATION

Trade/Material Name: SULFURIC ACID > 51%
Chemical Names, Common Names: Concentrated Sulfuric Acid
Synonyms: Hydrogen Sulfate; Oil of Vitriol; Vitriol Brown Oil; Matting Acid; Battery Acid; Sulphuric Acid; Electrolyte Acid; Dihydrogen Sulfate; Spirit of Sulfur; Chamber Acid
Product Use: Various
Molecular Formula: H₂SO₄
Product Catalog Numbers: ACS-.5; ACS-1; ACS-10; ACS-2; ACS-5; SVCS-.5; SVCS-1; SVCS-10; SVCS-2; SVCS-5

COMPANY/UNDERTAKING IDENTIFICATION:

U.S. Manufacturer's Name: EP Scientific Products, LLC.-ThermoFisher Scientific
Address: 520 N. Main Street
Miami, OK 74354
Business Phone: 1-(800)-331-7425
Emergency Phone: CHEMTREC: 1-800-424-9300 (U.S./Canada/Puerto Rico) [24-hours]
CHEMTREC: +1-703-527-3887 (Outside North America) [24-hours]

EMAIL ADDRESS FOR PRODUCT INFORMATION:

ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. The product is also classified per all applicable EU Directives through EC 1907: 2006, the European Union CLP EC 1272/2008 and the Global Harmonization Standard.

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION CLASSIFICATION: This product has been classified in accordance with the Global Harmonization Standard.

Classification: Skin Corrosion, Category 1A

Hazard Statement Codes: H314

See Section 15 for full text of Precautionary Statements and Hazard Statement Codes

EU LABELING AND CLASSIFICATION 67/548/EEC: This product meets the definition of hazardous, as defined by the European Community Council Directive 67/548/EEC or subsequent Directives.

EU CLASSIFICATION: C [Corrosive]

EU RISK PHRASES: R: 35

EU SAFETY PHRASES: S: (1/2-); S: 26; S: 30; S: 45

See Section 15 for full text of Ingredient Risk and Safety Phrases

EMERGENCY OVERVIEW: Product Description: This product is an oily, clear, colorless to yellow liquid with strong, acrid odor. **Health Hazards: DANGER!** This product is corrosive and can cause severe irritation or burns by all routes of exposure. May be fatal by inhalation or ingestion. Symptoms by inhalation may be delayed. Repeated inhalation of low level concentrations may cause reduced lung capacity. Chronic skin exposure to low concentration may result in dermatitis. Strong inorganic acid mists containing sulfuric acid may cause cancer. **Flammability Hazards:** This product is not flammable or combustible. If involved in a fire it may generate irritating fumes and toxic gases (e.g., sodium oxides). **Reactivity Hazards:** Concentrated Sulfuric Acid reacts violently with water and many other substances under certain conditions. Reaction with water can generate significant heat. Hygroscopic (absorbs moisture from the air). Sulfuric Acid is corrosive to many metals and contact may produce flammable hydrogen gas. **Environmental Hazards:** This product may cause harm to organisms if accidentally released. **Emergency Considerations:** Emergency responders should wear appropriate protection for situation to which they respond.

3. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS#	WT%	EU Hazard Symbol (67/548/EEC)	GHS/EU Hazard Symbol (1272/2008 EC)	EU Classification (67/548/EEC) GHS & EU Classification (1272/2008 EC) Risk Phrases/Hazard Statements
Sulfuric Acid	7664-93-3	231-639-5	96%			EU 67/548 Hazard Classification: C (Corrosive) EU 67/548 Risk Phrases: R: 35 GHS & EU 1272/2008 Classification: Skin Corrosion, Category 1A GHS & EU 1272/2008 Hazard Statement Code: H314

See Section 15 for full text of Ingredient Risk Phrases and Precautionary Statements

4. FIRST-AID MEASURES

DESCRIPTION OF FIRST AID MEASURES: Take a copy of label and MSDS to physician or health professional with the contaminated individual.

IMMEDIATE MEDICAL ATTENTION NEEDED: Yes.

SKIN EXPOSURE: If this solution contaminates the skin, flush with running water for 20 minutes. Seek medical attention if adverse effect occurs after flushing.

4. FIRST-AID MEASURES (Continued)

EYE EXPOSURE: If this product contaminates the eyes, rinse eyes under gently running water. Use sufficient force to open eyelids and then "roll" eyes while flushing. Do not interrupt flushing. Minimum flushing is for 20 minutes. The contaminated individual must seek immediate medical attention.

INHALATION: If mists, vapors or sprays of this product are inhaled, causing irritation, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. If breathing is difficult, give oxygen. Seek medical attention if adverse effect continues after removal to fresh air.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, DO NOT INDUCE VOMITING. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If victim is convulsing, maintain an open airway and obtain immediate medical attention.

PROTECTION OF FIRST AID RESPONDERS: See Sections 6 (Accidental Release Measures) and 8 (Exposure Controls-Personal Protection).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin or respiratory disorders may be aggravated by overexposures to this product.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT IF NEEDED: Treat symptoms and eliminate exposure. Monitor arterial blood gases, chest x-ray, and pulmonary function tests if respiratory tract irritation or respiratory depression is evident. Treat dermal irritation or burns with standard topical therapy. Effects may be delayed. Do NOT use sodium bicarbonate in an attempt to neutralize the acid.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %): Not applicable.

FIRE EXTINGUISHING MEDIA: Use extinguishing agents suitable for the surrounding fire. Use water only to keep non-leaking, fire-exposed containers cool. If water is used, care should be taken, since it can generate heat and cause spattering if applied directly to sulfuric acid.

UNSUITABLE FIRE EXTINGUISHING MEDIA: Water.

