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PRELIMINARY SITE CHARACTERIZATION RADIOLOGICAL MONITORING PLAN FOR THE NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT YUCCA MOUNTAIN SITE

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PRELIMINARY SITE CHARACTERIZATION RADIOLOGICAL MONITORING PLAN
FOR THE
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1.0 INTRODUCTION AND PLAN SUMMARY

1.1 Introduction

The United States plans to begin operating the first geologic repository for the permanent disposal of commercial spent nuclear fuel and high-level radioactive waste by the end of this century. Public Law 97-425, the Nuclear Waste Policy Act of 1982 (the Act), specifies the process for selecting a repository site, and constructing, operating, closing, and decommissioning the repository.

In February 1983, the U.S. Department of Energy (DOE) identified the Yucca Mountain site in Nevada as one of nine potentially acceptable sites for waste. The site is in the Great Basin, which is one of five distinct hydrologic settings considered for the first repository. To determine their suitability, the Yucca Mountain site and the eight other potentially acceptable sites were evaluated in accordance with the DOE's General Guidelines for the Recommendation of Sites for the Nuclear Waste Repositories. These evaluations were reported in draft and final environmental assessments (EAs), which were issued for public review and comment. On the basis of the evaluations, the DOE found that the Yucca Mountain site was suitable for site characterization.

On May 28, 1986 the President approved the Yucca Mountain site, Nevada; Hanford site, Washington; and Deaf Smith County site, Texas, for site characterization. During site characterization of these three sites, the DOE will construct exploratory shafts for underground testing to determine whether geologic conditions will allow the construction of a repository that will safely isolate radioactive waste. The Act requires the DOE to prepare site characterization plans for review by the Nuclear Regulatory Commission (NRC), States, Indian tribes, and the public. After site characterization and with completion of an environmental impact statement the DOE will recommend one of the characterized sites for development as the first repository and that site will proceed on to obtain a license from the NRC.

The repository site is located on and adjacent to the southwest side of the Nevada Test Site (NTS), approximately 26 kilometers (16 miles) north of the town of Amargosa Valley. The NNWSI Project consists of 9 phases which are the following:

1. Site Selection (selection of sites for further characterization, completed 5/28/86).
2. Site Characterization.
3. Environmental Impact Statement (EIS)/Safety Analysis Report (SAR) Data Gathering.
4. EIS/SAR Preparation/Review.
5. Construction Authorization.

6. Construction.
7. License to Receive and Possess/Operation.
8. Permanent Closure/Decommissioning.
9. Post Closure Monitoring.

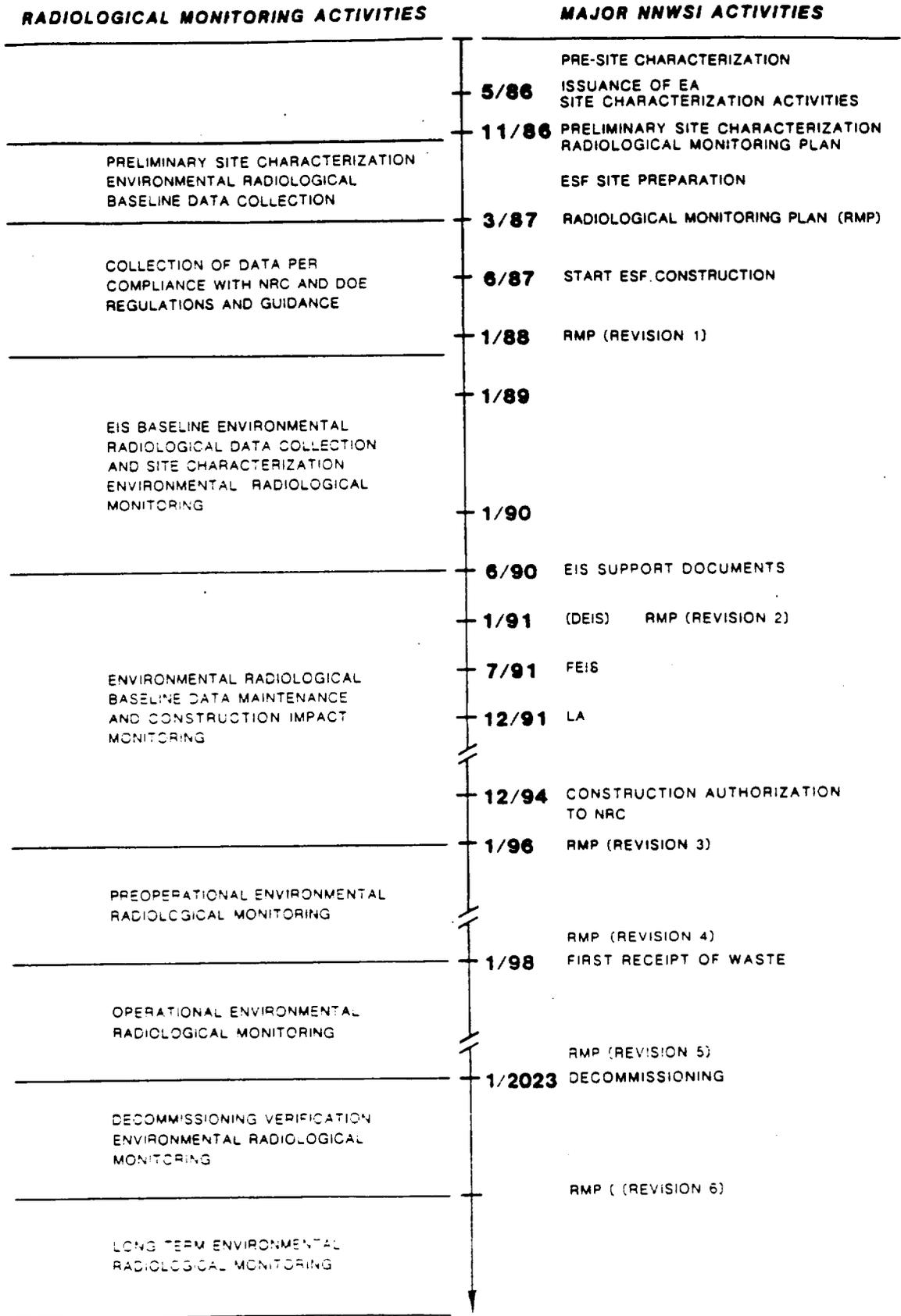
To allow proper planning the Radiological Monitoring Plan (RMP) will address all phases of the monitoring program through site closure. If this site is not selected as the site of the final repository phases 5, 6, and 7 will be eliminated and the schedule shortened. This should not be assumed to indicate the final outcome of the repository selection process. During these phases, it is important to assure compliance with applicable regulations, monitor the impacts of NNWSI Project activities, and gather data required by the NNWSI program. The environmental radiological monitoring activities necessary to support the phases of the NNWSI Project are summarized in Figure 1-1. The activities described in this plan occur in the early phases of site characterization. A complete description of the environmental radiological monitoring activities will be provided by the RMP.

Because site characterization activities have the potential to alter the background levels of radiation in the area, baseline data on radioactive material present in the environment must be collected before significant site characterization activities. Site characterization activities may alter the background radiation levels by releasing radon due to excavation and mining, and through the resuspension of deposited particulates. This document presents the Preliminary Site Characterization Radiological Monitoring Plan (PSCRMP) for collecting and evaluating such data in support of the NNWSI Project.

The PSCRMP defines and identifies control procedures for the monitoring activities. These procedures are prepared and issued as described in the instruction in Appendix A-1. The Technical and Management Support Services (T&MSS) Configuration Management Branch issues these procedures and instructions as part of a controlled manual which is maintained in an updated, audited form by each user. In early 1987 the RMP, which will incorporate the PSCRMP and describe the entire radiological environmental monitoring program, will be issued. The various phases of the environmental radiological monitoring activities are summarized in Figure 1-1, which relates them to relevant NNWSI Project activities.

The monitoring equipment for the PSCRMP will be owned by the DOE and operated by Science Applications International Corporation (SAIC) under the T&MSS contract for the NNWSI Project. Laboratory support to this program will be provided by various U.S. Environmental Protection Agency (EPA) offices in Las Vegas, Nevada in a manner similar to commercial contractors. Note the EPA participation is through an existing interagency agreement between DOE/NV and EPA.

Three regulatory agencies have established rules and regulations governing the repository approval process that may affect the data collection and evaluation activities needed to permit and license a repository at Yucca



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Figure 1-1. Radiological Monitoring Timeline

Mountain. The EPA has standards governing the release of radioactive materials into the environment from high-level radioactive waste repositories. The NRC, however, has the primary responsibility for implementing and enforcing these EPA standards and for ensuring that projects with the potential for radiological impacts are designed properly and operated safely. The NRC has also established standards for both worker and public exposure to radiological hazards and is responsible for granting construction authorization and licenses for high-level radioactive waste repositories. In addition, DOE regulatory requirements exist with regard to these activities. The DOE regulations which are directly applicable to activities in the site characterization phase.

1.2 Plan Summary

The PSCRMP activity will utilize integrating radon monitoring devices, a continuous radon monitor, and a particulate air sampler. These instruments will be used to establish the baseline radioactivity and/or radioactivity released due to early site characterization activities.

The sections that follow provide a general project description, the specifics of the monitoring program, and the practices that will be employed to ensure the validity of the collected data by integrating quality assurance into all activities. Section 2 of this document describes the regulatory base of this document. Section 3 describes the site characterization activities which may lead to release of radioactivity. Section 4 provides a description of the potential sources of radioactivity that site characterization could generate. Section 5 summarizes the sampling and monitoring methodology, which will be used to monitor the potential sources of radioactivity. The network of sampling and monitoring equipment is described in Section 6, and Section 7 summarizes the systems operation activities. The data reporting activities are described in Section 8. Finally, a description of the Quality Assurance (QA) and Quality Control (QC) activities is provided in Section 9. Appendix A contains a summary of the procedures to be used in this program, and Appendix B contains technical specification on equipment and services.

