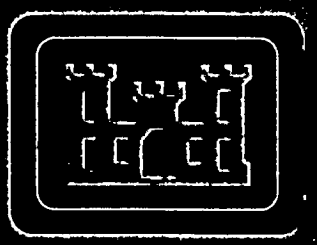
FINAL

FUSRAP RADIOANALYTICAL LABORATORY OPERATING PLAN

MARCH 2000



U.S. Army Corps of Engineers
St. Louis District Office
Formerly Utilized Sites Remedial Action Program

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1.0. PURPOSE

The operating plan outlines the existing capabilities of the laboratory as currently operated to meet the anticipated sample loading from the St. Louis Formerly Utilized Sites Remedial Action Program (FUSRAP). In addition, the plan identifies the existing procedural, regulatory, QA and facility/equipment operating parameters.

2.0. INTRODUCTION

The FUSRAP Radioanalytical Laboratory is located at 8945 Latty Avenue, Berkeley, MO, 63134. The laboratory is designed to support the St. Louis FUSRAP site remediation program with rapid turnaround of radioanalytical results on solid and liquid samples. Two satellite laboratories are also managed from the main radioanalytical laboratory and are located at the St. Louis Downtown Site (SLDS) at Foot of Angelrodt, St. Louis, MO, 63147 and the St. Louis Airport Site (SLAPS) at 110 McDonnell Blvd., Hazelwood, MO 63042.

The original FUSRAP Radioanalytical Laboratory facility consisted of two trailers acquired through a 5-year lease arrangement between ThermoTechnology Ventures, Inc. and the Idaho National Engineering Laboratory in early 1995. The laboratory trailers were designed and modified for the purpose of analyzing the FUSRAP samples, during the summer of 1995 and began operation in St. Louis in October 1995. Bechtel Environmental, Inc. managed the laboratory for the Department of Energy. Currently Science Application International Corporation manages the laboratory for the USACE.

Over the last four and a half years, the laboratory has been used to support the St. Louis FUSRAP site with sample analysis for screening, for guiding excavations, and for shipment verification of contaminated soils slated for final disposition. The laboratory has also processed, analyzed and reported results of samples from other FUSRAP sites across the country. The FUSRAP laboratory has continued to increase its capacity to meet the project needs. During fiscal year 1998, the laboratory processed over 4,897 soil and water samples and in 1999 over 10,765 while maintaining consistently high quality control scores on EPA and DOE performance evaluation samples.

During the fiscal year 1999, the USACE designed, procured, and built the current laboratory facility to support the increasing demand for radioanalytical sample results. The laboratory facility is approximately 2000 square feet, contains three chemical separation hoods, one soil preparation hood and utilizes equipment from the previous laboratory trailers. The laboratory facility was designed to meet the projected workloads for the duration of the St. Louis FUSRAP project.

3.0. LABORATORY CAPABILITIES

3.1 ANALYTICAL CAPABILITY

The FUSRAP Radioanalytical Laboratory is designed and equipped with the instrumentation and procedures to analyze most any sample matrix. Currently the laboratory analyzes solid, liquid and air filter matrices. Analyses include gamma-emitting radionuclides, alpha emitting isotopes of thorium, uranium and radium, gross alpha and beta analysis, and total uranium. The laboratory makes use of state of the art sample separation techniques that allow for low sample waste streams, high chemical yields, and far superior results when compared to methods commonly used by commercial labs.

Sample preparation involves both physical and chemical preparation. Physical preparation involves pulverizing, grinding and homogenizing solid samples. This assures that the aliquot (0.5-1.0 grams for alpha analysis) taken from the bulk sample (800–1000 grams) will be representative of the sample as a whole. Samples for gamma spectral analysis undergo the same physical preparation in order to homogenize the sample to even out the gamma-ray attenuation and absorption effects due to the matrix. Depending on the sample matrix, physical preparation of a batch of sixteen (16) samples can be completed in approximately four (4) hours. However, under a consistent sample load, physical preparation of one batch will be concurrent with the chemical preparation and/or counting of another batch.

