

RF/RMRS-99-330

**SAMPLING AND ANALYSIS PLAN**

**COLLECTION OF WETLAND SEDIMENTS AND SURFACE WATER  
FOR THE FISCAL YEAR 1999 ACTINIDE MIGRATION EVALUATION  
AT THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**

Revision 0

**March 9, 1999**

**Rocky Flats Environmental Technology Site  
Golden, Colorado 80402**



Rocky Mountain  
Remediation Services L.L.C.  
*protecting the environment*

**ADMIN RECCRD**

**SW-SW-A-003003**

**CONTENTS**

**1 0 INTRODUCTION . 3**

    1 1 BACKGROUND 4

    2 2 PREVIOUS SAMPLING 4

**2 0 PROJECT AND DATA QUALITY OBJECTIVES .. .. . 5**

**3 0 SAMPLING LOCATIONS.. .. . 6**

    3 1 WETLAND SEDIMENT AND SURFACE-WATER SAMPLING LOCATIONS 6

    3 2 SURFACE WATER SAMPLING LOCATIONS FOR CROSS FLOW FILTRATION AND PARTICLE SIZE ANALYSIS 8

**4 0 SAMPLING PROTOCOL .. .. . 8**

    4 1 WETLAND SEDIMENT AND WATER 8

    4 2 SUSPENDED SOLIDS SAMPLES 11

    4 3 FIELD LOGISTICS 12

    4 4 ANALYTICAL LABORATORY REQUIREMENTS 13

**5 0 DATA MANAGEMENT.. ... .. 13**

    5 1 PROJECT COMPLETION 14

    5 2 QUALITY ASSURANCE 14

**6 0 PROJECT ORGANIZATION .. .. . 15**

**7 0 REFERENCES ..... .. 16**

**8 0 ATTACHMENTS .. .. . 17**

***ATTACHMENT 1 - FE-II / FE-III SAMPLE PREPARATION AND MSDS SHEETS* 18**

**9 0 APPROVALS .. .. . 21**

157307 1/18

## 1 0 INTRODUCTION

This Sampling and Analysis Plan (SAP) directs the collection of surface soil and sediment samples from wetland areas contaminated with radionuclides at the Rocky Flats Environmental Technology Site (Site). This activity supports the Fiscal Year 1999 (FY99) Actinide Migration Study (AMS) research conducted by the Colorado School of Mines (CSM) and the Texas A&M University (TAMU). The forms and mobility of plutonium and americium (hereafter referred to collectively as actinides) in wetland systems has been studied previously both at the Site and in other environs. However, it is important to understand any unique characteristics of Site wetland systems that might affect actinide fate and transport, especially when future Site configuration alternatives include replacement of detention ponds with low head wetlands.

This SAP directs the collection of stormwater runoff and detention pond discharge waters at stations GS10 and GS03, respectively, for processing by cross-flow filtration to determine the particle size distribution of actinides in suspended sediment. This work is a continuation of research begun in FY98 (RF/RMRS 98 270 UN).

Additional data are needed to help calibrate the Water Erosion Prediction Project (WEPP) model for the South Interceptor Ditch (SID). The SID is a known sink for sediment that is derived from hillslopes in the SID watershed. Measurements of sediment depths in the SID channel are needed to compute annual average deposition rates in channel segments of the SID to improve the accuracy of sediment transport and deposition estimates in the watershed.

The objective of this sampling plan is to describe

- why the sampling is being performed
- who will perform the sampling,
- where sampling will be performed
- what will be sampled and the quantities of materials to be sampled
- sampling and field analysis requirements
- data requirements

- data handling procedures and records management issues and
- quality assurance/quality control (QA/QC) requirements for the sampling effort

All work will be performed in accordance with the RMRS *Quality Assurance Program Description* (QAPD) (RMRS 1998)

## **1 1 Background**

In FY98, the AMS research focused on

- Affect of oxidation / reduction (redox) conditions on actinide distribution between solid and aqueous phases,
- Chemical phase speciation of actinides,
- Particle size distribution of actinides on suspended solids in surface water, and
- Modeling the physical transport of actinides due to erosion and surface-water transport.

Follow-up research in FY99 is designed to investigate actinide forms and mobility in Site wetland and surface-water environments. CSM will continue to investigate the behavior of the actinides under a range of redox conditions using electrochemical cells and incubated microcosm samples in order to simulate prolonged waterlogged soil conditions. TAMU will continue to investigate the size distribution of the actinides on suspended materials as well as in wetland sediments. A complete description of the work planned for CSM and TAMU in FY99 is in *Work Scope Document for Actinide Migration Studies at the Rocky Flats Environmental Technology Site, FY99*, Honeyman and Santschi, November 1998. Erosion and surface-water transport modeling will also continue in FY98.

## **2 2 Previous Sampling**

Samples of wetland surface materials (soil / sediment) were acquired under a number of the Operable Unit investigations (e.g. OU2, OU5, OU6, OU7 and others). Other data are available from the Site-wide Surface Water and Sediment monitoring program, which operated from 1991 to 1994.

Actinide inventories and characteristics have been studied in Site detention pond sediments by Johnson (1974) Pain (1974) Cleveland and Reese (1976) Hurlev and Winsor (1978) and EG&G (circa 1993) Honevman and Santschi (1997) also calculated actinide inventories in detention pond sediments. These investigations did not focus on shallow wetland habitats but rather on deep water habitats. FY99 investigations will focus on wetland environments which have very low water (e.g. less than six inches) abundant vegetation and thus organic carbon inventories oxidized and reduced sediment horizons and relatively stagnant water. The intent of the FY99 work is to evaluate actinide migration through wetlands which will likely replace the detention ponds at Closure.

In FY98 Santschi et al performed cross flow filtration processing of surface water from Site monitoring station GS03 to study the size distribution of actinides. GS03 is a Site Point of Compliance (POC) where RFA reportable values were obtained in 1997. The water sampled at GS03 in FY98 had very low activity and algae in the water made filtration logistically complicated. Therefore the same filtration processing using a range of pore size filters will be done again at GS03 in the spring of 1999. In addition a stormwater runoff sample from station GS10 will be processed by the same filtration techniques.

SID sediments have been sampled for the Sitewide Surface Water and Sediment Monitoring Program in 1989 – 1992 and for the Operable Unit Number 5 Phase I RCRA Facility Investigation. SID sediments were also sampled for AMS research in 1997. However the sediment samples were taken for determination of chemical and radiochemical constituents not for sediment deposition rate determination as proposed herein.

## **2.0 PROJECT AND DATA QUALITY OBJECTIVES**

This SAP describes the sample collection protocol for the FY99 AMS research on actinide mobility in aquatic systems. The contaminants of concern for this investigation are plutonium (Pu) and americium (Am). The sediment samples, sediment pore water, and surface waters will be analyzed primarily for these constituents as well as for metals, organic carbon, inorganic carbon, ferric and ferrous iron, total nitrate, pH, conductivity, and alkalinity. Data needs to support this project were

developed using criteria established by Honeyman and Santschi (1998) In addition sediment cores will be collected in the SID for analysis of deposition rates

### **3 0 Sampling Locations**

#### **3 1 Wetland Sediment and Surface-Water Sampling Locations**

Samples of wetland sediments will be obtained from monitoring locations SW054 / SED029 and Pond B-4 (Figure 1) These two environments are known to contain sediments with actinide activity above background levels SED029 is a tall marsh habitat located in the SID just downstream of the 903 Lip Area SED029 is accessed via the North SID Road and identified by a white and red sign (Figure 1)

Pond B-4 is located in the South Walnut Creek watershed downstream of the B-Series Bypass which routes South Walnut Creek to Pond B-4 The sediment samples will be taken in the tall marsh habitat at the west end of Pond B-4 The sediments should be sampled close to the marsh vegetation and not in what would be deep-water habitat Surface water overlying the B-4 sediments will also be collected