1.3 Responsibilities

The reporting structure for this activity is shown in Figure 1.2. Solid lines indicate the flow of technical direction and dashed lines indicate the flow of technical input and support. The Task Manager is responsible for implementation of all Environmental Radiological Monitoring (ERM) activities. The Senior Health Physicist designated by the Technical and Administrative Directors of the T&MSS Technical Programs Division is responsible for providing appropriate technical input to the Task Manager. The ERM team and the Senior Health Physicist at the direction of the Task Manager will perform the ER activities. The designated ERM team will be made up of specifically trained T&MSS personnel from the various branches of the T&MSS Technical Programs Division. The functions of the other T&MSS organization groups and individuals will be as specified in this plan.

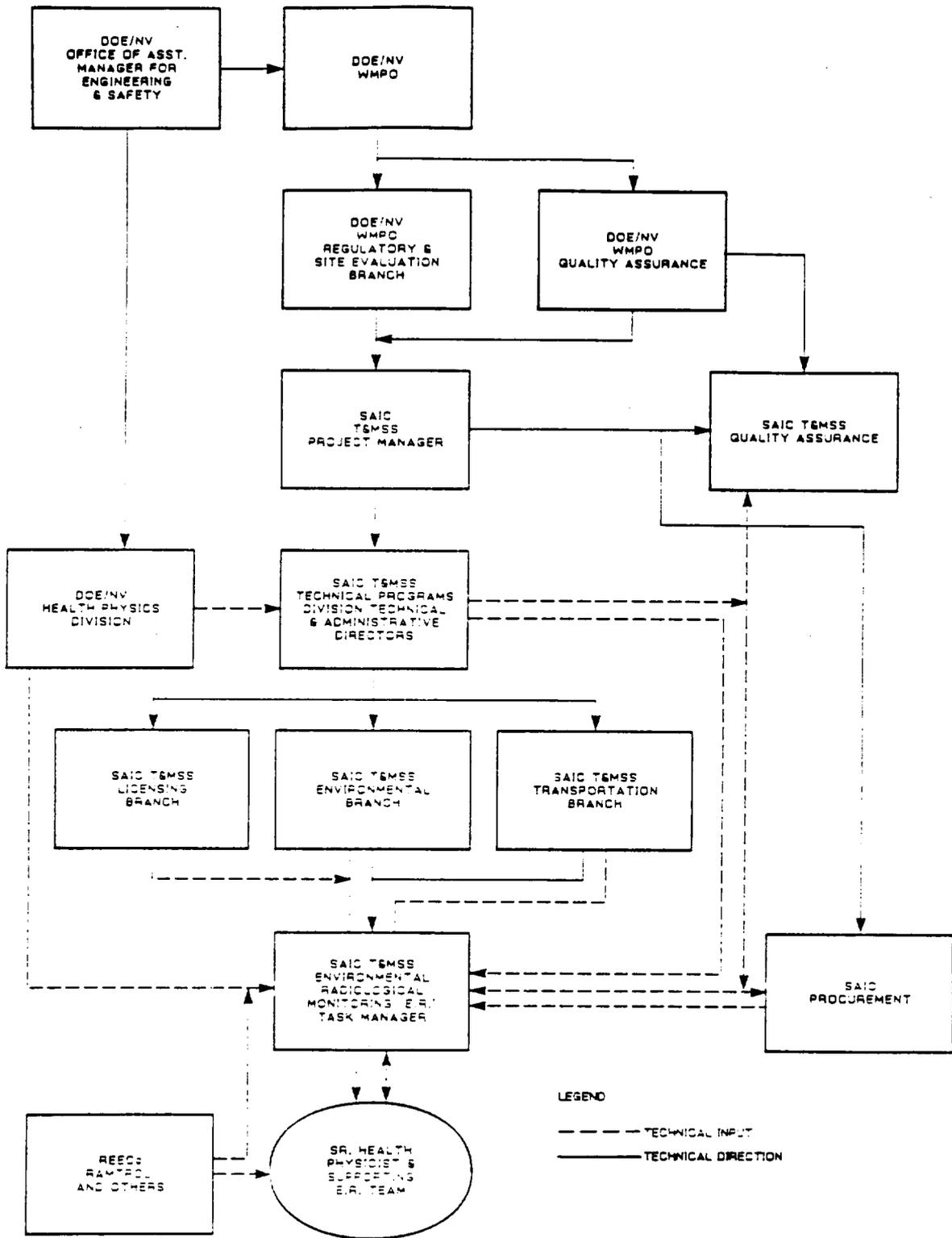


Figure 1-2. Environmental Radiological Monitoring Activities Organization Chart.

This activity supports the activities of the Regulatory and Site Evaluations Branch of DOE/NV Waste Management Project Office (WMPO). Technical support and direction is provided by the WMPO branch chief. In addition technical support will be provided by the Health Physics Division of DOE/NV.

2.0 APPLICABLE REGULATIONS AND GUIDELINES

Performance of activities identified in the PSCRMP will provide the data necessary to:

1. Assure compliance with applicable regulations during site characterization.
2. Identify the preliminary radiological baseline to allow assessment of the impact of site characterization activities.
3. Perform an assessment of early site characterization activity impacts.
4. Gather technical baseline and release data which will allow characterization of the radon release rate from tuff.

Data collected in accordance with this plan will be controlled in a manner consistent with the T&MSS QA and regulatory guidelines and requirements for environmental radiological monitoring activities. This will allow inclusion of this data in future activities. The applicable regulations addressed are summarized in the subsections that follow. It should be noted that site characterization activities are exempted from formalized National Environmental Policy Act of 1969 (PL91-190) (NEPA) documentation requirements by the NHPA, instead monitoring and mitigation of significant impacts is required to assure that there is minimal impact.

2.1 DOE Orders and Guidelines

Site characterization activities shall be carried out in compliance with DOE Order 5480.1 Chapter XI, "Requirements for Radiation Protection" specifically section 4.b. for nonoccupation exposure to airborne radionuclides and Section 4.a for occupational exposure to airborne radionuclides. This data shall be gathered using methods consistent with the DOE reference standard DOE/EP-0096, "A Guide for Effluent Radiological Measurements at DOE Installations", as specified in DOE Order 5480.4, Attachment 3, "Reference ES&H Standards," Section 2.b.(8). In addition, DOE Order 5480.4, Attachment 2 "Mandatory ES&H Standards (Policy Requirements)," Section 2.e.(8), cites the Mine Safety Orders, Administrative Code, Title 8, Chapter 4, Subchapter 12, State of California as the applicable mine safety regulations. The California regulation cites 30 CFR Part 57.5-37 for radon monitoring.

The data gathered in the activities described in the PSCRMP shall meet the requirements stated in DOE/EP-0023, "A Guide for Environmental Radiological Surveillance at U.S. Department of Energy Installations."

2.2 NRC Regulations and Guidelines

Since the data generated may be used in reports incorporated in the EIS and SAR and in demonstration of compliance with 10 CFR Part 60 including the

referenced 10 CFR Part 20, 30 CFR Part 57, and 40 CFR Part 191.03, the data shall be collected in a manner consistent with Regulatory Guides 4.1, 4.6, 4.13, 4.14, and 1.109.

2.3 Other Requirements

The data collected during site characterization, coupled with information on meteorology and site activity, will be used to characterize the radon release rate from the proposed facility. The "Environmental Assessment - Yucca Mountain Site Nevada Research and Development Area, Nevada" relied on conservative assumptions on radon release from granite in projecting the radon release from tuff since such data on tuff are not available. Monitoring of radon data during site characterization, excavation, mining and shaft construction allows an actual measurement of the radon released by mining. To determine how much radon is released from mining activities, it is necessary to know the ambient radon concentration baseline prior to these activities.

It is known that radon levels are related to both site characteristics and weather, and that the radon interferes with radiological airborne monitoring equipment, particularly for transuranic (TRU) material. An accurate measurement of the radon in the environment is necessary to identify the appropriate radiological airborne monitoring equipment to be employed in future efforts.

The drill-blast debris (muck) removal process used in excavating shafts, ramps, and drifts could be a significant source of radon gas emissions. Various drifts off the exploratory shaft are planned, and thus, excavation and mining activities are anticipated.

Another possible source of radon emissions is the shaft ventilation system. The radon released during excavation of the shafts and drifts, along with the radon which diffuses from the drifts will be vented from underground areas to the atmosphere through the shaft ventilation system. In addition, the effective drift wall surface will be increased by the boreholes drilled from the drifts. The shaft sinking and mining activities provide the data needed to assess the radon release rate from tuff during mining and from exposed drift faces. In addition to the release of radon to the environment, the ambient radon concentration in the mine may increase. The monitoring activities planned will support or demonstrate compliance with the monitoring requirement of 30 CFR Part 57.

2.4 Applicable Guidance

The data collected shall also be consistent with the applicable current guidance, such as NRC 50, "Environmental Radiation Measurements;" NRC 58, "A Handbook of Radioactivity Measurement Procedures;" EPA 520/1-80-012, "Upgrading Environmental Radiation Data;" ICRP 47, "Radiation Protection of Workers in Mines;" and others including the Nevada Test Site (NTS) guidance and experience. In addition, the recommendations of SAND83-7131, "NNWSI Preliminary Radiological Monitoring Plan for the Environment" have been considered.

3.0 SITE CHARACTERIZATION ACTIVITIES

Site characterization at Yucca Mountain officially began in May, 1986. This activity is intended to gather the technical data necessary for final site selection, facility design and construction, NEPA documentation, and the completion of license review and approval. The site characterization activities of particular concern in the PSCRMP are excavation and mining activities. The primary activities in these areas are:

1. Drilling.
2. Trenching.
3. Shaft construction, and mining.

Site characterization activities will increase the on and off road vehicle traffic and lead to the creation of additional unpaved roads and pads. The data in the sections that follow are based on the data on site characterization activities available in late July 1986. This data is used in a general manner to estimate monitoring requirements.