Laboratory samples for alpha isotopic analyses are prepared by chemical separation at a maximum rate of forty-eight (48) samples per shift, including the nine required quality control samples (i.e., method blank, lab duplicate and lab control sample). This capacity is based on the laboratory hood space and equipment.

Dr. Claude Sill at the Idaho National Engineering and Environmental Laboratory (INEEL) developed the chemical methods used in the laboratory for the separation of uranium, radium and thorium from the matrix material. This method is commonly referred to as total dissolution by fusion. The extraction method can be applied to all alpha-emitting isotopes normally analyzed by alpha spectroscopy. The method allows for total destruction of the sample by converting the sample (rocks and all) into a glass (pyrosulfate cake). The pyrosulfate cake is dissolved into a liquid and, by using chemical precipitation methods, the isotopes of interest are co-precipitated onto a filter for alpha counting. The typical chemical recovery for this method is 80 to 100%.

With the existing instrumentation in the counting laboratory, up to twenty-one (21), one-hour counts for a wide range of gamma emitting radioisotopes can be performed per shift. Alpha measurements are run simultaneously on sixteen (16) detectors for three (3) hours providing thirty-two (32) alpha spectral counts per shift. One proportional counter with an automatic sample changer is capable of analyzing up to twenty-two (22) one-hour counts per day. The Kinetic Phosphorescence Analyzer with automatic sample changer is capable of providing thirty-

three (33) total uranium analyses per shift considering current limitations. Typical minimal detectable activities for the isotopes of interest are listed in Table 1.

Table 1. Typical Minimum Detectable Activities

Thorium Series	Alpha MDA[1)]	Gamma MDA[2)]
Thorium-232	0.10 pCi/g	0.10 pCi/g
Radium-228	0.10 pCi/g	0.10 pCi/g
Actinium-228	NA	0.10 pCi/g
Thorium-228	0.10 pCi/g	0.10 pCi/g
Radium-224	NA	NA

Uranium Series	Alpha MDA[1)]	Gamma MDA[2)]
Uranium-238	0.10 pCi/g	3.0 pCi/g
Thorium-234	NA	3.0 pCi/g
Protactinium-234	NA	NA
Uranium-234	0.10 pCi/g	NA
Thorium-230	0.10 pCi/g	10.0 pCi/g
Radium-226	0.10 pCi/g	0.10 pCi/g

Actinium Series	Alpha MDA[1)]	Gamma MDA[2)]
Uranium-235	0.10 pCi/g	0.20 pCi/g
Thorium-231	NA	NA
Protactinium-231	0.002 pCi/g [3)]	1.0 pCi/g
Actinium-227	0.002 pCi/g [3)]	0.20 pCi/g

	KPA MDA[4)]	Proportional Counter MDA[5)]
Total Uranium	0.68 pCi/L	NA
Gross Alpha (Water)	NA	2.5 pCi/L
Gross Beta (Water)	NA	40.0 pCi/L
Gross Alpha (Air Filter)	NA	$8.0E^{-16}$ uCi/ml
Gross Beta (Air Filter)	NA	$3.30E^{-15}$ uCi/ml

1) Alpha spectroscopy MDAs are based on a nominal 3-hour count time of a 0.5 gram soil sample. Alpha spectroscopy samples are prepared using total dissolution by fusion method.

2) Gamma spectroscopy MDAs are based on a nominal one-hour count time of an 800 gram soil sample. Gamma spectroscopy samples are measured in Marinelli beakers.

3) Protactinium-231 and Actinium-227 Alpha spectroscopy values are estimated to be 65 times less than the Thorium-230 value determined by statistical regression analysis of historical data.

4) Kinetic Phosphorescence Analyzer (KPA) MDAs are based on a nominal one-minute count time of a 1ml water sample.