March 1999

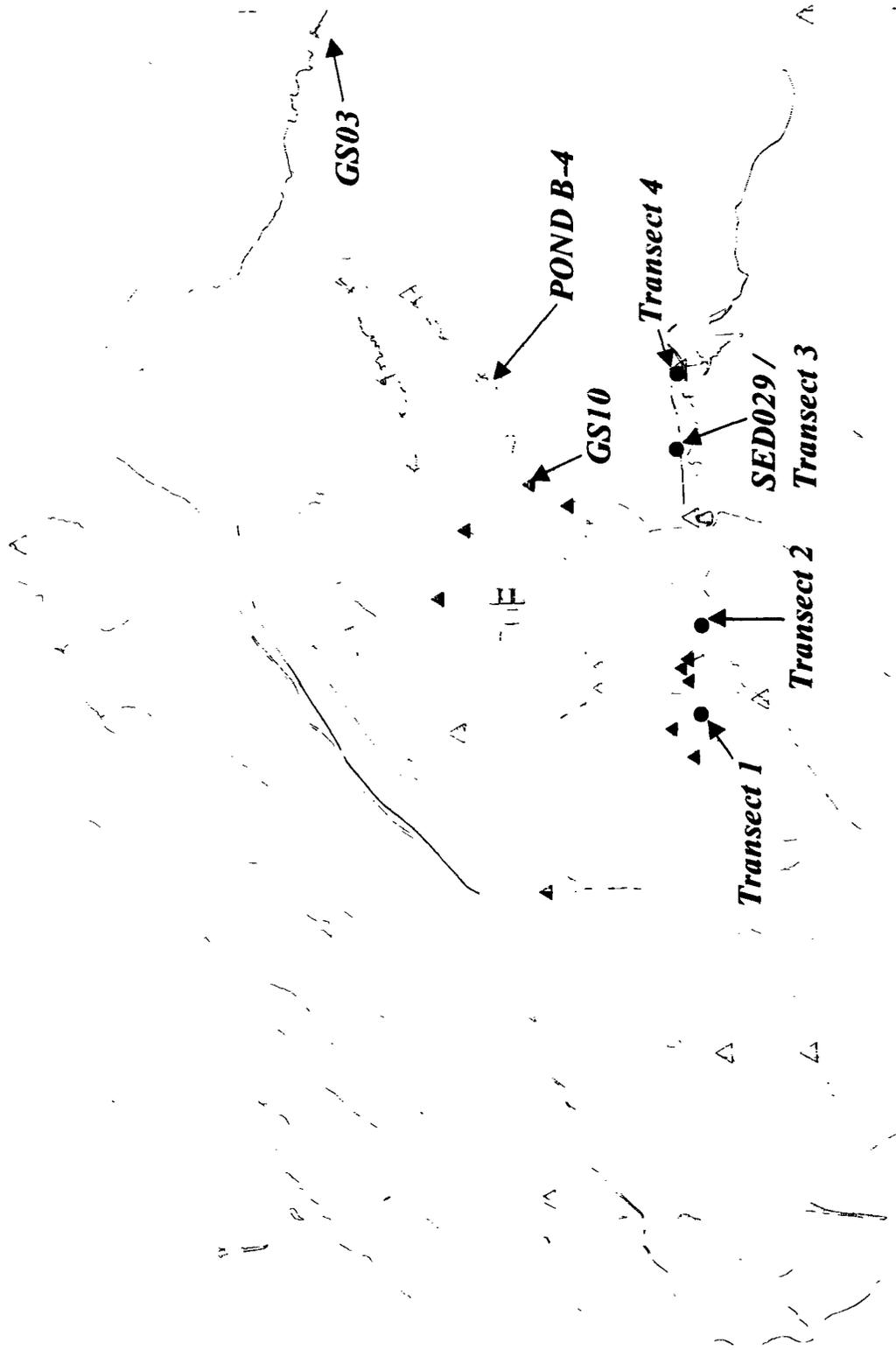


Figure 1 --Sediment and Surface-Water Sampling Locations for FY99 Actinide Migration Evaluation Experiments at CSM and TAMU

- SLD Sediment Coring Transects
- ▲ Gaging Stations

Figure 1 shows the locations of the SID coring transects. Each transect will include three cores obtained from 1) each side of the channel and 2) the thalweg (deepest portion of the channel). This will provide a measurement of the quantity of sediment in the SID.

### **3.2 Surface Water Sampling Locations for Cross Flow Filtration and Particle Size Analysis**

Sampling location GS03 was selected for collection of the detention pond discharge sample (Figure 1). This sampling location has a continuously recording stream gaging station where samples are routinely collected for compliance with the Rocky Flats Cleanup Agreement (RFCA). Discharge measured at this station comes from controlled detention pond discharges from Pond A-4 and Pond B-5 combined with local overland runoff predominantly from undisturbed range land. In addition, some flow at GS03 is generated from the landfill area. The sampling will be conducted during a scheduled pond discharge.

Monitoring station GS10, located on South Walnut Creek just upstream from the B-Series Bypass, is used to monitor IA runoff (Figure 1). During baseflow conditions, water at GS10 typically has very low actinide activity, but the activity increases at GS10 during stormwater runoff events. Therefore, two automatic water samples will be deployed to collect GS10 stormwater for ultrafiltration at CSM.

## **4.0 SAMPLING PROTOCOL**

### **4.1 Wetland Sediment and Water**

Wetland and SID sediment samples will be collected as a series of core samples. The cores will be approximately 3 centimeters (cm) in diameter by about 15 cm (6 inches) deep. Standard acrylic core liners will be used to collect the cores in B-4 and the SID. Stainless steel or acrylic core liners may be used to collect the SID transect cores. The core samples will be collected by Site SOPs 5-21000 OPS-PRO 086 Sediment Sampling and 5-21000-OPS-PRO 064 Pond and Reservoir Bottom Sediment Sampling. Surface water samples of B-4 water to accompany the B-4 sediment samples will be collected by the container emersion method in Site SOP 5-21000-OPS-PRO 081 Surface

Water Sampling Table 1 lists the number and types of samples to be collected Table 2 lists the SOPs applicable to the sampling and associated data collection activities

**Table 1 Sampling Requirements**

Sampling Location	Sample Type	Number of Field Samples	Sample Size
SED029	Sediment Cores	18	3 cm dia X 15 cm deep / Each
SID TRANSECTS 1 4	Sediment Cores	12	3 cm dia X total sediment depth
Pond B 4	Sediment Cores	18	3 cm dia X 15 cm deep / Each
Pond B 4	Surface Water	4 X 4 Liters	16 Liters

**Table 2 Applicable Field and Administrative Standard Operating Procedures**

Procedure Number	Procedure Title
2-G18-ER RM 06 02	Records Identification Generation and Transmittal
2-S47 ER-ADM 05 14	Use of Field Logbooks and Forms
5 21000-OPS PRO 127	Field Decontamination Operations
1PRO573SWODP	Handling of Personal Protective Equipment
5 21000 OPS PRO 12	Handling of Decontamination Water and Waste Water
1PRO079WGI001	Receiving Labeling and Handling Environmental Material Containers
5 21000-OPS-FO 11	Field Communications
5 21000-OPS-PRO 069	Containerization Preserving Handling and Shipping of Soil and Water Samples
5 21000-OPS-FO 16	Field Radiological Measurements
5 21000-OPS PRO 126	Surface Water Data Collection Activities
5 21000 OPS PRO 094	Field Measurements of Surface Water Field Parameters
5-21000 OPS-PRO 081	Surface Water Sampling
5-21000-OPS-PRO 093	Discharge Measurement
5-21000 OPS-PRO 086	Sediment Sampling
5-21000-OPS-PRO 092	Event-Related Surface Water Sampling
5-21000-OPS-PRO 084	Operation and Maintenance of Stream Gaging and Sampling Stations
5 21000-OPS-PRO 064	Pond and Reservoir Bottom Sediment Sampling
5 23000-WRP-WO 1101	Solid Radioactive Waste Packaging Outside the PA

Sediment cores will be collected at four locations in the SID channel at historic SID monitoring stations SW036 (Transect 1) SW031 (Transect 2) SED029 (Transect 3) and upstream from

SW027 (Transect 4) The cores will be collected in an attempt to measure the total depth of sediment that has been deposited in the SID since its construction circa 1980. The cores will be collected as deep as possible in an attempt to contact the original SID channel bottom.