3.1 Drilling Activities

There are currently about 150 shallow (less than 100 feet) and about 45 deep boreholes in the Yucca Mountain area. It is estimated that an additional 200 shallow and 25 deep boreholes will be drilled during the site characterization. The boreholes range from 4 to 18 inches in diameter. The boreholes will be used for hydrological and geological characterization. The hydrological characterization includes pumping studies, monitoring (level), and sampling. The geological characterization activities consist of core removal and various types of geological logging. In addition to the surface boreholes, additional boreholes will be drilled in various directions from the underground areas mined during site characterization.

3.2 Trenching Activities

Trenching activities at the site are associated with characterization of various fault structures in the soil. These trenches are typically 12 feet wide, 100 feet long, and 6 to 8 feet deep. It is projected that about a dozen of the existing trenches will be reworked during site characterization, producing about 300 feet of additional trenches.

3.3 Exploratory Shaft Construction and Mining

There are presently 1.8- and 3.7-meter diameter shafts planned for site characterization. One of these shafts will extend down about 400 meters, which is slightly deeper than the projected repository level. The other shaft will extend down about 450 meters, which is slightly below the Calico Hills formation and into unwelded tuff. In addition, more than 4,500 meters

of drift will be mined around these shafts. The drifts will be about 3 to 4 meters wide and about 4 meters high.

4.0 SOURCES OF RADIOACTIVITY

As previously noted, the source of radioactivity during site characterization are the radon in the rock and soil matrix, and radioactive material from previous NTS activities which have been deposited in the surface soils. The radon is released, or its natural release rate is significantly increased, by excavation and mining activities. The deposited radioactive material will be resuspended at a substantially greater rate (White and Dunaweg, 1977) due to road traffic, off-road traffic, construction, and excavation. Neither the radon or the resuspended radioactive particulates are predicted to be present in concentrations that could pose a significant health hazard to workers in the area or the general public.

Radon (Rn-222 and Rn-224) commonly are present in all rocks and soils due to the decay of trace amounts of Uranium and Thorium in these soils. Radon, which is a noble gas, diffuses through soil and rock until it decays in this matrix or reaches the atmosphere. If the radon reaches the atmosphere before it decays, the radioactive daughter products produced by its decay become an airborne radioactive particulate (in a soil or rock matrix these particulates are normally trapped and present no hazard). These particulates, in sufficient concentrations, constitute a significant health hazard. The concentration of radon and its daughter products in the air is measured in Work Levels (a measure of the potential hazard from these airborne particulates). Further information on the unit Working Level can be found in "Nuclear Power and Its Environmental Effects" by Gladstone and Jordan. Activities which change the permeability of the soil or rock matrix, such as excavation, drilling, mining, or blasting, etc. typically increase the radon release rate. The release rate of radon from a matrix is difficult to characterize due to the variability of the permeability of the matrix to radon and the fact that moisture content of the matrix, gas pressure in the matrix, atmospheric pressure and atmospheric pressure history also can affect the release rate.

4.1 Field Studies

The primary release of radon from the field studies is caused by trenching and excavation activities, although deep boreholes may also be a significant contributor to the radon release. The possible resuspension (see White and Dunaweg, 1977 for a discussion of resuspension) of deposited radioactive material could be caused by on and off-road traffic and the preparation of drilling pads. Trenching activities could also lead to a slight increase in resuspension.

4.2 Exploratory Shaft and Mining Activities

The primary release of radon will be due to the contributions of sinking shafts and mining activities. The evolution of radon from the shaft and mine walls will also be a significant contribution. The presence of boreholes in the mine will increase the effective amount of excavation and mine wall surface area, thus further increasing the radon release in the shaft and mine

area. These releases will pass out of the mine through the ventilation system, creating a point release source to the environment. The worker hazard in the mine is also of concern. The muck pile and the mine waste water will also release radon, although in lesser quantities.

The only significant source of resuspension of particulates in the surface soils from mining and shaft sinking would be from pad preparation and traffic.

5.0 RADIOLOGICAL SAMPLING PROGRAM DESCRIPTION

The PSCRMP sampling program consists of two activities, airborne particulate monitoring and radon monitoring. These two activities are addressed separately in the balance of this plan due to their significant differences in scope, purpose, and technique.

Primary responsibility for implementation of this program rests with the Environmental Monitoring-Radiological Task Manager. The primary responsibility for the technical content of the program rests with the T&MSS Senior Health Physicist designated by the Technical Director (TD) and the Administrative Director (AD) of T&MSS Technical Programs Division.

5.1 Airborne Particulate Sampling Program Description

The airborne particulate sampling activity is intended to characterize the suspended and aerosolized radioactive particulates in the general Yucca Mountain work area. Minimal activity in this area appears justified. To characterize suspended and aerosolized radioactive particulates, a representative sample of all the suspended and aerosolized particulates will be obtained. The sample will then be analyzed to determine its radioactive constituents. A low volume fixed filter particulate air sampler with charcoal cartridge will be used to minimize the potential air filter plugging, while requiring minimal change frequency. The lower limitation in flow rate is determined by the required accuracy of the result, the analytical capability of the laboratory facility, and the preference to use currently available off-the-shelf equipment. Samplers with flow rates of 50 to 80 slpm (standard liters per minute) are currently available and will provide sufficient sample size (based on at least 50 percent filtration efficiency for 0.3 micron particles) since quarterly averages are required. The filtration media will require changing at least weekly, but quarterly composites will be analyzed to improve the detection capability of the analyses.

5.2 Radon Monitoring

The radon monitoring activity involves the monitoring of airborne radon and its daughter products. There are currently several methods to monitor radon and each has various advantages and disadvantages as summarized in Table 5-1. (Table 5-1 is based on Table 3-1 of Saari (1984) and various other sources.) A typical radon emission rate from uncontaminated soil averages about $1\text{pCi}/(\text{m}^2\text{S})$ (EPA, 1982, p. 28) producing an average airborne radon concentration of about $0.15\text{pCi}/\text{l}$ (Glasstone, 1980, p. 224). A detection capability level of about $0.2\text{pCi}/\text{l}$ in a one-month sampling period is necessary to detect elevated releases. The samplers or monitors considered for this application can be divided into three basic classes: grab samplers, time integrating samplers, and continuous monitors. The grab samplers are not useful to establish background since they provide data only at the time of the sample, and a measurement of the radon concentration as a function of time is required. The time integrating samplers provide data on

Table 5-1. Instruments and methods for measuring radon and daughters

<u>Instrument/Method</u>	<u>Application</u>	<u>Sensitivity</u>	<u>Approximate Capital Cost</u>	<u>Approximate Unit Cost</u>	<u>Evaluation</u>
Scintillation flask	Grab or radon sampler	0.1 pCi/l	\$2,640	\$500	Not feasible since provides concentration at the time of the sample only.
Track etch ^a	passive time integrating radon monitor	0.2 pCi/l in a month	_____	\$ 50	Sensitivity is marginal.
Passive environmental radon monitor (PERM) [®]	time integrating radon monitor	0.03 pCi/l (in one week)	DNA	DNA	DNA (projected costs above track etch methods).
Continuous Radon Monitor	sample for radon daughters and working level	1 pCi/l and 0.01 WL	\$10,000	\$500	Provides real time data (recommended).
Working level ^b monitor	time integrating radon daughter concentrations	0.0005 WL in a week	\$ 2,625	\$500	Costs above track etch methods
Augment Track etch	time integrating radon monitor with concentrating pump	0.2pCi/l in a week	_____	\$75	Monthly sensitivity improved over normal track etch method. (recommended)
Passive Charcoal Radon sampler	passive time integrating radon monitor (measures only last 3 to 4 days and does measure Rn-220).	0.5 pCi/l in a week	_____	\$12	Maximum integration period is 3 to 4 days so not cost effective or feasible.

^aRegistered trademark of Terradex Corporation.

^bWorking levels should be calculated when miners are present in shaft.

DNA = Data not available.

the average radon concentration for the period of integration. These devices provide the data needed to assess the background radon levels. However, since the monthly time frame obscures cyclic diurnal variations and variations due to meteorological effects and site activities, they will not provide all the needed information. The continuous monitors provide detailed data on the radon concentration as a function of time but they are insensitive and very expensive, thus the number used will be limited.

To provide the necessary information, the most cost effective method would be to use time integrating samplers for most measurements. The augmented track etch system will be used since it provides significantly more accurate data for a small increase in cost. Because of the limited industry experience with the various integrating samplers, two types (one track etch system and one augmented track etch system) will be used for the first 2 to 3 quarters to verify system reproducibility. Then only the augmented track etch system will be used. These samplers will be supplemented with a single Continuous Radon Monitor (CRM). The CRM will provide data on the diurnal radon variation and allow correlations with meteorological data for release from the exploratory shaft. An existing SAIC meteorological station technician may incorporate this activity into his present work schedule at no additional labor cost to the program.

Thus, a basic cost effective strategy will be the use of a single CRM at the primary underground release point (exploratory shaft) and augmented track etch samplers around the projected location of the surface facilities and the shaft (see Table 5-1). This strategy provides continuous emission data from the primary source, while the augmented track etch samplers will provide integrated data on ambient radon levels in the environment. This program not only provides environmental data, but monitors the potential sources of operationally generated radon release above ground. This monitoring provides the data necessary for future activities and for air monitoring equipment selection. The continuous data allows correlation of radon concentrations with work activities (mining) and meteorological data. The CRM would be a capital equipment item and the integrating samplers would be provided as a service by a vendor.