SPECIAL FIRE AND EXPLOSION HAZARDS: Sulfuric Acid is not flammable or combustible. During a fire, irritating/toxic sulfur oxides may be generated. Sulfuric Acid reacts violently with water and organic materials with the evolution of heat. Fire may result due to the heat generated by contact of concentrated Sulfuric Acid with combustible materials. Sulfuric Acid reacts with most metals, especially when diluted with water. This reaction produces highly flammable hydrogen gas, which may explode if ignited, particularly in confined spaces. Sulfuric Acid is a strong dehydrating agent, which may cause ignition of finely divided materials on contact. Containers may explode in the heat of a fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

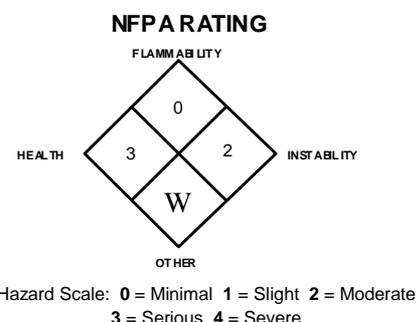
Explosion Sensitivity to Static Discharge: Not sensitive.

ADVICE TO FIRE-FIGHTERS: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus (SCBA) and full protective equipment. Evacuate area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous decomposition products. Closed containers may rupture violently when exposed to the heat of fire and suddenly release large amounts of product. If possible, isolate materials not yet involved in the fire and move containers from fire area if this can be done without risk.

Protect personnel. Otherwise, cool fire-exposed containers, tanks or equipment by applying hose streams. Cooling should begin as soon as possible (within several minutes) and should concentrate on any un-wetted portions of the container. Apply water from the side and a safe distance. Cooling should continue until well after the fire is out. If this is not possible, use unmanned monitor nozzles and immediately evacuate the area. Use water spray in large quantities to knock down fumes. The resulting sulfuric acid solutions are very corrosive. Dike fire control water for appropriate disposal. DO NOT direct water at open or leaking containers and take precautions not to get water into containers. If protective equipment is contaminated by this product, it should be thoroughly washed with soapy water prior to removal of SCBA respiratory protection. Firefighters whose protective equipment becomes contaminated should thoroughly shower with warm, soapy water and should receive medical evaluation if they experience any adverse effects.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES: Trained personnel using pre-planned procedures should respond to uncontrolled releases. In case of a spill, clear the affected area and protect people. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Avoid allowing water runoff to contact spilled material. Call CHEMTREC (1-800-424-9300) for emergency assistance. Or if in Canada, call CANUTEC (613-996-6666). The atmosphere must have levels of components lower than those listed in Section 8, (Exposure Controls and Personal Protective Equipment), if applicable, and have at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus.



6. ACCIDENTAL RELEASE MEASURES (Continued)

PROTECTIVE EQUIPMENT: Proper protective equipment should be used.

Small Spills: Wear double-gloves (rubber over latex gloves), rubber apron, and splash goggles or safety glasses.

Large Spills: Trained personnel following pre-planned procedures should handle non-incident releases. Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit. Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard hat, and Self-Contained Breathing Apparatus.**

METHODS FOR CLEAN-UP AND CONTAINMENT:

Small Spills: Neutralize spill area with sodium bicarbonate or other material appropriate for acidic materials. Absorb spilled liquid with polypads, or other suitable absorbent materials. Absorb spilled liquid with polypads, or other suitable absorbent materials. Do not use sawdust or other organic material. Wash contaminated area with soap and water, absorb with polypads or other appropriate material, and rinse with water.

Large Spills: Neutralize spill area with sodium bicarbonate or other material appropriate for acidic materials. Absorb spilled liquid with polypads, or other suitable absorbent materials. Ensure adequate ventilation. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Monitor area and confirm levels are below exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area.

All Spills: Place all spill residue in a double plastic bag or other containment and seal, place in appropriate container and dispose of properly. Decontaminate the area thoroughly. After all spill residue has been removed from the area, rinse the area with flooding quantities of water. Do not mix with wastes from other materials. If necessary, discard all stained response equipment or rinse with soapy water before returning such equipment to service.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Do not flush to sewer.

REFERENCE TO OTHER SECTIONS: See Section 13, Disposal Considerations for more information. State, and local procedures (see Section 13, Disposal Considerations).

7. HANDLING and USE

PRECAUTIONS FOR SAFE HANDLING: All employees who handle this product should be trained to handle it safely. As with all chemicals, avoid getting this product ON YOU or IN YOU. Do not eat, drink, smoke, or apply cosmetics while handling this product. Wash hands thoroughly after handling this product or equipment and containers of this compound. Follow SPECIFIC USE INSTRUCTIONS supplied with product. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Open containers slowly on a stable surface. Containers of this product must be properly labeled. Empty containers may contain residual liquid or vapors; therefore, empty containers should be handled with care. Do not allow water to get into containers. Corrosion of equipment and surfaces should be considered in areas where hot or misted acid is present. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Soda ash or lime should be kept nearby for emergency use. Never add water to Sulfuric Acid; always add Sulfuric Acid to water; severe spattering and generation of significant heat can occur. When mixing with water, stir small amounts in slowly. Use cold water to prevent excessive heat generation.

CONDITIONS FOR SAFE STORAGE: Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers or in a diked area, as appropriate. Keep container tightly closed when not in use. Storage areas should be made of fire and corrosion resistant materials. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged. Do not allow water to get into the container because of violent reaction. Ideally, Sulfuric Acid should be stored in isolation from all other chemicals in an approved acid or corrosives safety cabinet. Containers may develop pressure after prolonged storage. Drums may need to be vented. Venting should only be performed by trained personnel. Follow supplier/manufacturer recommendations. If drums are swollen, contact the manufacturer/supplier immediately for assistance. Handling swollen drums requires special procedures and equipment.