The B-4 and SID cores to be collected for off-Site analysis should be kept out of contact with the air at all times. The bottoms of the cores should be capped with a black colored cap underwater if possible. A red colored cap will be placed on the top of the core tube. The caps should be sealed with black electrical tape. Care should be taken to keep the cores in an upright position. The cores shall be refrigerated while awaiting radiation screening results for shipment. The cores may be shipped separately to comply with DOT requirements if necessary.

It is recognized that it may be difficult to obtain samples using the 2-inch coring device at Pond B-4. If this proves to be the case, a "clam-shell" type dredge sampler should be available as an alternative sampling method. If a dredge sampler is used, approximately 10 liters of sediment should be obtained and composited in a 2-gallon plastic carboy, sealed and refrigerated. Effort should be made to sample from the sediment surface to a depth of 6 inches.

Field measurements of water-quality parameters will be made on the surface water collected to accompany the B-4 sediment samples. The following in-situ measurements should be taken in the field:

- 1 pH, Eh, and temperature of the sediment at the surface, 2" depth, 4" depth, and 6' depth. These measurements must be done in-situ prior to sampling the sediments. A procedure for making these measurements is in the Attachments section herein.
- 2 pH, Eh, dissolved oxygen, and temperature of overlying water (if applicable).

In addition, measurements for nitrate, conductivity, and alkalinity of the overlying water will be obtained. In the absence of a dissolved oxygen measurement, samples should be collected for FeII/FeIII. The FeII/FeIII sampling procedure is described in the Appendix of this sampling plan. CSM will provide the reagents for the FeII/FeIII sample preparation. Unused reagents will be

returned to CSM so that there will be no chemical waste associated with the FeII/FeIII measurements

## **4.2 Suspended Solids Samples**

Large volumes of water are needed from Site monitoring stations GS10 and GS03 to obtain particulates by CFF for radiochemical analysis. Samples at GS03 will be grab samples collected during a planned Pond A-4 discharge event. The sample from GS10 will be collected during a storm event using an automatic sampler.

Two grab samples consisting of about 150 liters each will be collected at GS03 during the first two days of a planned Pond A-4 discharge event in the spring of 1999. The procedure for collection of the grab samples is in 5-21000-OPS PRO 081 Surface Water Sampling. The samples will be delivered to researchers at CSM by noon each day to allow enough time to process the samples with the CFF equipment. ASI will perform the sampling at GS03 using procedure PRO 081 Surface Water Sampling. CSM will provide acid rinsed plastic containers for the GS03 samples.

Stormwater runoff samples will be collected at GS10 using automatic sampler(s) linked to continuously recording flow meters. The automatic samplers will composite individual grab samples collected over the duration of a stormwater runoff event. The composite samples will be flow weighted meaning that each grab sample will be collected after the flow meter measures a specified volume of water that passes the station. Therefore the composite samples will represent the flow-weighted average water quality for the runoff event.

The GS10 samples will be collected per procedure PRO 092 Event Related Surface Water Sampling. Sample collection will be flow paced such that each aliquot of stormwater that is collected and composited in large plastic or teflon coated sample containers. CSM will provide the oversized sample collection containers.

The large volume of water composited in the oversized sample containers will be pumped into smaller acid-rinsed plastic containers for easy sample transportation and handling. The pumps on

the automatic samplers will be used to transfer the composite sample into the smaller containers. After pumping the sample, there will be a residual quantity of solids remaining in the bottoms of the oversized sample containers. Therefore, the oversized sample containers will also have to be transported to CSM.

The automatic samplers are operated and maintained by RMRS Surface Water. Therefore, the GS10 sample will be collected by RMRS and relinquished to ASI for containerization, water-quality parameter measurements, and COC generation. All of the samples will be transported directly to CSM by ASI and/or RMRS personnel.

Procedures for collection of the stormwater runoff samples using the automated equipment are in SOPs 5-21000-OPS-PRO 092 Event-Related Surface Water Sampling and 5-21000-OPS-PRO 084 Operation and Maintenance of Stream-Gaging and Sampling Stations. However, large non-standard composite sample containers will be needed to collect the large volume of water (100 to 150 Liters) which is not standard protocol in the procedures.

Samples will be collected during the period of April to June 1999. The water samples will be transported to CSM as soon as possible to prevent aggregation of particles in the samples. Collection of water-quality field parameter data, stream discharge data, and water samples will be done according to the RMRS Standard Operating Procedures in Table 1.

### **4.3 Field Logistics**

Most of the sampling sites are marked in the field by red and white signs, and the locations are in the Site GIS database. RMRS personnel under the supervision of Dr. Win Chromec (RMRS) will mark the locations of the SID transects with flagging. CSM personnel may accompany ASI and RMRS in the field at the time of sample collection. ASI will conduct the SID sampling, and RMRS will photograph and describe the samples in the field. The SID transect cores will be extruded in the field, split in half, described on Core Description Forms (see procedure PRO 064), and photographed. The core materials that are not shipped off-site for analysis will be placed back in the SID at their places of collection.

ASI will collect the samples within about 200 feet upstream from SED029 and in Pond B 4 as soon as possible and no later than March 31 1999. Samples will be handled in accordance with FO 10 Receiving Labeling and Handling Environmental Material Containers and FO 13 Containerization Preserving Handling and Shipping of Soil and Water Samples. Disposable sampling tools will be used wherever possible to eliminate decontamination waste streams.

If conditions are encountered in the field which make the use of a procedure unsafe or inappropriate for the task at hand the direction of RMRS OPS DIR 001 Safety and Environmental Stewardship Directive will be followed. This SAP will be revised to reflect changes in the procedures and procedural deviations will be noted in logbooks. The resulting changes may not impact safety or data quality objectives of the project. Likewise the direction of OPS DIR 001 will be followed upon discovery of any unanticipated and uncontrolled hazards. OPS-DIR 001 provides guidance for pausing work evaluating previously unidentified hazards modifying control measures as applicable and work restart.

#### **4.4 Analytical Laboratory Requirements**

The chemical and radiochemical analysis requirements for the AMS research are contractually controlled by the CSM/TAMU Statement of Work for Actinide Migration Studies at the Rocky Flats Environmental Technology Site. CSM and TAMU will perform all laboratory analyses on the samples. RMRS Quality Assurance personnel audit the CSM and TAMU laboratories and they review the laboratory quality control data.

## **5.0 DATA MANAGEMENT**

A field logbook will be used and controlled during this investigation by both field sampling personnel and SW technical staff. The logbook will be used per the protocol described in Site procedure 2-S47-ER-ADM 05 14 Use of Field Logbooks and Forms in conjunction with the appropriate field data forms utilized by field sampling personnel. The sediment sampling SOPs include sediment sample collection forms. It is not necessary to duplicate items recorded on field

data forms in the field logbook, but if additional clarification of entries on the forms is required they should be recorded in the field logbook. The field logbook should include time and date information concerning the field activities. Information not specifically required by the field data forms should be recorded in the field logbook. Upon completion of this sampling task, the project logbooks will be turned over to the project file center for archival.

Data for this project will be collected, entered, and stored in a controlled and retrievable environment in accordance with RM-06 02, *Records Identification Generation and Transmittal*.

### **5.1 Project Completion**

The results will be compiled and placed in the Soils and Water Database with copies to the project file. At the end of the project, all records and field documentation will be turned over to the RMRS Records Center. Analytical results must be received by RMRS Surface Water Group no later than March 27, 1998.

### **5.2 Quality Assurance**

Analytical data collected in support of this investigation will be evaluated using the guidance established by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08 02 *Evaluation of ERM Data for Usability in Final Reports*. This procedure establishes the guidelines for evaluating analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. The required methodology for evaluating the analytical data for this project is embodied in the document *Data Quality Objectives for the Actinide Migration Studies* (Kaiser Hill, 1998). CSM/TAMU will be responsible for evaluating and assuring the quality of the analytical data for this project.