6.0 RADIOLOGICAL MONITORING NETWORK DESCRIPTION

Based on the data from the sampling program and on site activities, the Senior Health Physicist in conjunction with the Environmental Monitoring-Radiological Task Manager may modify the locations specified in this section or other activities related to this sampling. The justification for such modifications must be documented in the PSCRMP Log, which will contain descriptions of monitoring activities.

6.1 Airborne Particulate Sampling Network

Since the PSCRMP is planned to monitor a period of minimal activity to establish baselines, one fixed filter air sampler in the Yucca Mountain area will be initially required. Once the RMP is implemented and site characterization activities increase, additional samplers may be added. Based on the assumption that any existing movement of radionuclide concentrations would be toward the eastern side of Yucca Mountain (from the NTS), the sampler will be on the eastern edge of projected activity to provide a conservative concentration estimate. Based on these assumptions, and to maximize the correlation of resuspension data with the meteorological data, the sampler will be located at the 60-meter meteorological tower location. The data is dependent on wind velocity and direction and on precipitation levels. The sampler will be located at least 1.5 meters above the ground to minimize ground impacts and the sample intake will be horizontal and free of any obstructions which could impact the representativeness of the sample.

6.2 Radon Monitoring Network

The radon monitoring network is intended to measure the baseline and the future changes in the radon levels near the exploratory shaft (see Figure 6-1). The radon monitoring program based on the discussion in Section 5.2 consists of a single continuous radon monitor (CRM) and a number of integrating radon samplers.

Since the primary purpose of the CRM is to measure the release of radon as a result of shaft sinking activities, mining activities, and to allow correlation of the data with the meteorological conditions, the CRM will be located at the shaft exhaust once shaft sinking begins. Prior to this time, the CRM will be used to establish diurnal (if detectable) variation in the radon baseline in the exploratory shaft area (see Figure 6-2) and in the constant radon baseline area (see Figure 6-3), discussed further in the balance of this section. Since only one monitor is available, it will be alternated each month between these two locations. The monthly period is used to correlate with the integrating samplers, which are discussed in the next paragraph.

The integrating samplers will be located typically around the area of interest on a 4 point compass rose. To minimize their impact on site characterization activities, they will be located at least 200 feet from the area of interest. This will also allow reasonable dispersion of the radon

plume. Figure 6-2 shows the positions of the samplers around the exploratory shaft. The inclusion of the extra sampler on the western side of the shaft is due to the two canyons coming down Yucca Mountain towards the shaft. These canyons will serve as channels for gas flow. A constant radon baseline for the Yucca Mountain area, to support exploratory shaft measurement, will be taken in the area surrounding the projected location of the surface facility (see Figure 6-3). A sampler near the 60-meter meteorological tower will allow correlation with meteorological data and provide an existent reference point. The distance between a sampler and the surface facility is about 150 meters (see Figure 6-3). Figure 6-4 shows the 4-point windrose around the muck storage area to monitor radon evolution from the broken tuff. An additional sampler is located west of the mine waste water percolation pond to allow determination of any contributing emissions from this source.

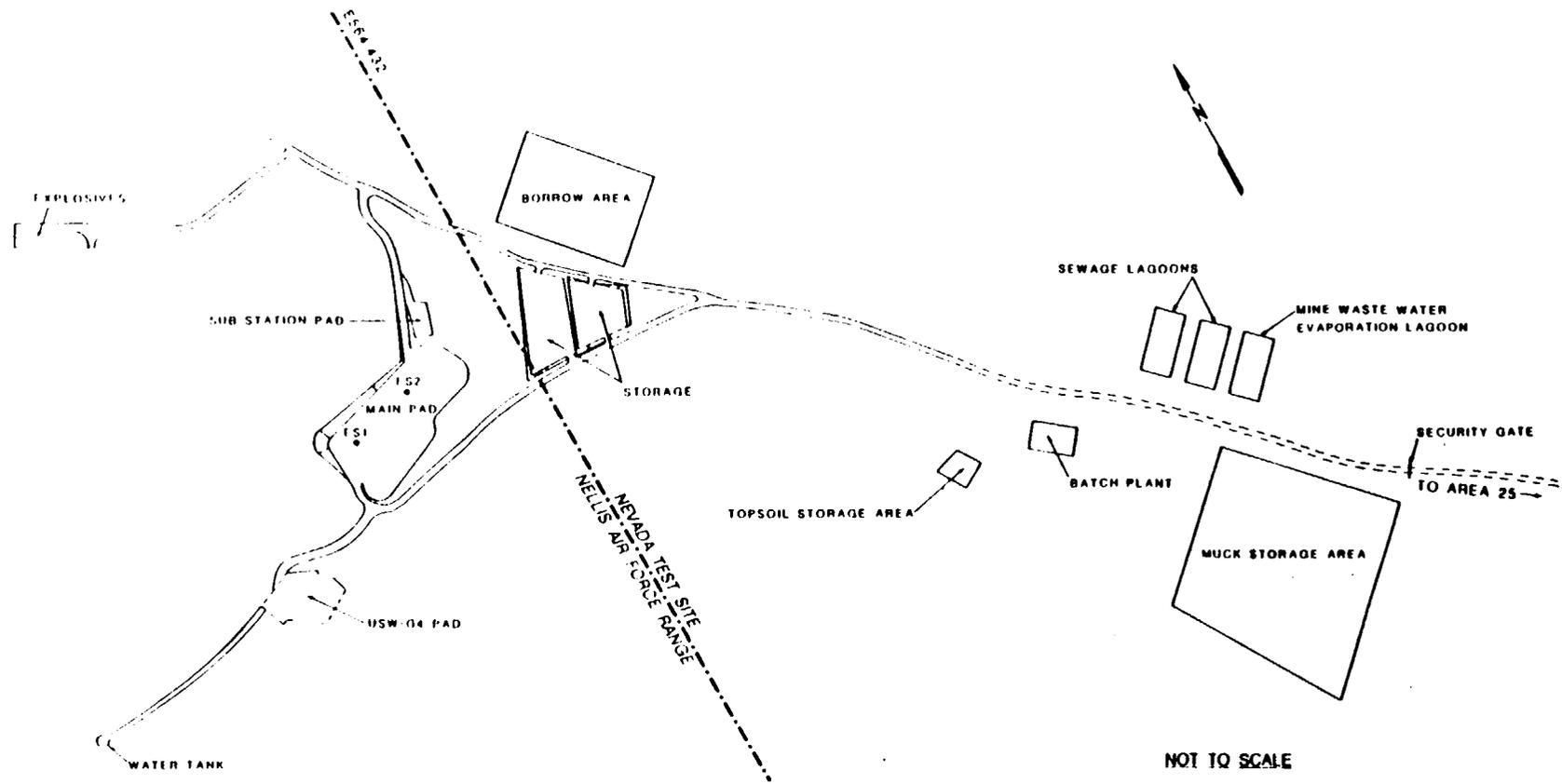
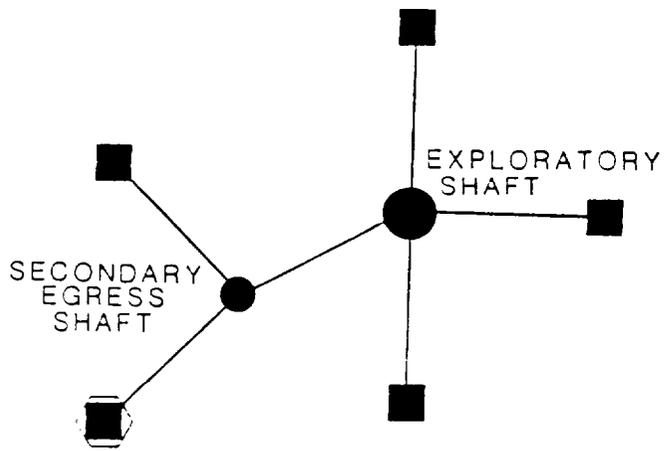


Figure 6-1. Exploratory shaft layout.



LEGEND

- INTEGRATING SAMPLER
- SHAFTS
- ⬡ TEN METER METEOROLOGICAL TOWER

Figure 6-2. Exploratory shaft radon samplers.