5) Proportional Counter MDAs are based on the matrix of the sample. Gross Alpha (water) MDAs are based on a nominal 30-minute count time of a 250 ml water sample. Gross Beta (water) MDAs are based on a nominal 30-minute count time of a 30 ml water sample. Gross Alpha and Gross Beta (air filter) MDAs are based on a nominal 60-minute count time of an air filter.

Reporting times for preliminary data are generally 24-36 hours for alpha and gamma analyses depending on sample prioritization and backlog. Total Uranium by KPA is typical reported within the same day. Gross Alpha and Beta results are typical reported within 10 to 14 days for air filters to allow for radon decay and 24 hours for water. Final data packages and

electronic data deliverables (EDD) are provided as time and sample load permits. A summary of analytical throughput is shown in Table 2.

Table 2. Summary of Laboratory Analysis Capabilities[1]

Analysis	# of Instruments	Analyses/Shift	Analyses/Month
Current Configuration			
Alpha Isotopic	16-PIP detectors	32	640
Gamma Isotopic	3-HPGe detectors	21	420
Gross Alpha & Beta	1-Gas Flow Prop. Cntr.	22	440
Total Uranium	1 KPA	33	660
Total		108	2,160

[1] Based on seven experienced analysts working one 8-hour shift per day processing full batches of 16 samples.

3.2 SAMPLE RECEIVING

Samples are received in accordance with procedure ML-013 of the FUSRAP St. Louis Laboratory Procedures Manual. Before samples are received in to the lab, the receiving analyst verifies that the Chain of Custody is complete and accurately represents the samples. The physical condition of the sample containers is assessed to ensure that they are secure and have not been tampered with. The analyst signs and dates the "Received By" section of the Chain of Custody and fills out a Cooler Receipt form. The samples are then placed in a locked storage area to await processing.

The Chain of Custody and Cooler Receipt forms are turned over to the Sample Coordinator, or designee, for entry into the Lab Sample Tracking Database System. This person maintains the original sample paperwork and distributes copies to the appropriate parties (i.e., Forward a copy of the Cooler Receipt Checklist along with the COC to the FUSRAP Laboratory Coordinator). Additionally, the Sample Coordinator logs the samples into the laboratory database and groups them into batches for processing. The sample priority is assessed and the batches are placed into the laboratory work schedule accordingly.

3.3 SAMPLE STORAGE AND ARCHIVE

During sample preparation for counting, a 50g aliquot of solid sample is retained in an appropriately labeled polypropylene vile for archiving. Water samples are received in 1-liter Nalgene bottles and the remaining sample after analysis is retained for archiving in the original container. Upon completion of all analyses, the 50g samples and Nalgene bottles are packed into boxes, labeled appropriately, and archived in an LSA box from which they can easily be retrieved if necessary. Excess sample material is returned to the submitting contractor for inclusion with their site remedial waste. Archived samples are held for six months. After validation these archived samples are disposed of.

4.0. BASELINE REQUIREMENTS

4.1 STAFFING

The FUSRAP Laboratory located in Berkeley, is currently staffed with seven (7) trained analysts. The laboratory has been operating on a two eight-hour shift per day basis, Monday through Friday, with overtime as necessitated by sample priority and backlog. The average throughput at this level is approximately 1054 analyses per month exclusive of quality control samples. During peak sample loads, such as in the summer when the remediation activities are the heaviest, the laboratory has operated with three shifts and seven (7) people. The lab has produced as many as 1,385 analytical results in a month.

There are also two satellite labs each staffed with one Laboratory Instrumentation Operator. The lab located at 110 McDonnell Blvd. in Hazelwood supports the St. Louis Airport Property Site and is responsible for the rapid gamma screening analysis of soil samples. The second lab, located at the Foot of Angelrodt, in St. Louis, supports the St. Louis Downtown Site and is responsible for the rapid analysis of air samples and rapid gamma screening analysis of soil samples.