## 6.0 PROJECT ORGANIZATION

The project team responsibilities are outlined in Table 3. RMRS Water Management & Treatment Surface Water Group is responsible for management and coordination of resources dedicated to the project. Other organizations assisting with the implementation of this project are Advanced Sciences Inc. (sampling team and health & safety), ER Program Compliance (radiological engineering guidance), and ER Quality Assurance.

**Table 3 Sediment and Surface Water Sampling Organizations. All personnel are direct RMRS employees or extended staff unless otherwise noted.**

Project Function	Responsible Individual(s)
Project Manager	W Chromec (RMRS)
Project Engineer(s)	G Squibb, C Haley, G Wetherbee, W Chromec
Sampling Team	ASI Personnel: W Chromec, G Squibb, C Haley G Wetherbee, R Hamish, B Honeyman
Field Supervisors	A Carpenter (ASI), G Wetherbee, B Honeyman (CSM)
Health & Safety Officers	Ron Bates (RMRS), D Spruce (ASI)
Radiological Safety Foreman	Chip Sawyer (RMRS)
ER Quality Assurance	M Peters
Analytical Services	V Ideker, KH - APO, B Honeyman (CSM), P Santschi (TAMU)
Radiological Engineering	Michalene Rodriguez (RMRS)

## 7 0 REFERENCES

- Cleveland, J M Rees T F , and Gottschall, W C , 1976, Factors Affecting the Solubilization of Plutonium and Americium from Pond Sediments at the Rocky Flats Facility, Rockwell International, Rocky Flats Plant, Golden, CO
- EG&G 1993 Possible Causes for Elevated Concentrations of Pu-239,240 in Pond C-2 at Rocky Flats During 1992, internal report, EG&G Rocky Flats, Inc Golden, CO 13p
- EPA 1992 *US EPA Test Methods for Evaluating Solid Waste Solid Waste-846* third edition Method 8260A Rev 1 , November
- EPA 1994 *Guidance for the Data Quality Objectives Process*, EPA QA/G-4, September
- RMRS 1997 *RMRS Quality Assurance Program Description*, RMRS-QAPD-001, Rev 2 April 15 1998
- EMD Operating Procedures Manual 1997 Volume I Field Operations, 5-21000-OPS-FO Rev 92 March 1992
- EMD Operating Procedures Manual 1997 Volume III Geotechnical, 5-21000-OPS-GT, Rev 92 March 1992
- EMD Operating Procedures Manual, 1997, Volume IV Surface Water, 5-21000-OPS-SW Rev 92 March 1992
- Honeyman B D and Santschi P H , November 1998 *Work Scope Document for Actinide Migration Studies at the Rocky Flats Environmental Technology Site FY99* Deliverable to Kaiser Hill Team Colorado School of Mines / Texas A&M University 9p
- Honeyman B D and Santschi P H October 1997, *Actinide Migration Studies at the Rocky Flats Environmental Technology Site*, Deliverable to Kaiser Hill Team Colorado School of Mines / Texas A&M University
- Hurley, J D and Winsor T F circa 1979 *Plutonium / Americium Inventory of a Pond Ecosystem Near the Rocky Flats Facility*, RFP-3052, Rocky Flats Plant, 6p
- Johnson J E 1974 *The Study of Plutonium in Aquatic Systems of the Rocky Flats Environs* Department of Radiology and Radiation Biology, Colorado State University Fort Collins CO
- Kaiser-Hill Company, Analytical Services Division, May 9 1997, *Statement of Work for Analytical Measurements Module RC01-B 2 Isotopic Determinations by Alpha Spectrometry* Rocky Flats Environmental Technology Site, Golden, CO
- Kaiser-Hill Company, Analytical Services Division June 2, 1997, *Statement of Work for Analytical Measurements Module GR01-B 1 General Laboratory Requirements* Rocky Flats Environmental Technology Site Golden CO
- Paine D 1974 *Plutonium in Aquatic Systems* Ph D thesis Colorado State University, Fort Collins CO
- Skougstad, M W , Fishman, M J , Friedman, L C Erdmann, D E , and Duncan, S S Eds *Techniques of Water-Resources Investigations of the United States Geological Survey Methods for Determination of Inorganic Substances in Water and Fluvial Sediments* Book 3 Chapter A1 USGPO, Washington, D C , pp 373-374, 387-388

**8 0 ATTACHMENTS**

**Attachment 1 – Fe-II / Fe-III Sample Preparation and MSDS Sheets**

The following procedure will be used to prepare Fe-II / Fe-III samples in the field. This method is also described in more detail in the attached documentation obtained from USGS TWRI Book 5 Chapter A1 Skougstad et al eds 1979. This procedure should be performed as soon as possible after sample collection because ferric iron (Fe-III) will rapidly photoreduce to ferrous iron (Fe-II).

**Note:** The chemical reagents for this procedure may be harmful. Wear protective, water-proof gloves and safety glasses while performing this procedure. Make sure that MSDS sheets for the reagents are available to the Health and Safety specialist and/or sampling personnel in the field. Take necessary safety precautions per the MSDS information.

1. Equipment: 2 - 50 ml plastic or amber glass sample bottles, 25 ml pipette, 1 ml pipette, 100 ml deionized water, 1 000 mg/L 2,2-bipyridine solution, 100 g/L hydroxylamine hydrochloride solution, 350 g/L sodium acetate solution. Solutions will be provided by CSM.
2. Label the sample bottles with the sampling location identifier and the date and time of collection. Label one of the bottles "FeII" and the other bottle "Fe-Total".
3. Obtain approximately 100 ml of water sample. Pipette 25 ml of sample into each of the two plastic sample bottles.
4. Immediately pipette 1 ml 2,2-bipyridine solution into each sample bottle. A pink color indicates the presence of ferrous iron.
5. Pipette 2 ml hydroxylamine hydrochloride solution into the "Fe-Total" sample bottle and let it stand for 30 minutes.
6. Pipette 2 ml deionized water into the "Fe-II" sample bottle.
7. Immediately pipette 2 ml sodium acetate solution into the "Fe-II" sample bottle.
8. After waiting 30 minutes, pipette 2 ml sodium acetate solution into the "Fe-Total" sample bottle.
9. Cap the sample bottles for shipment to the laboratory and place them in a bag or cooler that will prevent exposure of the samples to light.
10. Record the Fe-II / Fe-Total sample collection information in controlled logbooks and on COC forms.

<b>Summary of Procedure</b>	
<b>Fe-II Sample</b>	<b>Fe-Total Sample</b>
25 ml water sample	25 ml water sample
2 ml 2,2-bipyridine	2 ml 2,2-bipyridine
2 ml deionized water	2 ml hydroxylamine hydrochloride + 30 minutes
2 ml sodium acetate	2 ml sodium acetate

Please reduce your browser font size for better viewing and printing

**MSDS****Material Safety Data Sheet**

From Mallinckrodt Baker Inc  
222 Red School Lane  
Phillipsburg NJ 08865



24 Hour Emergency Telephone 908-859-2151  
CHEMTREC 1-800-424-9300

National Response in Canada  
CANUTEC 613-996-6666

Outside U.S. and Canada  
Chemtrec: 202-483-7616

NOTE CHEMTREC CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-562-2537) for assistance

## 2,2-BIPYRIDINE

MSDS Number B2443 --- Effective Date 02/15/98

### 1. Product Identification

Synonyms 2,2'-Dipyridyl, CI 588  
CAS No 366-18-7  
Molecular Weight 156.19  
Chemical Formula C<sub>10</sub>H<sub>8</sub>N<sub>2</sub>  
Product Codes C323

### 2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
2 2-Bipyridine	366-18-7	90 - 100%	Yes

### 3. Hazards Identification

#### Emergency Overview

**WARNING! HARMFUL IF SWALLOWED MAY BE HARMFUL IF INHALED OR ABSORBED THROUGH SKIN CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT**

J T Baker SAF-T-DATA<sup>(tm)</sup> Ratings (Provided here for your convenience)

Health Rating 2 - Moderate  
Flammability Rating 1 - Slight  
Reactivity Rating 1 - Slight  
Contact Rating 2 - Moderate  
Lab Protective Equip GOGGLES, LAB COAT VENT HOOD, PROPER GLOVES  
Storage Color Code Orange (General Storage)

**Potential Health Effects**  
-----

Information on the human health effects from exposure to this substance is limited

**Inhalation**

Causes irritation to the respiratory tract Symptoms may include coughing, shortness of breath

**Ingestion**

No information found, but compound should be handled as a potential health hazard  
May cause irritation to the gastrointestinal tract Symptoms may include nausea, vomiting and diarrhea.