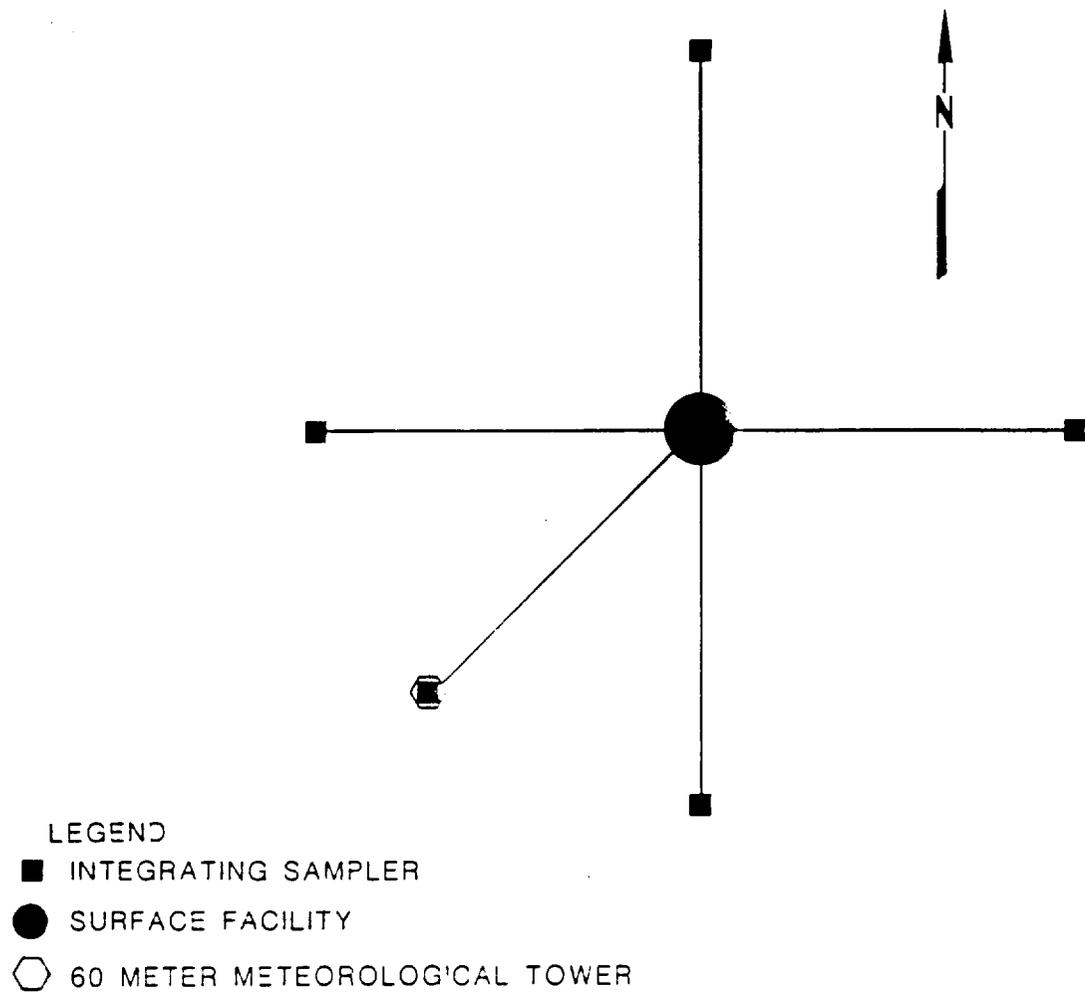


Figure 6-3. Baseline radon samplers

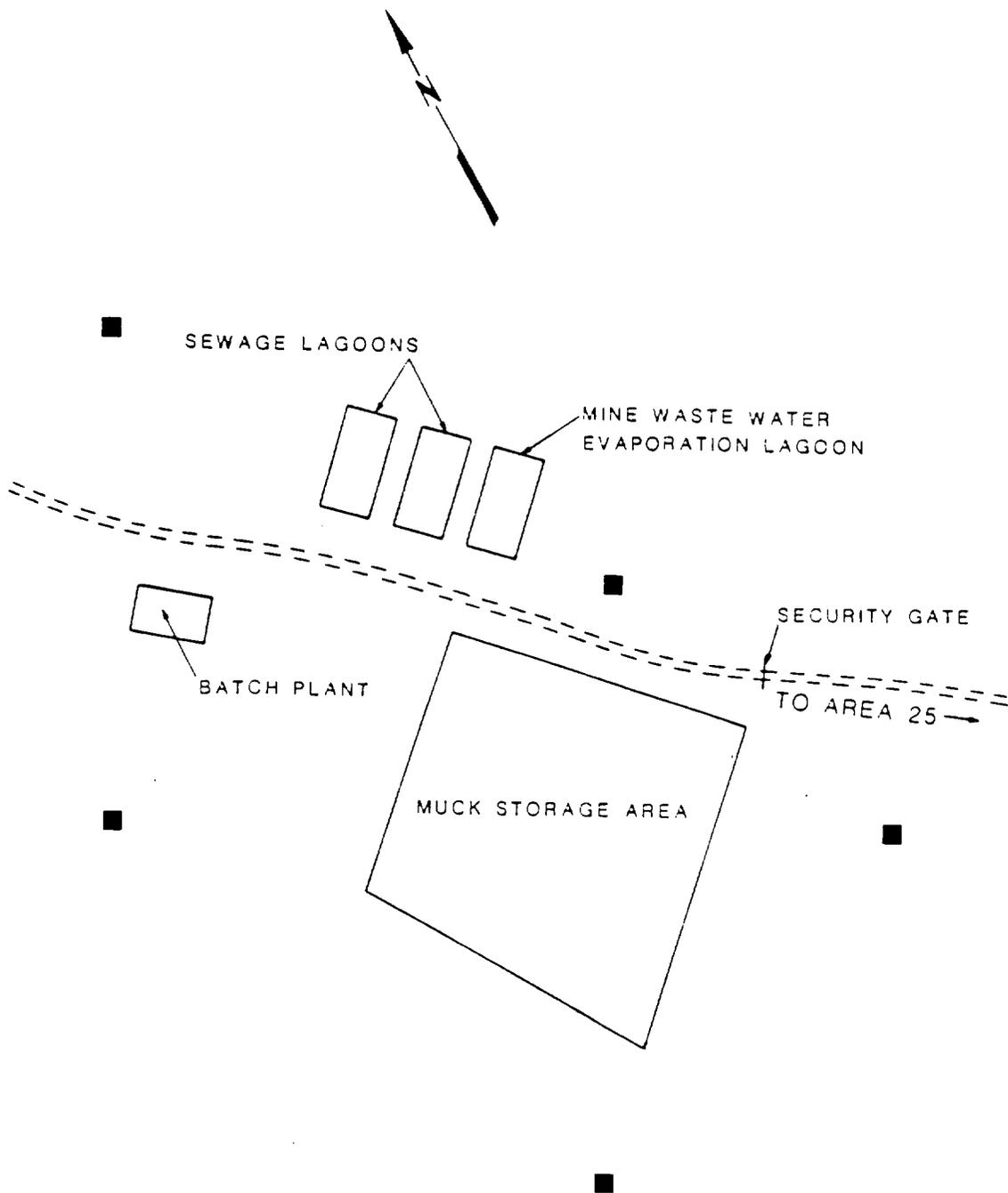


Figure 6-4. Muck storage radon sampler locations.

7.0 RADIOLOGICAL SAMPLING ACTIVITY DESCRIPTION

All activities associated with the collection of data for the PSCRMP will be completed as specified in approved Environmental Radiological Monitoring Technical Procedures (see Appendix A-1). The procedures to be used in this program are described in Appendix A. The descriptions summarize the content of each technical procedure, with the exception of Appendix A-1 which contains the draft guidance for procedure preparation. Detailed controlled procedures will be prepared after the equipment and/or services are procured. These controlled procedures (Environmental Radiological Monitoring Technical Procedures) will be maintained in the T&MSS Environmental Radiological Monitoring Procedure Manual, which will be a controlled document.

The technical specification for the Quality Assurance Level I equipment and services for this program are consistent with the NNWSI QA Program. Off-the-shelf items are Quality Assurance Level III and will be procured as specified in the T&MSS QAPP and applicable supporting procedures. No Quality Assurance Level II procurements are projected, but if such a procurement was required it would be completed as specified in the T&MSS QAPP and appropriate supporting procedures.

All activities associated with implementation of these procedures will be completed by the Task Manager of Environmental Monitoring - Radiological or by personnel specifically trained to complete these activities. Personnel will be trained by the T&MSS Senior Health Physicist designated by the Director of the Technical Program Division. The training shall be documented in writing, in the employee's personnel file, in accordance with T&MSS QAPP and applicable supporting procedures, and in the Environmental Radiological Monitoring file maintained by the Environmental Monitoring-Radiological Task Manager. The content of the training program will be documented in writing after receipt of the monitoring equipment by the Senior Health Physicist. The training will include both theoretical training and practical application of the procedures. The criteria for establishing successful completion of the training will be included in the documentation of the training program.

7.1 Airborne Radioactive Particulate Monitoring

The Airborne Radioactive Particulate Monitoring program will consist of a continuous sampling of airborne particulates at the 60-meter meteorological tower near the proposed surface facilities location, and will be performed for a period of one year. The air samples will be taken on filtration media and charcoal cartridge using a continuous low-volume sampling system (air sampler), which consists of a filter holder attached to a flow regulated vacuum pump (see Appendix B-3). The samples will be taken at a flow rate of 40 to 50 standard liters per minute (slpm) using Whatman 41 or a similar filtration media (see Appendix B-3). Samples will be taken about 1.5 meters above ground level. A one-year period of monitoring will include seasonal meteorological variations that may influence concentrations of radioactive particulates in the atmosphere. The sampling filters shall be changed weekly to reduce the possibility of filter plugging.

The flow rate identified above is within the operating range of existing, off-the-shelf low-volume air samplers. The filter media was selected to ensure collection of a significant fraction of the particulates of interest and facilitate the isotopic analyses, which may involve dissolution of the filters. The air samples will be analyzed to determine the concentration of radionuclides collected from the air. The analysis will consist of gross alpha and beta counts, a gamma spectral analysis for each filter media and charcoal cartridge, and a quarterly composite analysis for Pu-239 (Pu-240), Am-241, and Sr-90 (Sr-89) of the filter media.

The air sampler will be procured in accordance with the T&MSS QAPP and applicable supporting procedures (QP 7.1) using the technical specification in Appendix B-13. Receipt inspection will follow the Environmental Radiological Monitoring Procedure, "Receipt Inspection of Continuous Low-Volume Air Samplers," (TP-ER-006) (Appendix A-6) based on the QP 10.1. Copies of the receipt inspection report will be sent to the Project Administrator of the T&MSS Finance and Administration Division, T&MSS QA Project File 3.5.3.15, and the Environmental Monitoring-Radiological Task Manager. The original report shall be sent to Quality Assurance Records Coordinator as a QA record.

The air sampler will be installed and operability verified as specified in procedure TP-ER-007 (Appendix A-7). The operation and accuracy verification-calibration of the air sampler is specified in procedure TP-ER-007 (Appendix A-7). The air filtration media will be:

1. Exchanged on a weekly basis.
2. Removed from NTS and transferred to the T&MSS office in Las Vegas.
3. Stored until a complete quarterly sample is obtained in the T&MSS office in Las Vegas.
4. Shipped to the analytical laboratory.

as specified in TP-ER-007 (Appendix A-7).