SPECIFIC END USE(S): This product has various uses in different industries. Follow all industry standards for use of this product.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: When cleaning non-disposable equipment, wear latex or butyl rubber (double gloving is recommended), goggles, and lab coat. Wash equipment with soap and water. Wipe equipment down with damp sponge or polypad. Collect all rinsates and dispose of according to applicable Federal, State, and local procedures standards.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: This product should be used areas with adequate ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits provided in this section, if applicable. Use a non-sparking, grounded, explosion-proof ventilation system separate from other exhaust ventilation systems. Exhaust directly to the outside, taking necessary precautions for environmental protection. An eyewash and safety shower should be readily accessible.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EXPOSURE LIMITS/CONTROL PARAMETERS:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							OTHER mg/m ³
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELs		NIOSH	
		TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	IDLH mg/m ³	
Sulfuric Acid	7664-93-9	0.2 T	NE	1	NE	1	NE	15	DFG MAKs: TWA = 0.1 (inhalable fraction) PEAK = 1•MAK 15 min. average value, 1-hr interval, 4 per shift, 0.2 (ceiling) DFG MAK Pregnancy Risk Classification: C Carcinogen: IARC-1, MAK-4, NTP-K, TLV-A2

NE = Not Established. T = Measured as Thoracic Fraction of the Aerosol

INTERNATIONAL EXPOSURE LIMITS: Currently, the following international exposure limits are in place for Sulfuric Acid. This may not be a complete list and exposure limits change and should be checked for currency.

ARAB Republic of Egypt: TWA = 1 mg/m, JAN 1993
Australia: TWA = 1 mg/m³, STEL = 3 mg/m³, JUL 2008
Belgium: TWA = 1 mg/m³, STEL = 3 mg/m³, MAR 2002
Denmark: TWA = 1 mg/m³, OCT 2002
Finland: TWA = 1 mg/m³, STEL 3 mg/m³, SEP 2009
France: VME = 1 mg/m³, VLE = 3 mg/m³, FEB 2006
Germany: MAK = 1 0.1 mg/m³ (inhalable), 2005
Hungary: TWA = 1 mg/m³, STEL = 1 mg/m³, SEP 2000

Japan: OEL-C = 1 mg/m³, APR 2007
Korea: TWA = 1 mg/m³, 2006
Mexico: TWA = 1 mg/m³, 2004
The Netherlands: MAC-TGG = 1 mg/m³, 2003
New Zealand: TWA = 1 mg/m³, JAN 2002
Norway: TWA = 1 mg/m³, JAN 1999
Poland: MAC(TWA) = 1 mg/m³, MAC(STEL) = 3 mg/m³, JAN 1999

Russia: STEL = 1 mg/m³, Skin, JUN 2003
Sweden: TWA = 1 mg/m³, STEL = 3 mg/m³, JUN 2005
Switzerland: MAK-W = 0.1 mg/m³, KZG-W = 0.1 mg/m³, DEC 2006
Thailand: TWA = 1 mg/m³, JAN 1993
Turkey: TWA = 1 mg/m³, JAN 1993
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-07) and CR 13464:1999 for face/eye protection). Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: If airborne mists or sprays from this product are created during use, use appropriate respiratory protection. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) and equivalent U.S. State standards, Canadian CSA Standard Z94.4-93 and the European Standard EN 529:2005 and Respiratory Protection Standards of EU member states. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under U.S. Federal OSHA's Respiratory Protection Standard (1910.134-1998). The following are NIOSH respiratory protection equipment guidelines for Sulfuric Acid and are provided for additional information on the selection of respiratory protection equipment.

SULFURIC ACID

CONCENTRATION

Up to 15 mg/m₃:

RESPIRATORY PROTECTION

Any Supplied-Air Respirator (SAR) operated in a continuous-flow mode, or any Powered, Air-Purifying Respirator (PAPR) with acid gas cartridge(s) in combination with a high-efficiency particulate filter, or any Chemical Cartridge Respirator with a full facepiece and acid gas cartridge(s) in combination with a high-efficiency particulate filter, or any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter, or any Self-Contained Breathing Apparatus (SAR) with a full facepiece, or any SAR with a full facepiece.

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Any SCBA that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode.

Escape: Any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter, or any appropriate escape-type, SCBA.

EYE PROTECTION: Splash goggles or safety glasses should be worn during operations in which airborne mists or sprays may be generated. A faceshield may be necessary under certain circumstances and if large quantity is being handled. If necessary, refer to U.S. OSHA 29 CFR 1910.133, the Canadian CSA Standard Z94.3-M1982, *Industrial Eye and Face Protectors*, or the European Standard CR 13464:1999 for further information.

HAND PROTECTION: Wear butyl rubber gloves for routine industrial use. Use triple gloves for spill response. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate Standards of Canada, or the European Standard CEN/TR 15419:2006.

BODY/SKIN PROTECTION: Use body protection appropriate for task (e.g., lab coat, coveralls, Tyvek suit). When chemical contact is possible, use splash apron, work uniform, and shoes or coverlets to prevent skin contact. Full-body chemical protective clothing is recommended for emergency response procedures. If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) or refer to appropriate Standards of Canada, or the European Standard CEN/TR 15419:2006, for further information. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-M1984, *Protective Footwear*.

9. PHYSICAL and CHEMICAL PROPERTIES

BOILING POINT: 290- 338°C (554-640.4°F)

EVAPORATION RATE (water = 1): Slower than ether.

VAPOR PRESSURE (air = 1) @ 20°C: < 0.001 mmHg

SPECIFIC GRAVITY/DENSITY: 1.84

MOLECULAR WEIGHT: 98.08

DECOMPOSITION TEMPERATURE: 340°C (644°F)

OXIDIZING PROPERTIES: Not an oxidizer.

ODOR THRESHOLD: Sulfuric Acid is odorless. Irritation has been experienced between 1 and 3 mg/m3.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable (ionizable compounds)

APPEARANCE AND COLOR: This product is an oily, clear, colorless to yellow liquid with strong, acrid odor.

HOW TO DETECT THIS SUBSTANCE (identification properties): Litmus paper will turn red in contact with this product and may assist in identification in event of accidental release.

FREEZING/MELTING POINT: 10°C (50°F)

SOLUBILITY IN WATER: Soluble with much heat.