**Skin Contact**

Causes irritation to skin Symptoms include redness, itching, and pain May be absorbed through the skin

**Eye Contact**

Causes irritation, redness, and pain

**Chronic Exposure**

No information found

**Aggravation of Pre-existing Conditions**

No information found

---

**4. First Aid Measures****Inhalation**

Remove to fresh air If not breathing, give artificial respiration If breathing is difficult give oxygen Get medical attention

**Ingestion**

Induce vomiting immediately as directed by medical personnel Never give anything by mouth to an unconscious person. Get medical attention

**Skin Contact**

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes Get medical attention Wash clothing before reuse Thoroughly clean shoes before reuse

**Eye Contact**

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally Get medical attention immediately

---

**5. Fire Fighting Measures****Fire**

As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source

**Explosion**

Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard

**Fire Extinguishing Media**

Water spray, dry chemical, alcohol foam, or carbon dioxide

**Special Information**

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode

## 6 Accidental Release Measures

Remove all sources of ignition Ventilate area of leak or spill Wear appropriate personal protective equipment as specified in Section 8 Spills Clean up spills in a manner that does not disperse dust into the air Use non-sparking tools and equipment Reduce airborne dust and prevent scattering by moistening with water Pick up spill for recovery or disposal and place in a closed container

## 7 Handling and Storage

Keep in a tightly closed container, stored in a cool dry, ventilated area Protect against physical damage Isolate from incompatible substances Containers of this material may be hazardous when empty since they retain product residues (dust, solids), observe all warnings and precautions listed for the product

## 8. Exposure Controls/Personal Protection

### Airborne Exposure Limits

None established

### Ventilation System

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area Please refer to the ACGIH document, *Industrial Ventilation A Manual of Recommended Practices* most recent edition, for details

### Personal Respirators (NIOSH Approved)

For conditions of use where exposure to the dust or mist is apparent, a half-face dust/mist respirator may be worn For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator WARNING Air-purifying respirators do not protect workers in oxygen-deficient atmospheres

### Skin Protection

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact

### Eye Protection

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible Maintain eye wash fountain and quick-drench facilities in work area

## 9. Physical and Chemical Properties

### Appearance

White crystals

### Odor

No information found

### Solubility

Soluble in water

### Specific Gravity

No information found

### pH

No information found  
 % Volatiles by volume @ 21C (70F)

0

**Boiling Point**

273C (523F)

**Melting Point**

70C (158F)

**Vapor Density (Air=1)**

No information found

**Vapor Pressure (mm Hg)**

No information found

**Evaporation Rate (BuAc=1)**

No information found

## 10. Stability and Reactivity

**Stability**

Stable under ordinary conditions of use and storage

**Hazardous Decomposition Products**

Burning may produce carbon monoxide, carbon dioxide, nitrogen oxides

**Hazardous Polymerization**

Will not occur

**Incompatibilities**

Strong oxidizers and most common metals

**Conditions to Avoid.**

Heat, flame, ignition sources, dusting, light and incompatibles

## 11. Toxicological Information

Oral rat LD50 100 mg/kg Investigated as a tumorigen, mutagen, reproductive effector

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
2,2-Bipyridine (366-18-7)	No	No	None

## 12. Ecological Information

**Environmental Fate**

When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material is expected to have a half-life between 1 and 10 days.

**Environmental Toxicity**

No information found

## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal

regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## 14. Transport Information

### Domestic (Land, D O T)

**Proper Shipping Name** TOXIC SOLIDS N O S (2 2-BIPYRIDINE)

**Hazard Class** 6 1

**UN/NA** UN2811

**Packing Group** III

**Information reported for product/size** 10G

### International (Water, I M O)

**Proper Shipping Name** TOXIC SOLIDS, N O S (2 2-BIPYRIDINE)

**Hazard Class** 6 1

**UN/NA** UN2811

**Packing Group** III

**Information reported for product/size** 10G

## 15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
2 2-Bipyridine (366-18-7)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	Korea	--Canada--		Phil
		DSL	NDSL	
2,2-Bipyridine (366-18-7)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		-SARA 313-	
	RQ	TPQ	List	Chemical Catc
2,2-Bipyridine (366-18-7)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----			
Ingredient	CERCLA	-RCRA-	-TSCA-
		261 33	8 (d)
2,2-Bipyridine (366-18-7)	No	No	No

Chemical Weapons Convention No TSCA 12 (b) No CDTA No  
 SARA 311/312 Acute Yes Chronic No Fire No Pressure No  
 Reactivity No (Pure / Solid)

**Australian Hazchem Code** 2(Z)

**Poison Schedule** None allocated

**WHMIS**

This MSDS has been prepared according to the hazard criteria of the Controlled

Products Regulations (CPR) and the MSDS contains all of the information required by the CPR

## 16. Other Information

**NFPA Ratings** Health 2 Flammability 1 Reactivity 0

**Label Hazard Warning**

WARNING! HARMFUL IF SWALLOWED MAY BE HARMFUL IF INHALED OR ABSORBED THROUGH SKIN CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT

**Label Precautions**

- Avoid breathing dust
- Avoid contact with eyes, skin and clothing
- Keep container closed
- Use only with adequate ventilation
- Wash thoroughly after handling

**Label First Aid**

If inhaled, remove to fresh air If not breathing, give artificial respiration If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel Never give anything by mouth to an unconscious person In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse In all cases, get medical attention

**Product Use**

Laboratory Reagent

**Revision Information**

MSDS Section(s) changed since last revision of document include 3

**Disclaimer**

\*\*\*\*\*

**Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose MALLINCKRODT BAKER, INC MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION**

\*\*\*\*\*

Prepared by Strategic Services Division  
Phone Number (314) 539-1600 (U S A )

LABCHEM -- HYDROXYLAMINE HYDROCHLORIDE 3% TO 50% LC15520  
MATERIAL SAFETY DATA SHEET  
NSN 681000N074697  
Manufacturer's CAGE 0MX47  
Part No Indicator A  
Part Number/Trade Name HYDROXYLAMINE HYDROCHLORIDE, 3% TO 50%, LC15520

=====  
General Information  
=====

Company's Name LABCHEM INC  
Company's Street 200 WILLIAM PITTS WAY  
Company's City PITTSBURGH  
Company's State PA  
Company's Country US  
Company's Zip Code 15238  
Company's Emerg Ph # 412-826-5230  
Company's Info Ph # 412-826-5230  
Record No For Safety Entry 001  
Tot Safety Entries This Stk# 001  
Status SMJ  
Date MSDS Prepared 16NOV93  
Safety Data Review Date 18NOV96  
MSDS Preparer's Name AL BERANEK  
Preparer's Company SAME  
MSDS Serial Number CCSCX

=====  
Ingredients/Identity Information  
=====

Proprietary NO  
Ingredient HYDROXYLAMINE, HYDROCHLORIDE  
Ingredient Sequence Number 01  
Percent 3-50  
NIOSH (RTECS) Number NC3675000  
CAS Number 5470-11-1  
OSHA PEL N/K (FP N)  
ACGIH TLV N/K (FP N)

-----  
Proprietary NO  
Ingredient WATER  
Ingredient Sequence Number 02  
Percent BALANCE  
NIOSH (RTECS) Number ZC0110000  
CAS Number 7732-18-5  
OSHA PEL N/K (FP N)  
ACGIH TLV N/K (FP N)