The services of a radiological analytical laboratory, to complete the analyses specified above, will be procured in accordance with the requirements of the T&MSS QAPP and applicable supporting procedures (QP 7.1) using the specification in Appendix B-4. This lab is projected to be the U.S. EPA Nuclear Radiation Assessment Division (NRAD) in Las Vegas, Nevada. The data received from the analytical laboratory will be documented as specified in TP-ER-008.

The laboratory selected for sample analysis shall participate in the Environmental Radioactivity Laboratory Intercomparison Studies Program (Jarvis and Siv, 1981) operated by the EPA in Las Vegas. This has been required by the NRC at reactor facilities. Participation in the EPA intercomparison should include both Air Filter Studies and Water Studies for gross alpha, beta, gamma, plutonium-239, strontium-89, strontium-90, and mixed alpha, beta, and gamma. The laboratory shall utilize procedures acceptable to the DOE and the NRC such as those in HASL-1300 (Harley, 1972), and NRC Regulatory Guide 4.6. In addition the laboratory shall have a

Quality Assurance Program consistent with the T&MSS QAPP and applicable procedures. This shall include the provisions of applicable documentation by the laboratory to verify compliance with these requirements. In order to ensure the accuracy of the results, blank samples (no significant activity) and/or spiked samples (samples containing a known amount of activity) will be submitted with the samples sent for analysis. The NRC traceable spiked samples will be obtained from the EPA laboratory mentioned above or an existing DOE contractor. The spiked and blank sample shall be prepared and handled as specified in TP-ER-009 (Appendix A-9).

7.2 Continuous Radon Monitor

The Continuous Radon Monitor will be used to monitor radon emission from the exploratory shaft, once shaft sinking activities are initiated. Until that time, the one CRM will be located at the 60-meter tower near the proposed surface facility location, or at the 10-meter tower, near the exploratory shaft, on alternating months.

The CRM shall be purchased in accordance with the T&MSS QAPP and applicable supporting procedure (QP 7.1) using the technical specifications in Appendix B-2. The receipt inspection and acceptance test shall be completed as specified in procedure TP-ER-003 (Appendix A-3).

The CRM shall be installed and operated as specified in procedures TP-ER-004 (Appendix A-4) and TP-ER-005 (Appendix A-5). Monthly accuracy verification of the radon monitor shall be completed as specified in procedure TP-ER-005 (Appendix A-5). In addition, the CRM will be calibrated yearly by the vendor or another qualified calibration facility. All calibration and accuracy verification shall be traceable to the National Bureau of Standards (NBS) or other appropriate standards.

7.3 Integrating Radon Sampler

An Augmented Track Etch Radon sampler service will be procured in accordance with the T&MSS QAPP and applicable supporting procedures (QP 7.1) using the technical specifications in Appendix B-1. The samplers will be installed in the locations shown in Figures 6-2, 6-3, and 6-4. The receipt, operation, exchange and shipment of samplers shall be as specified in procedure TP-ER-002 (Appendix A-2). The initial installation of the samplers shall be performed as specified in TP-ER-012 (Appendix A-12).

As specified in TP-ER-002 (Appendix A-2) and TP-ER-010 (Appendix A-10), blank and spiked samples will be prepared, and returned with the samples to provide verification of the quality of the data.

8.0 DATA REPORTING AND MILESTONES

The data generated during the PSCRMP will be reviewed and documented as per TP-ER-008 (see Appendix A-8) sixty days after implementation of the Radiological Monitoring Plan or by February 28 of each year, results of the PSCRMP will be documented in an NNWSI report. Data reports are based on calendar year data summaries. This report will not only document the baseline data, but it will also indicate projections on the radon release rate for tuff. The report will further document the potential radiological onsite and offsite radiological impacts of site characterization. The impacts will be assessed using currently available data and the computer programs MILDOS (Gnugnoli, 1980), RAECOM (Rogers, Nielson, and Kalfwarf, 1984) and AIRDOS-EPA (Moore, et al., 1979). Distribution of the document shall include T&MSS Project Files, T&MSS QA records, and T&MSS QA. It should be noted that all samples are destroyed when analyzed with the exception of the integrating samples (track etch material), which remains the property of the vendor. Thus, no onsite archiving is required for the samples. The vendor for the integrating samplers will archive the samples for at least 5 years.

A report containing the data summary will be issued February 28, 1988 based on the CY 87 and CY 87 data. The program will be implemented on or before January 1, 1987.

9.0 QUALITY ASSURANCE PROGRAM AND QUALITY CONTROL

The activities of the Preliminary Site Characterization Radiological Monitoring Program will be conducted in full compliance with regulatory requirements, guidelines, and applicable parts of the T&MSS Quality Assurance Program Plan (QAPP). The primary activities implemented by this plan are QA Level I activities as contained in the Quality Assurance Level Assignment Sheets (QALAs) for WBS 1.2.3.1.2.T. These activities are to be implemented as applicable in accordance with the T&MSS QAPP and supporting procedures as indicated in the QALAs for WBS 1.2.3.1.2.T for Environmental-Radiological activities. The T&MSS QAPP and supporting procedures will be supplemented by Environmental-Radiological approved technical procedures and instructions and a comprehensive quality control program implemented by the Environmental Radiological Monitoring Team as defined in Section 1.3 of this plan.

All procurement shall be made in a manner consistent with the QAPP and applicable supporting documents (e.g., QP 4.1). Receipt and acceptance test procedures will be based on the procurement specifications.

The accuracy of monitoring instrumentation will be routinely confirmed using standard accuracy verifications and/or approved calibration procedures. Accuracy verification is similar to calibration except it uses a comparison to a traceable single rather than the minimum of 3 points required for a calibration. All accuracy verification and calibration, test, inspection, and audit activities will be fully documented. Analyses of results will be performed on a regular basis by the Senior Health Physicist and specially trained professionals or technicians. Verification of equipment performance using traceable accuracy verification and/or calibration will be performed on a quarterly basis to ensure responsiveness to regulatory requirements. When traceable accuracy verification, rather than calibration, is used, yearly calibration by an independent agency is required. All measurement-monitoring equipment will be calibrated (at least 3 point calibration) at least yearly. All accuracy verification and calibration shall be traceable to NBS or appropriate established standards. All activities of the program shall be designed to ensure overall data accuracy, accountability, traceability, and repeatability.

T&MSS Quality Assurance ensures by audit, surveillance, and monitoring activities that applicable QA activities are performed in accordance with the T&MSS QAPP and supporting procedures as well as supplementary procedures-instructions.

The activities of the Preliminary Site Characterization Radiological Monitoring Program are also subject to the NNWSI QA Program activities of audit and surveillance.

9.1 Field Quality Control Activities

The field activities organization is illustrated by Figure 9-1. The Task Manager provides administrative control for all activities. The Senior

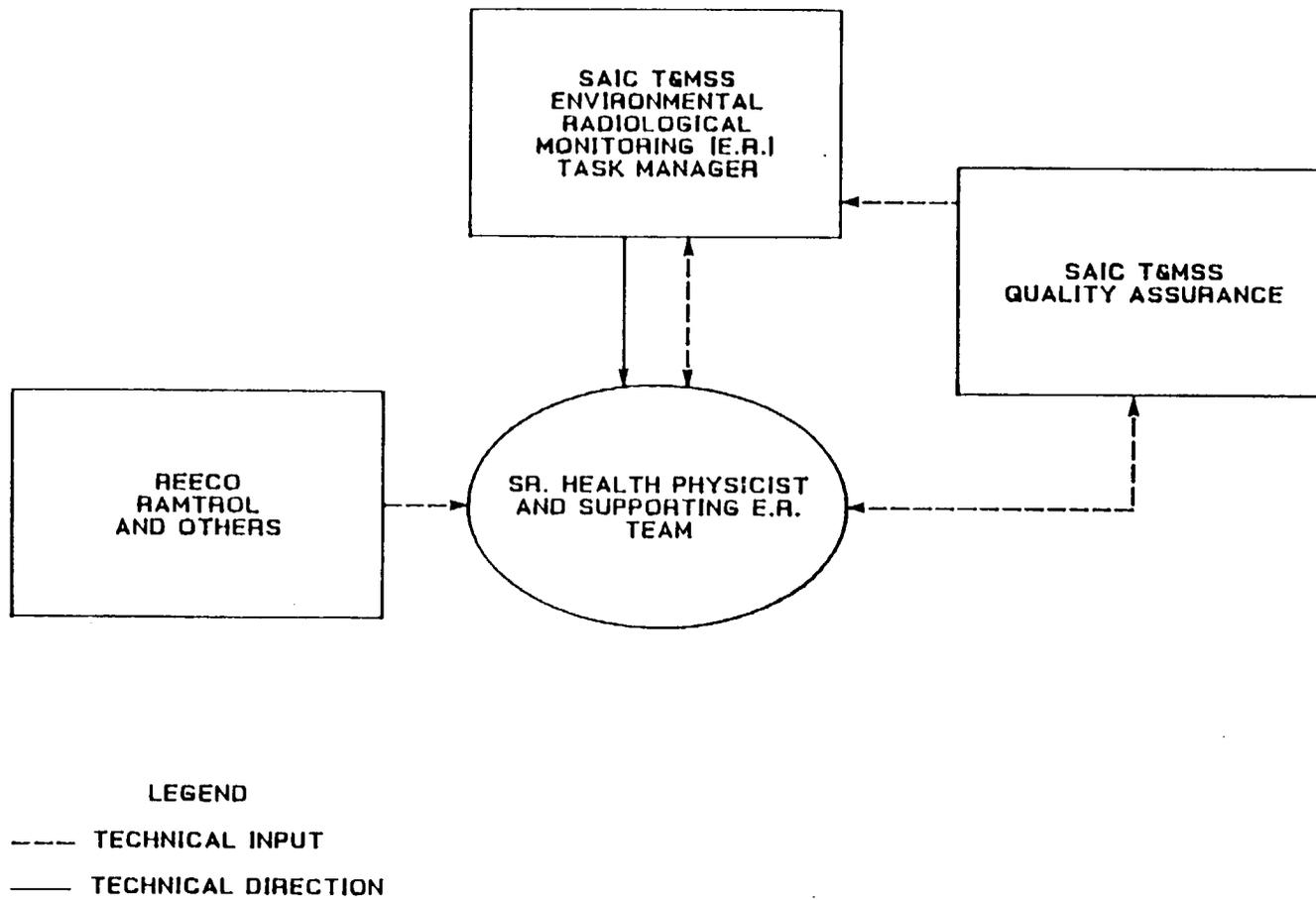


Figure 9-1. Field operations organization.