The Laboratory Manager is responsible for the following:

a) Oversees laboratory staff and technical operations to ensure accurate and consistent testing procedures;
b) Trains, mentors, and evaluates laboratory staff to ensure quality control, safety, and records maintenance;
c) Develops and implements new analytical procedures and methods;
d) Examines equipment, processes, operations, and assembly of data, suggests improvements;
e) Evaluates staffing levels in relation to workload. Directs production operations and processes for laboratory;
f) Recognizes and solves problems affecting production including staff, quality, and order; and
g) Manages facilities and equipment maintenance.

The Lab Sample/Database Coordinator is responsible for receiving incoming samples and maintaining the sample tracking database system. This person also assesses sample priority and assigns the work schedule accordingly. The Lab Sample/Database Coordinator is also responsible for assembling electronic date and distributing it to the clients. They also interface with the clients for information pertaining to sample results, delivery dates, etc. They maintain the archive databases, track sample throughput, work accomplished, and projected work. Also, they prepare status reports.

Laboratory Chemists are responsible for the physical preparation of the sample. They require proficiency at performing the laboratory separation methods used for preparing samples for analysis. They are also required to prepare reagents and standards. Laboratory Chemists also assist in the development of procedures and methods.

Laboratory instrumentation operators are responsible for the day to day operation of nuclear counting equipment and sample analysis. They perform quality control testing, assemble quality control reports, maintain and repair equipment, and perform calibrations. These operators also assist in the development of procedures and methods.

In order for the laboratory to operate efficiently and effectively, it is imperative that each of these individuals be well trained and cross-trained in the execution of his or her duties. Site training requirements of laboratory personnel are documented and controlled through the FUSRAP St. Louis Laboratory Quality Assurance Plan, March 1999, Revision 1, and the Radioanalytical Laboratory Chemical Hygiene Plan for the Hazelwood Interim Storage Site, December 1999.

4.2 QUALITY ASSURANCE (QA)

4.2.1 QA Plan

The FUSRAP Radioanalytical Laboratory quality control documents consist of a laboratory specific QA/QC plan titled *Laboratory Quality Assurance Plan (LQAP)* and SAIC corporate QA plans titled *SAIC Engineering and Environmental Management Group Quality Assurance Program* and the *SAIC Quality Assurance Program and Quality Assurance Administrative Procedures*. The overall quality assurance program describes the management controls, objectives and outlines the policies to be followed.

In addition to organizational responsibilities, The Laboratory Quality Assurance Plan outlines internal laboratory quality control, references the analytical procedures manual, training, records management, and the archive and storage of data.

4.2.2 Laboratory Quality Control

The laboratory runs three (3) quality control (QC) samples (method blank, duplicate and laboratory control sample (LCS)) with each batch of samples processed, whether the batch consists of one sample or 13 samples. QC samples are evaluated to determine if an interference of any kind might exist that would bias the analytical result. Radioactive tracers are also used to determine analytical recoveries of the alpha isotopic separations. In addition, 5% of all samples submitted to the laboratory are submitted in duplicate to an outside laboratory by the field sample collection teams for verification of the FUSRAP laboratory results.

4.2.3 Third Party Cross Check Programs

The laboratory currently participates in two cross check programs; the Mixed Analyte Performance Evaluation Program (MAPEP) administered through DOE's Environmental Sciences Laboratory in Idaho Falls, Idaho and Analytics Inc. environmental cross-check program. Since the laboratory began participation in cross check programs, more than 70 analytical results have been submitted with only one value outside the 2 sigma warning limit but within the 3 sigma criteria. This indicates that the data produced in the FUSRAP laboratory is of good and reliable quality.

4.2.4 Audits

Over the last four and a half years, the FUSRAP laboratory has undergone several internal audits for both compliance and technical evaluation. It is anticipated that the laboratory will be audited at least twice by SAIC's quality assurance department during the period of one year.