-----  
Proprietary NO  
Ingredient EYE PROT AND FULL LENGTH FACESHIELD (FP N)  
Ingredient Sequence Number 03  
NIOSH (RTECS) Number 9999999ZZ  
OSHA PEL NOT APPLICABLE  
ACGIH TLV NOT APPLICABLE

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor CLEAR COLORLESS SOLUTION/ODORLESS  
Boiling Point N/A  
Melting Point N/A  
Vapor Pressure (MM Hg/70 F) N/A  
Vapor Density (Air=1) N/A  
Evaporation Rate And Ref N/A  
Solubility In Water SOLUBLE IN WATER  
pH ACIDIC

=====  
Fire and Explosion Hazard Data  
=====

Flash Point NON-FLAMMABLE  
Lower Explosive Limit N/A  
Upper Explosive Limit N/A  
Extinguishing Media DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM  
Special Fire Fighting Proc USE NIOSH APPRVD SCBA & FULL PROT EQUIP (FP  
N) SLIGHT FIRE & EXPLOSION HAZ WHEN EXPOSED TO HEAT/FLAME REACTS AT  
EXTREME TEMP W/VIOLET DECOMP MOVE (SUPDAT)  
Unusual Fire And Expl Hazrds NONE SPECIFIED BY MANUFACTURER

=====  
Reactivity Data  
=====

Stability YES  
Cond To Avoid (Stability) EXTREME HEAT, REACTION MIXTURES WHEN THE  
HYDROCHLORIDE CAN BE MADE TO DECOMPOSE VIOLENTLY DUE TO EXOTHERMIC  
REACTION  
Materials To Avoid DRY HYDROXYLAMINE HYDROCHLORIDE REACTS AT EXTREME  
TEMPERATURES, DECOMPOSING VIOLENTLY  
Hazardous Decomp Products THERMAL DECOMPOSITION MAY INCLUDE TOXIC &  
HAZARDOUS FUMES OF CHLORINE, HYDROCHLORIC ACID, AMMONIA & OXIDES OF  
NITROGEN  
Hazardous Poly Occur NO  
Conditions To Avoid (Poly) NOT RELEVANT

=====  
Health Hazard Data  
=====

LD50-LC50 Mixture LD50 (ORAL, MOUSE) 408 MG/KG  
Route Of Entry - Inhalation YES  
Route Of Entry - Skin YES  
Route Of Entry - Ingestion YES  
Health Haz Acute And Chronic ACUTE INHALATION MAY RESULT IN CYANOSIS,  
HEADACHE, DYSPNEA, DIZZINESS, NAUSEA, VOMITING, STUPOR AND CONVULSIONS WITH  
JAUNDICE, ANEMIA, AND PAINFUL URINATION FROM SEVERE EXPOSURE DERMATITIS,  
IRRITATION, REDNESS AND PAIN CAN OCCUR TO THE SKIN CONJUNCTIVITIS &  
CORNEAL DAMAGE IS POSSIBLE TO THE EYE (EFTS OF OVEREXP)  
Carcinogenicity - NTP NO  
Carcinogenicity - IARC NO  
Carcinogenicity - OSHA NO  
Explanation Carcinogenicity NOT RELEVANT  
Signs/Symptoms Of Overexp HLTH HAZ INGEST SYMPS ARE LIKE INHAL & INCL  
METHEMOGLOBIN FORMATION W/ANEMIA & JAUNDICE OCCURRING CHRONIC PRLNG EXPOS  
MAY RSLT IN NERVOUS SYS, LIVER, KIDNEY & BONE MARROW DMG WEIGHT LOSS,  
ANEMIA & WEAK MAY OCCUR, DERM & CONJ W/CORNEAL DMG CAN OCCUR TOXICITY IS  
AN EYE, MUC MEMBRANE, & SKIN IRRITANT SKIN SENSITIZER  
Med Cond Aggravated By Exp NONE SPECIFIED BY MANUFACTURER  
Emergency/First Aid Proc INHAL MOVE VICTIM TO FRESH AIR, GIVE ARTIF RESP  
IF NEC MAINTAIN AIRWAY & BLOOD PRESS MED PERS MAY ADMIN OXYGEN KEEP  
VICTIM WARM, AT REST GET MED AID AT ONCE SKIN IMMED REMOVE CONTAMD CLTHG,  
WASH AREA W/SOAP & H\*2O, FLUSH W/LRG AMTS OF H\*2O (15-20 MIN) UNTIL CHEM IS  
GONE GET MED AID EYES IMMED FLUSH W/LRG AMTS OF H\*2O (15-20MIN) LIFTING  
UPPER/LOWER LIDS OCCAS UNTIL CHEM IS GONE (SUPDAT)

=====  
Precautions for Safe Handling and Use  
=====

Steps If Matl Released/Spill ABSORB WITH SAND, DIATOMACEOUS EARTH, OR  
SUITABLE INERT ABSORBENT SCOOP MATERIAL INTO PLASTIC CONTAINER, LABEL FOR  
LATER DISPOSAL  
Neutralizing Agent NONE SPECIFIED BY MANUFACTURER  
Waste Disposal Method DISPOSE IN ACCORDANCE WITH FEDERAL, STATE, AND  
LOCAL REGULATIONS  
Precautions-Handling/Storing MAY BE STORED AT ROOM TEMPERATURE AVOID  
EXTREME HEAT OR EXPOSURE TO WATER REACTIVE SUBSTANCES

Other Precautions DO NOT WEAR CONTACT LENSES WHEN WORKING WITH CHEMICALS

Control Measures

Respiratory Protection NIOSH APPROVED HIGH LEVELS-SUPPLIED AIR RESPIRATORY WITH FULL FACEPIECE SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE FIREFIGHTING SCBA WITH FULL FACEPIECE, OPERATED IN PRESSURE-DEMAND OR POSITIVE PRESSURE MODE  
Ventilation PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION  
Protective Gloves IMPERVIOUS GLOVES (FP N)  
Eye Protection ANSI APPROVED CHEM WORKERS GOGGLES (ING 3)  
Other Protective Equipment EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N) PROTECTIVE CLOTHING RECOMMENDED  
Work Hygienic Practices NONE SPECIFIED BY MANUFACTURER  
Suppl Safety & Health Data FIREFIGHT PROC CNTNR IF POSS, COOL W/H\*20 AVOID TOX FUMES FROM BURNING/DECOMPOSING MATL FIRST AID PROC GET MED AID AT ONCE THE EYE MAY BE IRRIGATED W/NORMAL SALINE SOLN INGEST IF VICTIM IS CONSCIOUS, GIVE 2-4 GLASSES OF H\*2O IF VOMIT OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION GET MEDICAL AID AT ONCE

Transportation Data

Disposal Data

Label Data

Label Required YES  
Technical Review Date 18NOV96  
Label Date 18NOV96  
Label Status G  
Common Name HYDROXYLAMINE HYDROCHLORIDE, 3% TO 50%, LC15520  
Chronic Hazard YES  
Signal Word DANGER  
Acute Health Hazard-Moderate X  
Contact Hazard-Severe X  
Fire Hazard-None X  
Reactivity Hazard-Slight X  
INHALATION MAY RESULT IN CYANOSIS, HEADACHE, DYSPNEA, DIZZINESS, NAUSEA, VOMITING, STUPOR & CONVULSIONS WITH JAUNDICE, ANEMIA, & PAINFUL URINATION FROM SEVERE EXPOSURE DERMATITIS, IRRITATION, REDNESS & PAIN CAN OCCUR TO SYMPTOMS ARE LIKE INHALATION & INCLUDE METHEMOGLOBIN FORMATION WITH ANEMIA & JAUNDICE OCCURRING CHRONIC PROLONGED EXPOSURE MAY RESULT IN NERVOUS SYMPTOM, LIVER KIDNEY & BONE MARROW DAMAGE WEIGHT LOSS, ANEMIA & WEAKNESS MAY OCCUR DERMATITIS & CONJUNCTIVITIS WITH CORNEAL DAMAGE CAN OCCUR SKIN SENSITIZER  
Protect Eye Y  
Protect Skin Y  
Protect Respiratory Y  
Label Name LABCHEM INC  
Label Street 200 WILLIAM PITT WAY  
Label City PITTSBURGH  
Label State PA  
Label Zip Code 15238  
Label Country US  
Label Emergency Number 412-826-5230