VAPOR DENSITY (air= 1): 3.38

VISCOSITY @ 25°C: 21 mPas

MOLECULAR FORMULA: H₂SO₄

pH: 0.3 (1N solution)

10. STABILITY and REACTIVITY

REACTIVITY: Sulfuric Acid is a very reactive substance. Sulfuric Acid reacts with most metals, especially when diluted with water.

CHEMICAL STABILITY: This product is stable when properly stored (see Section 7, Handling and Storage) at normal temperature. Contact with metals can produce highly flammable hydrogen gas.

DECOMPOSITION PRODUCTS: *Combustion:* If exposed to extremely high temperatures, thermal decomposition may generate irritating fumes and toxic gases (e.g. sulfur oxides). *Hydrolysis:* None.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Sulfuric Acid is a very reactive substance. Sulfuric Acid is water-reactive. The concentrated acid oxidizes, dehydrates, or sulfonates most organic compounds. Sulfuric acid reacts vigorously, violently or explosively with many organic and inorganic chemicals including acrylonitrile, alkali solutions, carbides, chlorates, fulminates, nitrates, perchlorates, permanganates, picrates, powdered metals, metal acetylides or carbides, epichlorohydrin, aniline, ethylenediamine, alcohols with strong hydrogen peroxide, chlorosulfonic acid, cyclopentadiene, hydrofluoric acid, nitromethane, 4-nitrotoluene, phosphorus (III) oxide, potassium, sodium, ethylene glycol, isoprene, styrene. Hazardous gases, such as hydrogen, hydrogen cyanide, hydrogen sulfide and acetylene, are evolved on contact with chemicals such as metals, cyanides, sulfides and mercaptans and carbides respectively. Sulfuric acid attacks many plastics, such as nylon, polyvinylidene chloride, acrylonitrile-butadiene-styrene, styrene acrylonitrile, polyurethane (rigid), polyetherether ketone, polyethylene terephthalate, high-density polyethylene, thermoset polyester bisphenol A fumarate, thermoset polyester isophthalic acid, polystyrene, ethylene vinyl acetate; elastomers, such as butyl rubber (isobutylene isoprene), nitrile buna N (nitrile rubber), chloroprene (neoprene), isoprene, natural rubber, hard rubber, soft rubber, chlorosulfonated polyethylene, styrene-butadiene, polyacrylate, polyurethane, chlorinated polyethylene, nylon 11 and 12, silicone rubbers, flexible polyvinyl chloride, low density polyethylene, ethylene vinyl acetate. Sulfuric Acid also attacks many types of polymer coatings.

POSSIBILITY OF HAZARDOUS REACTIONS OR POLYMERIZATION: Acetaldehyde and allyl chloride may polymerize violently in the presence of Sulfuric Acid.

CONDITIONS TO AVOID: Avoid extreme temperatures and contact with water and incompatible chemicals.

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The health hazard information provided below is pertinent to employees using this product in an occupational setting. The following paragraphs describe the symptoms of exposure by route of exposure.

INHALATION: If vapors, mists or sprays of this solution are inhaled, symptoms of exposure may include breathing difficulty, irritation of the mucus membranes, coughing, nasal congestion, and a sore throat. Damage to the tissues of the respiratory system may also occur, especially after prolonged exposures or exposures to high concentrations of this solution. Severe inhalation over-exposures can lead to chemical pneumonitis, pulmonary edema, and death. Chronic inhalation exposures may result in dental erosion and perforation of the nasal septum. Exposure may impair lung function and cause mucostasis (reduced mucous clearance).

CONTACT WITH SKIN or EYES: Contact with the eyes will cause severe irritation, pain, reddening, watering, and possibly, blindness. Depending on the duration of skin contact, skin overexposures may cause reddening, discomfort, severe irritation, and chemical burns. Chemical burns result in blistering of the skin and possible scarring. Repeated skin-overexposures to low concentrations can result in dermatitis (inflammation and reddening of the skin).

SKIN ABSORPTION: Skin absorption is not a significant route of overexposure for this product.

INGESTION: Ingestion is not anticipated to be a likely route of occupational exposure to this product. If ingestion does occur, severe irritation and burns of the mouth, throat, esophagus, and other tissues of the digestive system will occur immediately upon contact. Symptoms of such over-exposure can include nausea, vomiting, diarrhea. Ingestion of large volumes of this product may be fatal.

INJECTION: Though not anticipated to be a significant route of overexposure for this product, injection (via punctures or lacerations by contaminated objects) may cause redness at the site of injection.

11. TOXICOLOGICAL INFORMATION (Continued)

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Overexposure to this product may cause the following health effects:

ACUTE: This product is corrosive and may cause severe irritation or burns by all routes of exposure. Eye contact may cause tissue damage or blindness. Ingestion may be harmful or fatal.

CHRONIC: Chronic inhalation of vapors, mists or spray from this product may cause reduction in lung capacity, bronchitis and erosion of the teeth. Repeated, low concentration skin contact of this product may cause dermatitis. Occupational exposure to strong inorganic acid mists containing Sulfuric Acid is carcinogenic to humans.

TARGET ORGANS: ACUTE: Eyes, respiratory system, skin. CHRONIC: Respiratory system, skin.

TOXICITY DATA: Currently, the following toxicity data are available for Sulfuric Acid.