4.3 CHEMICAL HYGIENE AND HEALTH AND SAFETY

The chemical hygiene plan in use at the laboratory was developed specifically for the laboratory and is titled Radioanalytical Laboratory Chemical Hygiene Plan and Laboratory Safety Program. This plan identifies the specific individuals their responsibilities and roles as they pertain to chemical hygiene. This plan discusses processes for maintaining Material Safety and Data Sheets, requirements for maintaining an inventory of hazardous chemicals, exposure limits, training requirements, medical examinations, hazard identification, general procedures, fume hood exhaust systems, and plan review and evaluation. The plan references the applicable procedures from the SAIC corporate Environmental Compliance and Health and Safety Manual. Additional health and safety items are covered in the document titled SAIC Site Safety and Health Plan for St. Louis- FUSRAP Activities. Under this document, an activity hazard analysis has been performed that addresses specific laboratory health and safety items as they pertain to a specific activity.

4.4 ANALYTICAL INSTRUMENTATION AND EQUIPMENT

Instrumentation

The primary analytical instrumentation required for alpha, beta, and gamma analysis of samples is listed below. These instruments are located in the laboratory facility at 8945 Latty Avenue and at the satellite labs. This equipment is the property of the USACE and is managed and controlled by SAIC.

The following Gamma Spectroscopy instruments are located at the main FUSRAP lab at 8945 Latty Avenue:

Gamma Spectroscopy

Canberra HPGe 30% detector, "J" configuration, liquid nitrogen dewar and shield
ORTEC HPGe 50% N-Type detector, liquid nitrogen dewar, and vertical shield
Canberra HPGe 40% detector, "J" configuration, liquid nitrogen dewar and shield

The following Gamma Spectroscopy instruments are located at the St. Louis Airport Property Site lab at 110 McDonnell Blvd:

Canberra HPGe 30% P-Type detector, liquid nitrogen dewar and vertical shield
Canberra HPGe 50% Large surface area detector, "Insitu" portable detector

The following Gamma Spectroscopy instruments are located at the St. Louis Downtown Site lab at Foot of Angelrodt in St. Louis:

Canberra HPGe 28% N-Type detector, liquid nitrogen dewar and vertical shield

Each detector has an associated power supply, pre-amplifier, main amplifier acquisition interface module (AIM) and analog-to-digital converter (ADC). There are two electronics racks that contain the electronics for all three Gamma spectroscopy systems. The electronic racks are located within an air-cooled Canberra electronics cabinet.

Alpha Spectroscopy

The alpha counting system consists of 16 ion-implanted alpha particle detectors and counting chamber modules. Each module contains its own power supply and pulse shaping electronics. All 16 chambers are contained in an electronics rack that is located within a Canberra electronics cabinet. The cabinet has been plumbed and valved for high vacuum operation. The vacuum is supplied by two Welch Duoseal vacuum pumps. This system is located at the main FUSRAP lab.

Gas Flow Proportional Counters

The proportional counter is a Tennelec Series 5 gas flow proportional counter. The Tennelec has all shielding and electronics enclosed in a desktop configuration. The gas used in the Tennelec is a mixture of 90% Argon and 10% Methane. This system is used for the analysis of gross alpha and beta in water and air. One system is located at the main FUSRAP lab and one system is located at the St. Louis Downtown Site.

Kinetic Phosphorescence Analyzer (KPA)

The KPA analyzes clear water samples for total uranium using a pulse laser to phosphoresce the sample. This system requires minimal sample preparation and quickly provides

accurate results. The system is limited in that samples must be clear before analysis otherwise extensive sample preparation is required. Samples are often pre-filtered before analysis to eliminate interference. This causes minimal compromise to the sample, as uranium is highly soluble in water. This system is located at the main FUSRAP lab.

Peripheral equipment

The main laboratory facility contains six computers and monitors; one of which is dedicated to the control and operation of the Alpha and Gamma spectroscopy systems. Alpha and Gamma spectroscopy software is resident on this machine to handle operational characteristics as well as quality control information from all of the detectors. The Tennelec and KPA also have dedicated computer systems. The Tennelec's computer system has counting software and an accompanying Microsoft Access database. The KPA's computer system also contains counting software and sample database. The laboratory has a FAX machine, a telephone and uses a copier for the reproduction and transmittal of hard copy and electronic data deliverables.