Health Physicist provides technical direction to the Environmental-Radiological (ER) Team, who completes these activities. T&MSS Quality Assurance verifies completion of hold points as specified in the Environmental Radiological Monitoring Technical Procedures (see Appendix A). RAMTROL provides the following:

1. Control of all radioactive material used on the NTS site.
2. Control of the radiological release of any property removed from NTS.
3. Storage and management of radioactive sources used in calibration.

The persons authenticating records for this activity based on the general organization illustrated in Figure 1.2 will be documented on the form shown in Figure 9-2. In addition, this form indicates that type of training received by personnel. A unique number will be placed in the upper right corner for identification of this copy. Copies of this form, or any revisions to this completed form, will be transmitted by the Task Manager to the Document Control Specialist (DCS), the TD, the AD, Senior Health Physicist, T&MSS Project Files, T&MSS QA Project Records, and T&MSS QA. The date, if determined, on which such authorization ends will be indicated in the "Date Deleted" column. The DCS will distribute copies of the form, or the revisions to these forms, to all holders of the Environmental Radiological Monitoring Procedure Manual for inclusion in its first Appendix A-1, the DCS shall recover superceded copies of this form from the document holders.

9.1.1 Equipment and Integrating Samplers (IS) Receipt, Inspection, Acceptance Testing, and Installation

Integrating samplers received as part of a radiation measurement service will be received and handled, as indicated in Environmental Radiological Monitoring Technical Procedures by the Senior Health Physics professionals or specifically trained personnel (ER Team). Documentation of the receipt of these dosimeters will be on data sheets specifically described in a detailed operational procedure (Appendix A). The initial quality control tasks include an inventory, a thorough inspection upon receipt, and acceptance testing of all equipment prior to installation. A form similar to that shown in Figure 9-3 will be used to prepare the inventory. This checklist includes equipment serial numbers, condition, and the presence of manufacturer's manuals and comments. The trained technician or professional Health Physicist will also inventory all spare parts on a project-specific equivalent of the form shown in Figure 9-4. The status of all project equipment shall be maintained utilizing a project-modified form similar to that which is shown in Figure 9-5. Project-specific versions of the forms presented in Figures 9-3 through 9-5, which have been used in previous T&MSS monitoring programs, will be developed on approval of this PSCRMP.

Equipment inspection will be performed by the trained technician or Health Physics professional according to Environmental Radiological Monitoring Technical Procedures. This individual's comments will appear on the Inventory Checklist. Acceptance testing will be conducted according to

SUBJECT:		FORM:	PAGE OF			
APPROVAL:		REVISION NO.:	DATE:			
INVENTORY OF AIR MONITORING STATION EQUIPMENT Date: _____ By: _____	Item/Name	Model	Ser. #	Book	Condition	Comments

SAMPLE

Figure 9-3. Example inventory preparation form.

SUBJECT:		FORM:	PAGE OF
APPROVAL:		REVISION NO.:	DATE:
SPARE PARTS INVENTORY Date: _____ By: _____	Part		
	Instrument		
	Mfr.		
	Part No.	SAMPLE	
	Other Description		
	#		
	Comments		

Figure 9-4. Example spare parts inventory form.

SUBJECT:	FORM:	PAGE OF
APPROVAL:	REVISION NO.:	DATE:

INSTRUMENT RECORD

System _____ Location _____

Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____
Model No. _____	Ser. No. _____	Type _____

Rec'd by _____ At Location _____

Date Installed _____ By _____ In Service _____

Service Interval _____ Calibration Interval _____

Calibration Responsibility _____

Service Responsibility _____

Checking Interval _____ Responsibility _____

Comments:

Figure 9-5. Example instrument record form.

approved procedures. Any nonconforming condition shall be documented in accordance with the T&MSS QA Program.

The installation of each piece of monitoring equipment will be performed after the equipment is inventoried, inspected, and acceptance tested. Installation, onsite tests, and related activities will be performed in accordance with approved operating procedures. These activities will be thoroughly documented in the PSCRMP and equipment logs, and on other required forms as specified in the applicable Environmental Radiological Monitoring Technical Procedures. Distribution of the documentation is addressed in the applicable procedures.

9.1.2 Calibrations and Precision Assessment

All instrumentation calibrations must be traceable to a National Bureau of Standards (NBS) or other acceptable standard. The standard actually used in this calibration shall be a primary or secondary standard. If the instrumentation requires adjustment during calibration both pre- and post-calibration data shall be documented. If the calibration occurs at other than the installed location, verification of the accuracy of the equipment is required after it is installed.

The particulate air sampler shall use a flow controlled vacuum system to draw 40 to 60 slpm through a Whatman 41 (or equivalent filter). The flow control shall be designed to maintain a constant flow rate (+ 20 percent) through the filter, with two filters rather than one installed in the filter holder verified as per TP-ER-006 (Appendix A-6). The filter media shall have a filtration efficiency of at least 65 percent for 0.3 micron polydisperse dioctyl pathalate (DOP) when challenged at a face velocity of 27 cm/sec. The filter media shall be based on manufacturer-supplied information or technical publications rather than actual tests.

The particulate air samples will be sent to an offsite laboratory on a quarterly basis. The laboratory shall use appropriate standards and procedures to ensure the quality of their analysis and its traceability to NBS or other appropriate established standards. The laboratory must participate in the intercomparison studies run by the EPA as part of the drinking water quality program (Jarvis) as well as any other appropriate NRC intercompany programs. The lab used will be selected based on its performance in these and other intercomparison programs. In addition, the Senior Health Physicist will submit blind, blank and/or spiked samples for analysis with the actual samples. The spikes and blanks will be used to assess the accuracy of the results in conjunction with the data reported by the laboratory.

The integrating samplers shall be capable of detecting a radon concentration of 0.1+ (0.05 + 10%) pCi/l in a period of one week. In addition, the Senior Health Physicist will arrange for a blind blank or spiked samples to be returned for analysis at the same time as the integrating samplers used in the field are returned for analysis. Blanks will be made by sealing the dosimeter in a container for the monitoring period or by not operating the air sampler in the integrating sampler. Spikes will be made by having the dosimeter exposed to a known concentration of radon (in equilibrium with its

daughters) for a specified time by the Office of Radiation Programs, EPA, Las Vegas, Nevada.

The CRM shall be capable of detecting concentrations of 1.0pCi/l at equilibrium. The detector accuracy will be checked monthly using an NBS traceable or other approved standard. The instrument will be calibrated at least yearly by a vendor and the accuracy of the detector verified whenever the monitor is moved. The flow rate meter will be calibrated annually by the vendor; no accuracy check is required for the flow meter due to the type of meter (rotometer) and the insensitivity of the CRMs accuracy to flow rate.

9.1.3 Maintenance and Spare Parts

To provide continued proper operation of the monitoring systems, T&MSS will implement a scheduled maintenance program utilizing written, approved operating procedures. The activities performed in this maintenance program include, but are not limited to, the following:

1. Weekly cleaning of the magnetic tape recording heads if any.
2. Semi-annual lubrication and/or replacement of moving parts as per applicable procedures.
3. Weekly checking of all sensor cables, tie-downs, power cords, etc.
4. Weekly inspection of all sensors for proper operation.
5. Weekly inspection of all digital and strip chart recorders for data reasonableness and proper timekeeping.

In addition to the project maintenance schedule, maintenance instructions and schedules in manufacturers' manuals will be followed for each instrument. The recommended maintenance schedules may be modified based on the operational experience gained in the initial period of monitoring.

9.2 Data Handling Activities

9.2.1 Data Transmittal and Screening

To help ensure maximum data recovery, the technician or Health Physics professional will deliver all data collected onsite to the Senior Health Physicist or his designee located at the T&MSS NNWSI Project facilities in Las Vegas, Nevada, on a weekly basis. Upon receipt, the data will be inspected by the T&MSS NNWSI Project Health Physics staff for errors or suspected errors in transmittal, recording, or documentation. Any errors thus noted will be brought to the immediate attention of the Senior Health Physicist who, in turn, will notify the individuals involved to correct the errors and document the problem as specified in TP-ER-008 (Appendix A-8). The Senior Health Physicist shall assure that the QP 15.1 on nonconformances is complied with. The digital data tapes, if any, will be immediately transcribed onto a permanent file in the computer (VAX) system. The digital

data file will then be subjected to a screening process that identifies anomalies, and such data will be investigated and anomalies resolved, per TP-ER-008 (Appendix A-8). Nonconformances and corrective actions will be handled in accordance with the T&MSS QAPP and applicable supporting procedures and written instructions.

9.2.2 Data Summarization and Formatting

After the data has been verified using the procedures described in the previous section, the data will be summarized for inclusion in an annual report.