Standard Draize Test (Eye-Rabbit) 250 µg: Severe
Rinsed with Water (Eye-Rabbit) 5 mg/30 seconds: Severe

TCLo (Inhalation-Human) 3 mg/m³/24 weeks: Musculoskeletal: changes in teeth and supporting structures

TCLo (Inhalation-Human) 1 mg/m³/3 hours: Lungs, Thorax, or Respiration: other changes

TCLo (Inhalation-Human) 0.6 mg/m³: Lungs, Thorax, or Respiration: cough

TCLo (Inhalation-Human) 0.73 mg/m³: Sense Organs and Special Senses (Eye): effect, not otherwise specified
TCLo (Inhalation-Human) 0.63 mg/m³: Brain and Coverings: changes in surface EEG

TCLo (Inhalation-Human) 3 mg/m³/5 minutes: Lungs, Thorax, or Respiration: dyspnea

LDLo (Unreported-Man) 135 mg/kg

LD₅₀ (Oral-Rat) 350 mg/kg

LC₅₀ (Inhalation-Rat) 510 mg/m³/2 hours

LC₅₀ (Inhalation-Rat) 510 mg/m³

LC₅₀ (Inhalation-Mouse) 320 mg/m³/2 hours

LC₅₀ (Inhalation-Mouse) 320 mg/m³

LC₅₀ (Inhalation-Guinea Pig) 18 mg/m³: Lungs, Thorax, or Respiration: other changes

LC₅₀ (Inhalation-Guinea Pig) 18 mg/m³/8 hours

LCLo (Inhalation-Rat) 65 mg/m³/30 minutes: Lungs, Thorax, or Respiration: bronchiolar constriction

LCLo (Inhalation-Rat) 461 mg/m³/7 hours

LCLo (Inhalation-Mouse) 461 mg/m³/7 hours

LCLo (Inhalation-Rabbit) 461 mg/m³/7 hours

LCLo (Inhalation-Cat) 461 mg/m³/7 hours

TCLo (Inhalation-Rat) 0.2 mg/m³/6 hours/4 weeks-intermittent: Lungs, Thorax, or Respiration: other changes

TCLo (Inhalation-Rat) 784 µg/m³/24 hours/84 days-continuous: Behavioral: muscle contraction or spasticity; Kidney/Ureter/Bladder: other changes in urine composition; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: true cholinesterase

TCLo (Inhalation-Rat) 1.8 mg/m³/24 hours/65 days-continuous: Peripheral Nerve and Sensation: recording from peripheral motor nerve; Kidney/Ureter/Bladder: changes in both tubules and glomeruli

TCLo (Inhalation-Rat) 0.3 mg/m³/6 hours/5 days-intermittent: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified; Lungs, Thorax, or Respiration: other changes

TCLo (Inhalation-Guinea Pig) 8 mg/m³/5 days: Behavioral: food intake (animal), changes in motor activity (specific assay); Lungs, Thorax, or Respiration: acute pulmonary edema

TCLo (Inhalation-Guinea Pig) 30 mg/m³/7 days-continuous: Lungs, Thorax, or Respiration: acute pulmonary edema; Related to Chronic Data: death

TCLo (Inhalation-Guinea Pig) 4 mg/m³/24 hours/18 days-continuous: Lungs, Thorax, or Respiration: fibrosis (interstitial), acute pulmonary edema

TCLo (Inhalation-Monkey) 2 mg/m³/23 hours/78 weeks-intermittent: Lungs, Thorax, or Respiration: other changes

TCLo (Inhalation-Monkey) 2.4 mg/m³/24 hours/78 weeks-continuous: Lungs, Thorax, or Respiration: other changes

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	3
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FLAMMABILITY HAZARD	(RED)	0
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PHYSICAL HAZARD	(YELLOW)	2
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PROTECTIVE EQUIPMENT

EYES RESPIRATORY HANDS BODY

SEE SECTION 8

For Routine Industrial Use and Handling Applications

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate
3 = Serious 4 = Severe * = Chronic hazard

TCLo (Inhalation-Monkey) 2.4 mg/m³/24 hours/78 weeks-continuous: Lungs, Thorax, or Respiration: respiratory depression

TCLo (Inhalation-Dog) 900 µg/m³/21 hours/89 weeks-intermittent: Cardiac: changes in heart weight; Lungs, Thorax, or Respiration: other changes Lungs, Thorax, or Respiration: changes in lung weight

TCLo (Inhalation-Dog) 0.9 mg/m³/21 hours/620 days-intermittent: Lungs, Thorax, or Respiration: respiratory depression

TCLo (Inhalation-Rabbit) 20 mg/m³/7 hours: female 6-18 day(s) after conception: Reproductive: Specific Developmental Abnormalities: musculoskeletal system

TCLo (Inhalation-Mammal-Horse, Donkey) 0.1 mg/m³/5 days/26 weeks-intermittent: Lungs, Thorax, or Respiration: other changes

Cytogenetic Analysis (Hamster-Ovary) 4 mmol/L

IRRITANCY OF PRODUCT: This product may cause severe irritation or burns by all routes of exposure.

SENSITIZATION OF PRODUCT: Sulfuric Acid is not known to cause human skin or respiratory sensitization.

CARCINOGENIC POTENTIAL: Sulfuric Acid is listed by agencies tracking the carcinogenic potential of chemical compounds, as follows:

SULFURIC ACID (*strong inorganic acid mists containing sulfuric acid): *ACGIH TLV-A2 (Suspected Human Carcinogen); *IARC-1 (Carcinogenic to Humans); *NTP-K (Known to Be a Human Carcinogen); MAK-4 (Substances with Carcinogenic and Genotoxic Effects, the Potency of Which is Considered to Be So Low, That, Provided the MAK and BAT Values are Observed, No Significant Contribution to Human Cancer Risk is to Be Expected)

SYNERGISTIC MATERIALS: There are conflicting results from studies in animals on the interactive effects between ozone and Sulfuric Acid when they are inhaled concurrently. While some have shown a synergistic effect others have shown no effect or an antagonistic effect.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Sulfuric Acid on human and animal reproductive systems.

Mutagenicity: The components of this product are not reported to cause human mutagenic effects. There are no mutagenicity studies specifically of sulfuric acid. However, there are established effects of reduced pH in mutagenicity testing, as would be caused by sulfuric acid. These effects are an artifact of low pH and are not necessarily due to biological effects of sulfuric acid itself.

Embryotoxicity: The components of this product are not reported to cause human embryotoxic effects.