LABCHEM -- SODIUM ACETATE SOLUTIONS, LC22830  
MATERIAL SAFETY DATA SHEET  
NSN 681000N073911  
Manufacturer's CAGE OMX47  
Part No Indicator A  
Part Number/Trade Name SODIUM ACETATE SOLUTIONS, LC22830

=====  
General Information  
=====

Company's Name LABCHEM INC  
Company's Street 200 WILLIAM PITT WAY  
Company's City PITTSBURGH  
Company's State PA  
Company's Country US  
Company's Zip Code 15238  
Company's Emerg Ph # 412-826-5230  
Company's Info Ph # 412-826-5230  
Record No For Safety Entry 001  
Tot Safety Entries This Stk# 001  
Status SMJ  
Date MSDS Prepared 18FEB95  
Safety Data Review Date 22OCT96  
MSDS Preparer's Name AL BERANEK  
Preparer's Company SAME  
MSDS Serial Number CCPXV

=====  
Ingredients/Identity Information  
=====

Proprietary NO  
Ingredient ACETIC ACID, SODIUM SALT, TRIHYDRATE, (SODIUM ACETATE,  
TRIHYDRATE), LD50 (ORAL RAT) 3530 MG/KG  
Ingredient Sequence Number 01  
Percent 20-27  
NIOSH (RTECS) Number AJ4580000  
CAS Number 6131-90-4  
OSHA PEL N/K (FP N)  
ACGIH TLV N/K (FP N)

-----  
Proprietary NO  
Ingredient WATER  
Ingredient Sequence Number 02  
Percent BALANCE  
NIOSH (RTECS) Number ZC0110000  
CAS Number 7732-18-5  
OSHA PEL N/K (FP N)  
ACGIH TLV N/K (FP N)

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor CLEAR, COLORLESS SOLUTION/ODORLESS  
Boiling Point N/A  
Melting Point N/A  
Vapor Pressure (MM Hg/70 F) N/A  
Vapor Density (Air=1) N/A  
Specific Gravity N/A  
Evaporation Rate And Ref N/A  
Solubility In Water SOLUBLE  
pH SUPDAT

=====  
Fire and Explosion Hazard Data  
=====

Flash Point N/A  
Lower Explosive Limit N/A

Upper Explosive Limit N/A  
 Extinguishing Media DRY CHEMICAL, CARBON DIOXIDE WATER SPRAY REGULAR  
 FOAM  
 Special Fire Fighting Proc WEAR NIOSH APPROVED SCBA & FULL PROTECTIVE  
 EQUIPMENT (FP N) AVOID HAZARDOUS VAPORS  
 Unusual Fire And Expl Hazrds NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT  
 OR FLAME

 =====  
 Reactivity Data  
 =====

Stability YES  
 Cond To Avoid (Stability) MAY BURN BUT DOES NOT READILY IGNITE  
 Materials To Avoid KEEP AWAY FROM OXIDIZERS  
 Hazardous Decom Products THERMAL DECOMPOSITION MAY PRODUCE TOXIC OXIDES  
 OF CARBON AND SODIUM OXIDE  
 Hazardous Poly Occur NO  
 Conditions To Avoid (Poly) NOT RELEVANT

 =====  
 Health Hazard Data  
 =====

LD50-LC50 Mixture SEE INGREDIENT 1  
 Route Of Entry - Inhalation YES  
 Route Of Entry - Skin YES  
 Route Of Entry - Ingestion YES  
 Health Haz Acute And Chronic ACUTE MAY CAUSE IRRITATION TO RESPIRATORY  
 AND GASTROINTESTINAL TRACTS, SKIN, EYES INGESTION MAY CAUSE ABDOMINAL  
 PAIN, VOMITING CHRONIC SIMILAR EFFECTS AS IN ACUTE HEALTH HAZARDS  
 Carcinogenicity - NTP NO  
 Carcinogenicity - IARC NO  
 Carcinogenicity - OSHA NO  
 Explanation Carcinogenicity NOT RELEVANT  
 Signs/Symptoms Of Overexp SEE HEALTH HAZARDS  
 Med Cond Aggravated By Exp NONE SPECIFIED BY MANUFACTURER  
 Emergency/First Aid Proc INHAL MOVE FROM EXPOS AREA IMMED IF BREATHING  
 WAS STOPPED GIVE ARTIFICIAL RESP GET MED AID AT ONCE SKIN REMOVE CONTAM  
 CLOTHING FLUSH SKIN W/LARGE AMTS OF WATER FOR 15-20 MIN GET MED AID AT  
 ONCE EYES FLUSH W/LARGE AMTS OF WATER FOR 15-20 MIN GET MED AID AT ONCE  
 INGEST TREAT SYMPTOMATICALLY & SUPPORTIVELY IF VOMITING OCCURS, KEEP HEAD  
 LOWER THAN HIPS TO PVNT ASPIR GET MED AID AT ONCE

 =====  
 Precautions for Safe Handling and Use  
 =====

Steps If Matl Released/Spill ABSORB SPILLS WITH ABSORBENT (VERMICULITE)  
 AND PLACE IN PLASTIC BAGS FOR LATER DISPOSAL  
 Neutralizing Agent NONE SPECIFIED BY MANUFACTURER  
 Waste Disposal Method DISPOSE ACCORDING TO FEDERAL, STATE, AND LOCAL  
 REGULATIONS  
 Precautions-Handling/Storing STORE IN COOL, DRY AREA  
 Other Precautions NONE SPECIFIED BY MANUFACTURER

 =====  
 Control Measures  
 =====

Respiratory Protection USE NIOSH APPROVED RESPIRATOR APPROPRIATE FOR  
 EXPOSURE OF CONCERN (FP N)  
 Ventilation PROVIDE LOCAL EXHAUST VENTILATION  
 Protective Gloves IMPERVIOUS GLOVES (FP N)  
 Eye Protection ANSI APPRVD CHEM WORKERS GOGGLES (FP N)  
 Other Protective Equipment EMERGENCY EYEWASH AND DELUGE SHOWER MEETING  
 ANSI DESIGN CRITERIA (FP N) WEAR PROTECTIVE CLOTHING  
 Work Hygienic Practices NONE SPECIFIED BY MANUFACTURER  
 Suppl Safety & Health Data PH SLIGHTLY ALKALINE

 =====  
 Transportation Data  
 =====

=====  
Disposal Data  
==========  
Label Data  
=====

Label Required YES  
Technical Review Date 22OCT96  
Label Date 22OCT96  
Label Status G  
Common Name SODIUM ACETATE SOLUTIONS, LC22830  
Chronic Hazard YES  
Signal Word CAUTION'  
Acute Health Hazard-Slight X  
Contact Hazard-Slight X  
Fire Hazard-None X  
Reactivity Hazard-None X  
Special Hazard Precautions ACUTE MAY CAUSE IRRITATION TO RESPIRATORY AND  
GASTROINTESTINAL TRACTS, SKIN, EYES INGESTION MAY CAUSE ABDOMINAL PAIN,  
VOMITING CHRONIC SIMILAR EFFECTS AS IN ACUTE HEALTH HAZARDS  
Protect Eye Y  
Protect Skin Y  
Protect Respiratory Y  
Label Name LABCHEM INC  
Label Street 200 WILLIAM PITT WAY  
Label City PITTSBURGH  
Label State PA  
Label Zip Code 15238  
Label Country US  
Label Emergency Number 412-826-5230

## **Attachment 2 – Sediment In-Situ pH, Eh, and Temperature Measurements**

*At each sampling Site, at two separate locations, the following in-situ measurements should be taken in the field*

- 1 pH, Eh, and temperature of the sediment at the surface, 2" depth, 4" depth, and 6" depth*
- 2 pH, Eh, D O , and temperature of overlying water (if applicable)*
- 3 These in-situ measurements should be done before any sediment samples are taken*