Laboratory Equipment

The source prep laboratory at the main laboratory contains equipment to assist the analyst in the physical and chemical preparation of the sample for counting. A list of the equipment is as follows:

- jaw crusher for the reduction of large sample particles (e.g., rocks);
- ball mill for the physical homogenization of samples;
- balances; analytical and top loading with certified weights;
- drying oven for moisture removal;
- centrifuges;
- hotplates;
- muffle furnace for destruction of organic material;
- pH probe and meter;
- sieves and shaker;
- vacuum pump and air pressure pump;
- platinum crucibles; and
- four containment hoods.

In addition to this equipment, the laboratory has and uses a variety of consumable laboratory supplies, materials and reagent chemicals.

4.5 LABORATORY FACILITY

The main FUSRAP Radiochemical Laboratory is a 2000 sq. ft. modular constructed building (See Attachment 2). The laboratory building is segregated into five main areas; one area provides for sample receiving, secure sample storage, and supplies storage. Two areas are designated for chemical separation and source preparation areas, and one maintains nuclear

counting instruments for the analysis of alpha, beta, and gamma emitting radioisotopes. The office area contains two bathrooms, one lunchroom, and three offices. Exterior to the laboratory is an enclosed waste storage area including secondary containment for liquid waste.

Electrical power and potable water are supplied via site connections. There is a holding tank for laboratory wastewater to allow for monitoring prior to release to the sanitary sewer.

The preparation laboratories are an HVAC controlled environment. The laboratories contain a six-foot HEPA filtered hood enclosure designed for the safe handling of dry and dusty contaminated soil samples. They also contain three six-foot hoods for the chemical separation and isolation of radioactive constituents of interest. Peripheral equipment supporting the function of this laboratory includes analytical balances, a centrifuge, drying ovens, a muffle furnace and a vortex mixer as well as chemical reagents, glassware and a deionizer for the preparation of contaminant free water.

Data acquisition and spectral processing are accomplished with an AXP based Digital equipment computer system and software developed by Canberra Industries for this purpose. All counting and computer systems in the laboratory are connected to each other and to printers through a local area network. The network allows for simultaneous data reduction without interfering with the data acquisition operations. Data reduction is accomplished through a Visual Basic program designed specifically for FUSRAP. The program virtually eliminates the need for manual data entry thereby reducing errors and increasing laboratory efficiency. All computers and instruments in the counting laboratory are protected from power spikes, surges and line noise with an isolated power supply system.

4.6 LABORATORY SECURITY

The laboratory is enclosed within an eight-foot chain link security fence with one entry point. The compound also has security lighting. The Laboratory Manager is responsible for ensuring that the laboratory compound is properly secured. A Physical Security Checklist (Attachment 1) is maintained within the laboratory. This checklist requires that high value items have been properly stored, any necessary equipment has been turned off, windows and doors have been properly secured, appropriate lights have been turned on or off as appropriately necessary, and entry gate has been secured upon exit.

4.7 REGULATORY

4.7.1 Waste Disposal

Currently, in the FUSRAP Program, all solid laboratory waste is handled in the same manner as all other dry active waste (DAW). Laboratory solid waste includes gloves, used plastic ware (e.g., pipette tips), contaminated glassware, etc. The solid waste is gathered and bagged in the laboratory. The bagged waste is collected by the health physics (HP) staff and

becomes the responsibility of the USACE for disposal in accordance with the site practices. Typically solid waste is transported to an active USACE load out facility for inclusion with the site remedial waste. Additionally contractors submitting samples to the laboratory are required to pick up excess samples for inclusion with their site remedial waste.