Teratogenicity: The components of this product are not reported to cause human teratogenic effects. Sulfuric Acid was not teratogenic in mice and rabbits, but was slightly embryotoxic in rabbits (a minor, rare skeletal variation). The animals were exposed to 5 and 20 mg/m³ for 7 hr/day throughout pregnancy. Slight maternal toxicity was present at the highest dose in both species.

Reproductive Toxicity: The components of this product are not reported to cause human reproductive effects.

11. TOXICOLOGICAL INFORMATION (Continued)

REPRODUCTIVE TOXICITY INFORMATION (continued):

A *mutagen* is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An *embryo toxin* is a chemical that causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A *teratogen* is a chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. A *reproductive toxin* is any substance that interferes in any way with the reproductive process.

ACGIH BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, ACGIH Biological Exposure Indices (BEIs) have not been determined for the components of this product.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY IN SOIL: Since Sulfuric Acid is miscible with water, the presence of water in the soil or falling as precipitation at the time of the spill will influence the rate of chemical movement in the soil. Dilution through mixture with water will decrease the viscosity more than the mass density. This will have the net effect of increasing the velocity of downward movement in the soil. Upon reaching the groundwater table, the acid will continue to move in the direction of groundwater flow and downward since its mass density exceeds that of water. A contaminated plume will be produced, with diffusion and dispersion serving to reduce the acid concentration somewhat.

PERSISTENCE AND BIODEGRADABILITY: Sulfuric Acid has led to increased weathering of calcium from soils and rocks so that the calcium ion rises in concentration in waters above pH 6, and also in those below pH 5.

BIO-ACCUMULATION POTENTIAL: Sulfuric Acid does not bioconcentrate.

ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. All release to terrestrial, atmospheric, and aquatic environments should be avoided. The following aquatic toxicity data are available for Sulfuric Acid:

TLm (<i>Gambusia affinis</i> mosquito fish) 48 hours = 42 mg/L turbid water/Conditions of bioassay not specified	LC ₅₀ (Flounder) 48 hours = 100 to 330 mg/L; aerated water/Conditions of bioassay not specified
TLm (<i>Lepomis macrochirus</i> bluegill) 48 hours = 49 mg/L tap water 20°C/Conditions of bioassay not specified	LC ₅₀ (Shrimp) 48 hours = 80 to 90 mg/L; aerated water /Conditions of bioassay not specified
TLm (<i>Lepomis macrochirus</i> bluegill) 24 hours = 24.5 ppm/fresh water/Conditions of bioassay not specified	LC ₅₀ (Prawn) 48 hours = 42.5 ppm/salt water /Conditions of bioassay not specified

OTHER ADVERSE EFFECTS: This material is not listed or expected to have having ozone depletion potential.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

13. DISPOSAL CONSIDERATIONS

WASTE TREATMENT/DISPOSAL METHODS: It is the responsibility of the generator to determine at the time of disposal whether the product meets the criteria of a hazardous waste per regulations of the area in which the waste is generated and/or disposed of. Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. Shipment of wastes must be done with appropriately permitted and registered transporters.

DISPOSAL CONTAINERS: Waste materials must be placed in and shipped in appropriate 5-gallon or 55-gallon poly or metal waste pails or drums. Permeable cardboard containers are not appropriate and should not be used. Ensure that any required marking or labeling of the containers be done to all applicable regulations.

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials. Dispose of in accordance with applicable Federal, State, and local procedures and standards.

EPA WASTE NUMBER: Wastes from this product should be tested to see if they meet D002 (Waste Characteristic-Corrosivity).

EUROPEAN WASTE CODES: 16 05 08: Discarded Organic Chemicals Consisting of or Containing Dangerous Substances.

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: This product is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

PROPER SHIPPING NAME:	Sulfuric acid with more than 51 per cent acid
HAZARD CLASS NUMBER and DESCRIPTION:	8 (Corrosive)
UN IDENTIFICATION NUMBER:	UN 1830
PACKING GROUP:	PG II
DOT LABEL(S) REQUIRED:	Class 8 (Corrosive)

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2008): 137

MARINE POLLUTANT: No component of this product meets the criteria of the DOT as Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

NOTE: Shipments of this product may be shipped under small quantity and limited quantity exceptions as indicated under 49 CFR §173.4 and 49 CFR §173.154, if all requirements are met.

Small Quantity Exception (49 CFR 173.4): Small quantities of Class 8 material are not subjected to other requirements of the Hazardous Materials Regulations (Subchapter C) when the maximum quantity per inner receptacle is limited to 30 mL (liquids). Refer to 49 CFR 173.4 for specific information in packaging small quantity materials.

Limited Quantity Exceptions [49 CFR 173.154(b)(2)]: Limited quantities for Class 8, Packing Group II materials have inner packagings not over 1.0 L (liquids) net capacity each, packed in strong outer packaging.

14. TRANSPORTATION INFORMATION (Continued)

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified as Dangerous Goods, per regulations of Transport Canada.

PROPER SHIPPING NAME: Sulfuric acid with more than 51 per cent acid, or Sulphuric acid with more than 51 per cent acid

HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive)

UN IDENTIFICATION NUMBER: UN 1830

PACKING GROUP: PG II

HAZARD SHIPPING LABEL(S) REQUIRED: Class 8 (Corrosive)

SPECIAL PROVISIONS: None

EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX: 1

ERAP INDEX: 3000

PASSENGER CARRYING SHIP INDEX: None

PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX: 1

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is classified as dangerous goods, per the International Air Transport Association.

UN IDENTIFICATION NUMBER: UN 1830

PROPER SHIPPING NAME/DESCRIPTION: Sulfuric acid with more than 51 per cent acid

HAZARD CLASS or DIVISION: 8 (Corrosive)

HAZARD LABEL(S) REQUIRED: Class 8 (Corrosive)

PACKING GROUP: II

PASSENGER and CARGO AIRCRAFT PACKING INSTRUCTION: 809

PASSENGER and CARGO AIRCRAFT MAXIMUM NET QUANTITY PER PKG: 1 L

PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY PACKING INSTRUCTION: Y809

PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY MAXIMUM NET QUANTITY PER PKG: 0.5 L

CARGO AIRCRAFT ONLY PACKING INSTRUCTION: 813

CARGO AIRCRAFT ONLY MAXIMUM NET QUANTITY PER PKG: 30 L

SPECIAL PROVISIONS: None

ERG CODE: 8L

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is classified as dangerous goods, per the International Maritime Organization.