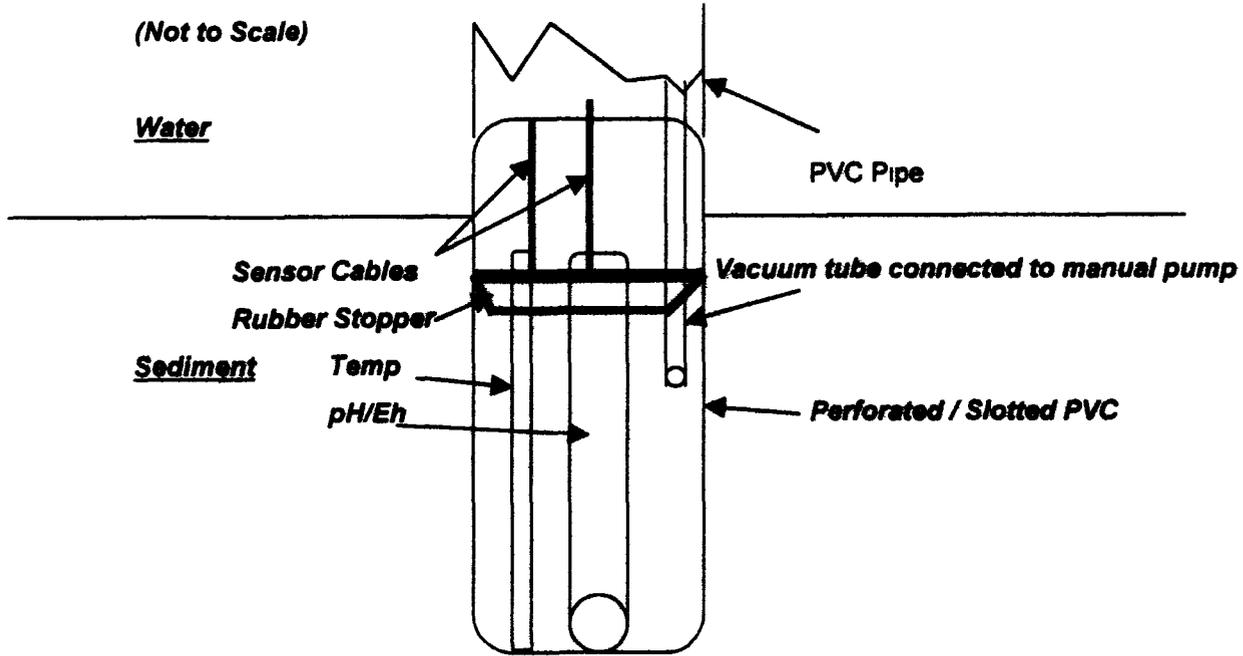
Measurement of pH D O and temperature for pond waters is covered by existing Site SOPs. The following protocol will be used to obtain in-situ measurements of sediment pore water temperature pH and D O. The procedure calls for a specialized measurement apparatus shown in the sketch below. The hand-operated vacuum pump used to evacuate the measurement chamber in the porous ceramic lysimeter is not shown.

- 1 Calibrate the pH / D O meter(s) per manufacturer's instructions with fresh standard solutions
- 2 Insert the following items through snug openings in a rubber stopper as shown in the diagram below: 1) tygon 3/8" diameter vacuum tube 2) pH/Eh combination electrode 3) temperature probe
- 3 Attach a 1 foot PVC pipe handle to the ceramic lysimeter cup to use as a handle
- 4 Place the lysimeter cup vertically into the water until the top of the sediment is touched and mark the water surface on the PVC or lysimeter cup. Mark 2 inch graduations on the PVC handle with a marker.
- 5 Place the apparatus back into the water and touch the sediment again. Apply vacuum to the ceramic lysimeter bulb and allow for water to seep into the lysimeter bulb.
- 6 Turn on the meter(s) and obtain data readings when pH and Eh are stable.
- 7 Repeat the above procedure after pushing the apparatus into the sediment to each graduation line marked on the PVC handle until data are obtained for every sediment depth interval.
- 8 Record all data on appropriate data forms and logbooks per Site SOPs.

**Attachment 2 – Sediment In-Situ pH, D O , and Temperature Measurements**

**- continued**

**Sketch of Proposed Apparatus for Collecting pH, D O , and Temperature for In-Situ Sediments  
(Not to Scale)**



## 9 0 APPROVALS

\_\_\_\_\_  
F Winchester Chromec  
Project Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
David Farler  
Health and Safety

\_\_\_\_\_  
Date

\_\_\_\_\_  
Mike Peters  
Quality Assurance

\_\_\_\_\_  
Date

\_\_\_\_\_  
Bates Estabrooks  
Radiological Engineering

\_\_\_\_\_  
Date

\_\_\_\_\_  
Jim Patterson  
V P RMRS

\_\_\_\_\_  
Date

\_\_\_\_\_  
Chip Sawyer  
Radiation Safety

\_\_\_\_\_  
Date

**90 APPROVALS**

*[Signature]*  
F W Chromec

2-25-99

F Winchester Chromec  
Project Manager

Date

\_\_\_\_\_  
Tony Medina

\_\_\_\_\_  
Date

Health and Safety

*[Signature]*  
Mike Peters

3/2/99

Quality Assurance

Date

\_\_\_\_\_  
Bates Estabrooks

\_\_\_\_\_  
Date

Radiological Engineering

\_\_\_\_\_  
Jim Patterson

\_\_\_\_\_  
Date

V P RMRS

\_\_\_\_\_  
Chip Sawyer

\_\_\_\_\_  
Date

Radiation Safety

## 9 0 APPROVALS

\_\_\_\_\_  
F Winchester Chromec  
Project Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Tony Medina  
Health and Safety

\_\_\_\_\_  
Date

\_\_\_\_\_  
Mike Peters  
Quality Assurance

\_\_\_\_\_  
Date

  
Bates Estabrooks  
Radiological Engineering

\_\_\_\_\_  
Date

2/26/99

\_\_\_\_\_  
Jim Patterson  
V.P. RMRS

\_\_\_\_\_  
Date

\_\_\_\_\_  
Chip Sawyer  
Radiation Safety

\_\_\_\_\_  
Date

**90 APPROVALS**

*Approved for  
F W Chromec*

*2-25-99*

F Winchester Chromec  
Project Manager

Date

Tony Medina  
Health and Safety

Date

Mike Peters  
Quality Assurance

Date

Bates Estabrooks  
Radiological Engineering

Date

Jim Patterson  
V P RMRS

Date

*RE SAWYER*  
*Chip Sawyer*  
Chip Sawyer  
Radiation Safety

*3/1/99*  
Date

**9 0 APPROVALS**

\_\_\_\_\_  
F Winchester Chromec  
Project Manager

\_\_\_\_\_  
Date

*David Farler* 3/2/99

David Farler

\_\_\_\_\_  
Date

Health and Safety

\_\_\_\_\_  
Mike Peters  
Quality Assurance

\_\_\_\_\_  
Date

\_\_\_\_\_  
Bates Estabrooks  
Radiological Engineering

\_\_\_\_\_  
Date

\_\_\_\_\_  
Jim Patterson  
V P RMRS

\_\_\_\_\_  
Date

\_\_\_\_\_  
Chip Sawyer  
Radiation Safety

\_\_\_\_\_  
Date

**9 0 APPROVALS**

\_\_\_\_\_  
F Winchester Chronoc  
Project Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
David Farler  
Health and Safety

\_\_\_\_\_  
Date

\_\_\_\_\_  
Mike Peters  
Quality Assurance

\_\_\_\_\_  
Date

\_\_\_\_\_  
Bates Estabrooks  
Radiological Engineering

\_\_\_\_\_  
Date

*J.W. Patterson*  
\_\_\_\_\_  
Jim Patterson

3/3/99  
\_\_\_\_\_  
Date

V P RMRS

\_\_\_\_\_  
Chip Sawyer  
Radiation Safety

\_\_\_\_\_  
Date