Liquid waste generated by the laboratory is grouped into two categories; rinse water and process waste. The process waste is the residual liquid media from the chemical separation of radionuclides from the bulk sample matrix. This waste is collected in the laboratory, neutralized, and stored in drums located in an enclosed waste storage building outside the laboratory. This waste is then characterized to determine the appropriate disposal requirements.

Wash water is generated in the lab from the cleaning of pre-rinsed laboratory containers (crucibles, glassware, etc.) This liquid waste stream is disposed of to the sanitary sewer system in accordance with an annual permit issued by the Metropolitan Sewer District, Department of Environmental Compliance. The permit allows the discharge of up to 25 gallons per week to the sanitary system.

4.7.2 Licensing

The FUSRAP laboratory currently operates under the permit waver provision of CERCLA extended to on site activities. The Issuance of Directors Decision Under 10 CFR 2.206 is listed in the Federal Register / vol. 64, No. 64 / Monday, April 5, 1999 / Notices. SAIC, by letter of agreement with the USACE, has concurred with this ruling.

4.7.3 Hood Exhaust/Air Permits

Exhaust air from the laboratory hoods in the sample preparatory areas is ejected through the exhaust stack. One of the hoods, in which dry, dusty samples are handled, is HEPA filtered, whereas the other hood, in which chemical separation occurs, is not. Since volatile radioactive species are not being handled in the laboratory, and HEPA filters are being used to remove particulates from the air stream, air permits have not been needed for the laboratory. A technical work record (TWR98-11) was performed to assess potential emissions from the laboratory to demonstrate compliance with the National Emissions Standard for Hazardous Air Pollutants (NESHAP). The results from the assessment confirmed the laboratory would not have to perform any monitoring on facility emissions. Furthermore, the lab is exempt from reporting requirements.