UN No.: 1830

PROPER SHIPPING NAME: Sulfuric acid with more than 51 per cent acid

HAZARD CLASS NUMBER: 8

SUBSIDIARY RISK: None

PACKING GROUP: II

SPECIAL PROVISIONS: None

LIMITED QUANTITIES: LQ: 1 mL, EQ: E2

PACKING INSTRUCTIONS: P001

EmS: F-A, S-B

STOWAGE CATEGORY: Category C. For steel drums, Category B.

MARINE POLLUTANT: This material does not meet the criteria of a Marine Pollutant under UN criteria.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is classified by the Economic Commission for Europe to be dangerous goods.

UN NO.: 1830

NAME and DESCRIPTION: Sulfuric acid with more than 51 per cent acid

CLASS: 8

CLASSIFICATION CODE: C1

PACKING GROUP: II

LABELS: 8

SPECIAL PROVISIONS: None

LIMITED QUANTITIES: LQ22

PACKING INSTRUCTIONS: P001, IBC02

MIXED PACKING PROVISIONS: MP15

HAZARD IDENTIFICATION No.: 80

15. REGULATORY INFORMATION

ADDITIONAL UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: Sulfuric Acid is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows.

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Sulfuric Acid	No	No	Yes (aerosol forms only)

U.S. SARA SECTION 302 THRESHOLD PLANNING QUANTITY (TPQ): 1000 lb (454 kg)

15. REGULATORY INFORMATION (Continued)

ADDITIONAL UNITED STATES REGULATIONS (continued):

U.S. SARA SECTION 304 REPORTABLE QUANTITY (TPQ): 1000 lb (454 kg)

U.S. CERCLA REPORTABLE QUANTITY (RQ): 1000 lb (454 kg)

U.S. TSCA INVENTORY STATUS: Sulfuric Acid is listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Sulfuric Acid has requirements under additional U.S. regulations, as follows:

SULFURIC ACID:

CLEAN WATER ACT: Sulfuric Acid is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance.

CERCLA REPORTABLE QUANTITIES: Releases of CERCLA hazardous substances are subject to the release reporting requirement of CERCLA section 103, codified at 40 CFR part 302, in addition to the requirements of 40 CFR part 355. Sulfuric acid is an extremely hazardous substance (EHS) subject to reporting requirements when stored in amounts in excess of its threshold planning quantity (TPQ) of 1,000 lbs.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Strong inorganic acid mists containing sulfuric acid are on the California Proposition 65 Lists. **WARNING!** Strong inorganic mists containing Sulfuric Acid are known to the State of California to cause cancer.

U.S. ANSI STANDARD LABELING (Precautionary Statements): **DANGER! CORROSIVE. WATER REACTIVE.** CAUSES BURNS BY ALL ROUTES OF EXPOSURE. MAY BE HARMFUL OR FATAL IF SWALLOWED. CHRONIC, LOW-LEVEL INHALATION MAY CAUSE REDUCED LUNG FUNCTION. CHRONIC, LOW-LEVEL SKIN EXPOSURE MAY CAUSE DERMATITIS. CONTACT WITH WATER CAN CAUSE VIOLENT REACTION. Can react dangerously with many organic and inorganic materials. Strong inorganic acid mists containing sulfuric acid may cause cancer. Do not taste or swallow. Do not get on skin or in eyes. Avoid breathing vapors or mist. Keep container closed. Avoid accidental contact with water. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, faceshields, suitable body protection, and NIOSH-approved respiratory protection, as appropriate. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water for at least 20 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with inert material or neutralizing agent for acids. Place residue in suitable container. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDL STATUS: This material is listed on the DSL inventory.

CANADIAN ENVIRONMENTAL PROTECTION AGENCY (CEPA) PRIORITIES SUBSTANCES LIST: Substance With Greatest Potential For Human Exposure Substance on Environment Canada/Health Canada Pilot Project List (CEPA 1999, Section 73). Meets categorization criteria: *may present, to individuals in Canada, the greatest potential for exposure; or *are persistent or bio-accumulative in accordance with the regulations, and inherently toxic to human beings or to non-human organisms, as determined by laboratory or other studies.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: **Class E:** Corrosive Material, **Class D1A:** Class D, Division 2 Poisonous and Infectious Material: Other toxic effects



GLOBAL HARMONIZATION CLASSIFICATION: This product has been classified in accordance with the Global Harmonization Standard.

Classification: Skin Corrosion, Category 1A

Hazard Statements: H314: Causes severe skin burns and eye damage

Precautionary Statements:

Prevention: P260: Do not breathe gas/mist/vapours/spray. P264: Wash thoroughly after handling. P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response: P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician. P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. P310: Remove contact lenses, if present and easy to do. Continue rinsing. P363: Wash contaminated clothing before reuse.

Storage: P405: Store locked up.

Disposal: P501: Dispose of contents/containers in accordance with all local, regional, national and international regulations.

Signal Words: Danger

Hazard Symbols: GHS05



15. REGULATORY INFORMATION (Continued)

EU LABELING AND CLASSIFICATION: This product meets the definition of hazardous as defined by the European Community Council Directives.

EU Classification: C [Corrosive]

EU Risk Phrases: R: 35: Corrosive.

EU Safety Phrases: S:(1/2-)*: Keep locked up and out of the reach of children.* S: 26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S: 30: Never add water to this product. S: 45: In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).

*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only.

European Community Annex II Hazard Symbols: C [Corrosive]



16. OTHER INFORMATION

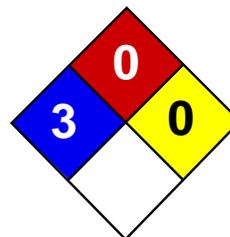
PREPARED BY:

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August 27, 2014

DATE OF PRINTING:



Health	3
Fire	0
Reactivity	0
Personal Protection	

Material Safety Data Sheet

Nitric Acid, 15% (v/v) MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nitric Acid, 15% (v/v)

Catalog Codes: SLN2284

CAS#: Mixture.

RTECS: Not applicable.

TSCA: TSCA 8(b) inventory: Water; Nitric acid, fuming

CI#: Not applicable.

Synonym:

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Water	7732-18-5	88-94.5
Nitric acid, fuming	7697-37-2	7-10.5

Toxicological Data on Ingredients: Nitric acid, fuming: VAPOR (LC50): Acute: 244 ppm 0.5 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, . Hazardous in case of skin contact (corrosive), of eye contact (corrosive). Slightly hazardous in case of inhalation (lung sensitizer). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to lungs, mucous membranes, upper respiratory tract, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not available

Explosion Hazards in Presence of Various Substances:

Slightly explosive in presence of reducing materials, of organic materials, of metals, of alkalis. Non-explosive in presence of open flames and sparks, of shocks.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:

Flammable in presence of cellulose or other combustible materials. Phosphine, hydrogen sulfide, selenide all ignite when fuming nitric acid is dripped into gas. Nickel tetrakisphosphide ignites with fuming nitric acid. (Nitric Acid)

Special Remarks on Explosion Hazards:

Reacts explosively with metallic powders, carbides, cyanides, sulfides, alkalies and turpentine. Can react explosively with many reducing agents. Arsine, phosphine, tetraborane all oxidized explosively in presence of nitric acid. Cesium and rubidium acetylides explode in contact with nitric acid. Explosive reaction with Nitric Acid + Nitrobenzene + water. Detonation with Nitric Acid + 4-Methylcyclohexane. (Nitric acid, fuming)

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:

Corrosive liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as alkalis. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

Nitric acid, fuming TWA: 2 STEL: 4 (ppm) from ACGIH (TLV) [United States] [1999] TWA: 2 STEL: 4 (ppm) [Australia] TWA: 2 STEL: 4 from NIOSH TWA: 5 STEL: 10 (mg/m³) from NIOSH TWA: 2 STEL: 4 (ppm) from OSHA (PEL) [United States] TWA: 5 STEL: 10 (mg/m³) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: Not applicable.

Color: Clear Colorless.

pH (1% soln/water): Acidic.

Boiling Point: The lowest known value is 83°C (181.4°F) (Nitric acid, fuming). Weighted average: 98.51°C (209.3°F)

Melting Point: May start to solidify at -41.6°C (-42.9°F) based on data for: Nitric acid, fuming.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1.03 (Water = 1)

Vapor Pressure: The highest known value is 6.4 kPa (@ 20°C) (Nitric acid, fuming). Weighted average: 2.66 kPa (@ 20°C)

Vapor Density: The highest known value is 2.3 (Air = 1) (Nitric acid, fuming). Weighted average: 0.77 (Air = 1)

Volatility: Not available.

Odor Threshold: The highest known value is 0.29 ppm (Nitric acid, fuming)

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:

Easily soluble in cold water, hot water. Soluble in diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances:

Reactive with alkalis. Slightly reactive to reactive with reducing agents, combustible materials, organic materials, metals, acids.

Corrosivity:

Extremely corrosive in presence of copper, brass. Corrosive in presence of aluminum. Non-corrosive in presence of glass, of stainless steel(304), of stainless steel(316).

Special Remarks on Reactivity:

A strong oxidizer. Reacts violently with alcohol, organic material, turpene, charcoal. Violent reaction with Nitric acid + Acetone and Sulfuric acid. Incompatible with combustible materials, metallic powders, hydrogen sulfide, carbides, alcohols. Nitric Acid will react with water or steam to produce heat and toxic, corrosive and flammable vapors. (Nitric acid, fuming)

Special Remarks on Corrosivity:

In presence of traces of oxides, it attacks all base metals except aluminum and special chromium steels. It will attack some forms of plastics, rubber, and coatings. No corrosive effect on bronze. No corrosivity data for zinc, and steel (Nitric acid, fuming)

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans:

Contains material which may cause damage to the following organs: lungs, mucous membranes, upper respiratory tract, eyes, teeth.

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant), of ingestion, . Hazardous in case of skin contact (corrosive), of eye contact (corrosive), of inhalation (lung corrosive).

Special Remarks on Toxicity to Animals: LDL - Lowest Published Lethal Dose [Human] - Route: Oral; Dose: 430 mg/kg (Nitric acid, fuming)

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects (effects on newborn and fetotoxicity) based on animal data. (Nitric acid, fuming)

Special Remarks on other Toxic Effects on Humans:**Section 12: Ecological Information**

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Nitric Acid UNNA: 2031 PG: II

Special Provisions for Transport: Marine Pollutant (Nitric acid, fuming)

Section 15: Other Regulatory Information**Federal and State Regulations:**

New York release reporting list: Nitric acid, fuming Rhode Island RTK hazardous substances: Nitric acid, fuming Pennsylvania RTK: Nitric acid, fuming Florida: Nitric acid, fuming Minnesota: Nitric acid, fuming Massachusetts RTK: Nitric acid, fuming New Jersey: Nitric acid, fuming TSCA 8(b) inventory: Water; Nitric acid, fuming SARA 302/304/311/312 extremely hazardous substances: Nitric acid, fuming SARA 313 toxic chemical notification and release reporting: Nitric acid, fuming 8.75% CERCLA: Hazardous substances.: Nitric acid, fuming: 1000 lbs. (453.6 kg);

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS E: Corrosive liquid.

DSCL (EEC):

R34- Causes burns. S24/25- Avoid contact with skin and eyes. S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 10:59 AM

Last Updated: 05/21/2013 12:00 PM

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