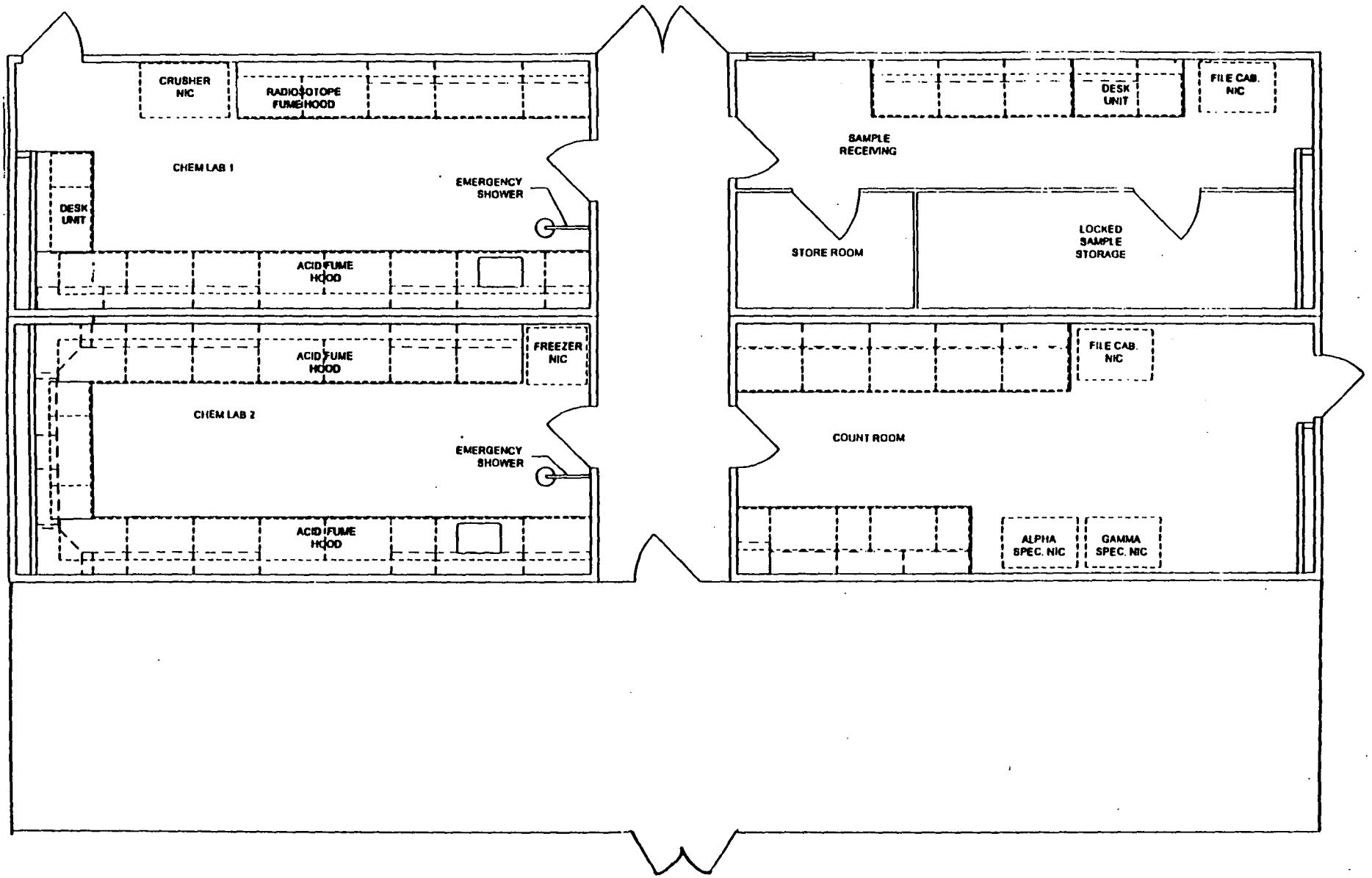
5.0 SUMMARY

The FUSRAP Radioanalytical Laboratory is designed and equipped to provide accurate radioanalytical measurements of a variety of alpha, beta, and gamma emitting radionuclides. The laboratory provides support for the St. Louis FUSRAP site characterization and remediation programs with rapid turnaround of analytical results on solid, liquid, and air samples.

The laboratory employs nine (9) experienced analysts and is comprised of one main lab and two satellite labs. The main lab is capable of routinely producing more than 2,000 analytical measurements (including laboratory QC) per month with a normal 40-hour workweek. The current facilities, instrumentation and equipment allow the laboratory to expand production to over 4,000 analytical measurements (including laboratory QC) per month, by adding additional shifts.

The laboratory has a complete set of operational procedures that cover all aspects of the operation including QA/QC, chemical hygiene, laboratory safety, laboratory management, waste management, and daily operations. Additionally, the laboratory has been dedicated to FUSRAP project exclusively for over four years providing fully validated electronic and hard copy data packages. The laboratory has also generated four years of cross check data that confirms the quality of work performed.

FUSRAP Lab Security Checklist								8945 Latty Ave.								HISS lab				month/year:											
Irregularities discovered will be promptly repported to the designated Security Officer for corrective action.								**Statement** - I have conducted a security inspection of this work area and checked all of the items listed below.																							
To: (if required)								From:(if required)												Through:(if required)											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
High value items have been properly stored (laptop, crucibles, etc.)																															
Hot plates have been turned off.																															
Fume hoods have been turned off.																															
Lab windows are closed and locked.																															
Lab Lights are turned off.																															
Lab doors and gate will be locked on exit.																															
Initial and list time of departure.																															



MAP OF MAIN FUSRAP LABORATORY

Administrative Record for the Formerly Utilized Sites Remedial Action Program (FUSRAP) North St. Louis County Sites

St. Louis County, Missouri

US Army Corps of Engineers
St. Louis District®

Volume 1.12a
Site Management –
Reference Documents

Administrative Record for the Formerly Utilized Sites Remedial Action Program (FUSRAP) North St. Louis County Sites

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Volume 1.12a
Site Management –
Sampling/Analysis Data & Plans