9.2.3 Laboratory Reports

Data reported by the laboratories will be transmitted to the Senior Health Physicist. The Senior Health Physicist shall, per TP-ER-008 (Appendix A-8), then:

1. Transmit copies of the data to the Project files, T&MSS Quality Assurance, the Quality Assurance Records Coordinator, and the Environmental Programs Manager (for storage in a fireproof file or dual storage).
2. Review the data for completeness and reasonableness (this includes documentation of any findings and their resolution).
3. Compare the reported data to information on the activity present on the spiked or blank sample analyzed at the same time. Take appropriate action and document the steps taken to resolve any unacceptable variations in accuracy, if necessary (all results are reported as a mean value plus or minus the statistical uncertainty at the 95 percent confidence level). The Senior Health Physicist shall assure initiation of appropriate nonconformance reports, as specified in the T&MSS QAPP and applicable supporting procedures.

9.2.4 Internally Generated Data

Data from the continuous radon monitor and flow rate data for air samplers are examples of internally generated data for the PSCRMP. Internally generated data will be reviewed by the Senior Health Physicist for reasonableness, completeness, and accuracy. Resolution of any questions shall be documented and attached with the data, per TP-ER-008 (Appendix A-8). The Senior Health Physicist will then transmit copies of the data to the Project files, T&MSS Quality Assurance, Quality Assurance Project Records, and the Environmental Programs Manager, as well as initiate any nonconformance reports if required by QAPP and applicable supporting procedures.

9.3 Independent System and Performance Audits

Certain QA activities that will be carried out under the PSCRMP are defined differently than those for the overall NNWSI Project QA programs. The following definitions apply to this monitoring plan:

- o System Audits encompass all aspects of the monitoring program, i.e., sampler siting, data handling activities, calibration techniques, and schedules (maintenance schedules, etc.).
- o Performance Audits involve verifying the accuracy of monitoring equipment.

Within 60 days after monitoring stations become operational (or at the time that the station becomes operational, if required by applicable procedures), and on a semi-annual basis thereafter, a system audit of the monitoring, installation, and operational activities will be conducted, in addition to the verification required in specific procedures. The system audit will include a critical review of the monitoring stations to determine compliance applicable to specific procedures and this plan. This review will also include an investigation of the onsite data handling and transmittal activities, the schedule of calibration activities, and other functions in accordance with the T&MSS QAPP, supporting procedures, and supplemental written instructions. All nonconformances identified in any system audit will be recorded in an audit report and the deficient activity will be corrected. The resolution of the nonconformance will also be documented in the permanent Project file as per T&MSS QP 15.1.

An Audit Plan that outlines the schedules for system and performance audits, as well as the procedures to be used during these audits, will be developed as soon as this proposed monitoring program has been approved.

T&MSS QA staff shall monitor the internal data handling and analysis activities and will assure that nonconformances are identified and handled per QP 15.1. As required by the EPA regulations (U.S. Environmental Protection Agency, 1980), T&MSS participates in the EPA National Performance Audit Program.

10.0 COSTS

The costs associated with implementation of this program are summarized below. The personnel costs are associated with existing staff. These costs are based on implementation of the Radiological Monitoring Plan by October 1987 at which time this plan is terminated.

Table 10-1. Activity costs

Item	Manhours ^a			Direct Cost	
	Prof.	Tech.	QA	Expense	Capital
Preparation of PSCRMP	150 ^b	-	8 ^b		
Preparation of Associate Procedures and Documents	150 ^b	-	20		
Procurement of Integrating Radon Monitoring Service	30 ^b	-	20	\$12K-16K	
Procurement of Continuous Radon Monitor	30 ^b	-	4		\$8K-10K
Particulate Air Sampling and Analysis ^c	40	40	32	\$ 4K	
Radon Integrating Monitoring	80	80	32		
Continuous Radon Monitoring	80	80	32		
Preparation of Data Report	120	-	4		
TOTAL	680	200	152	\$16K-20K	\$8K-10K

^a Existing T&MSS staff.

^b Completed primarily in FY 86.

^c NRAD EPA/LV, work activity completed through and existing interagency agreements.

11.0 REFERENCES

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APPENDIX A

APPLICABLE
ENVIRONMENTAL RADIOLOGICAL MONITORING
PROCEDURES

A-1. TI-ER-001: Preparation of Environmental Radiological Monitoring Technical Procedures Draft

I. PURPOSE/SCOPE

This instruction describes the use, preparation, review, and control of Environmental Radiological Monitoring (ER) Technical Procedures (TP). ERTPs are written to provide a documented and reproducible series of steps for completing data gathering related activities for which SAIC Technical and Management Support Service (T&MSS) is responsible. These ERTPs shall be consistent with the NNWSI Project Quality Assurance Plan (QAP), T&MSS Quality Assurance Program Plan (QAPP) and supporting documents, and the Radiological Monitoring Plan (RMP). All data gathering related activities are specified in the RMP or its predecessor, the Preliminary Site Characterization Radiological Monitoring Plan (PSCMP), and are conducted by or for T&MSS.

II. APPLICABILITY

This instruction applies to all Environmental Radiological Monitoring Technical Procedures prepared by SAIC T&MSS.

III. DEFINITIONS

Approval:

The authorization to implement ERTPs, including revisions, when final approval is obtained.

Issuance:

The distribution of approved controlled copies of ERTPs, including revisions, for use.

Review:

The documented review of a ERTTP to determine the adequacy of the procedures and compliance with existing NNWSI Project procedures, T&MSS QAPP and supporting documents, and other applicable procedures, to provide a basis for approval.

Preparer:

The individual responsible for preparation of the ERTTP.

Senior Health Physicist(T&MSS):

A senior professional health physicist, designated by the T&MSS Technical Programs Division Technical Director and Administrative Director is responsible for the technical content of the ERTTPs.

IV. RESPONSIBILITY

Technical Director (TD) and Administrative Director (AD) of the Technical Programs Division.

The Technical Programs Division TD and AD shall review and approve all ERTPs, including revisions, prepared in accordance with this instruction.

Configuration Management Branch

Configuration Management Branch is responsible for the issuance and control of all Environmental Radiological Monitoring Technical Procedures (ER Technical Procedures) and retrieval of suspended revisions.

Task Manager of Environmental Monitoring-Radiological (Task Manager)

The Task Manager of Environmental Monitoring-Radiological or his designee is responsible for origination, review, and implementation of ERTPs. In addition, the Task Manager designates the recipients of controlled copies of the "Environmental Radiological Monitoring Procedure Manual" in accordance with NNWSI AP 1.5, "Issuance and Maintenance of Controlled Documents."

T&MSS Personnel

T&MSS personnel designated by the Task Manager, the TD, or AD, shall review the procedure.

Quality Assurance

Quality Assurance (QA) personnel are responsible for conducting audits and surveillances to ensure implementation of ER Technical Procedures per QP 18.1, "Audits", 10.1, "Inspections", and 10.2, "Surveillance". QA verifies the completion of activities specifically identified as "Hold Points" in these procedures. QA also reviews and approves all procedures, including changes prior to final approval for implementation.

Health Physics Division of DOE/NV

The Health Physics Division of DOE/NV is responsible for review of these ERTPs, developed pursuant to this instruction, including changes, for consistency with and impact on other NTS activities.

Senior Health Physicist

The Senior Health Physicist (T&MSS) (Sr HP) or his designee (Health Physics designee) is responsible for the technical content of ERTPs in accordance with QP 5.1, "Instructions, Procedures, and Drawings", and this instruction. The designee may not be specifically called out but may perform the function of the Sr HP in procedure development if designated by the Sr HP. The Sr HP is responsible for training and documenting the training of personnel implementing ERTPs, and designating in writing the health physics designee.

Environmental, Licensing and Transportation Branches

The Environmental, Licensing, and Transportation Branches of the T&MSS Technical Programs Division are responsible for review of ERTPs including changes.

V. MATERIALS

NOTE

Typically forms are not listed in the "MATERIALS" section but are included in this instruction only to provide an example of the section format.

- o Form T-AD-035 First page (approval page) of Environmental Radiological Monitoring Technical Procedure (Figure A.1-1)
- (1 copy) -
- o Form T-AD-035 Second and subsequent pages of the Environmental Radiological Monitoring Technical Procedure (Figure A.1-2)
- (copies as needed) -
- o Form T-QA-066 Document Review Comment Sheet (Figure A.1-3)
- (copies as needed) -
- o Form T-QA-066 Document Review Comment Continuation Sheet (Figure A.1-4) - (copies as needed) -

VI. PROCEDURE

This section contains detailed steps for the following activities:

- o Subsection A describes the basic format and content of ERTPs.
- o Subsection B describes the format of the "Procedure" section of ER Technical Procedures.
- o Subsection C describes the forms, control system, and numbering system for ER Technical Procedures.
- o Subsection D describes the review and approval cycle for ER Technical Procedures.

A. Basic Format

The procedures issued as Environmental Radiological Monitoring Technical Procedures shall be issued in the format illustrated in this instruction. Only "Section VI" may have additional internal subsections, with the exception of the numbering of the forms (e.g., Figures A.1-1 to A.1-4) in Section VIII "Forms". All of the sections (I to VIII) shall be left justified, except for lists of items as shown in Section V, VI, VII and VIII (indented 5 spaces), and the subsections of Section VI.

B. Structure of Section VI - Procedure

At the discretion of the preparer this section may contain a preliminary descriptive paragraph, if it is useful to clarify information. The beginning of this section shall provide a description of each subsection. This description will be in the form of a list, as illustrated at the beginning of this section, and shall be indented 5 spaces as noted above. The subsections are to be titled to describe the activity addressed in each of the subsections and are to be identified by upper case alphabetic identifiers (i.e., A,B,C,...). Subsections are to be indented 10 spaces from the left margin.

Each subsection is to contain that information required to implement an activity, and if necessary a number (i.e., 1,2,3,...) is to identify each successive step. Each step is to be indented 20 spaces from the left margin and contain a complete, single, action-type instruction. Lists of items within the steps (see step VI.D.11 for an example) are to be enumerated through the use of lower case alphabetic identifiers (i.e., a,b,c,...) and no further substructure is allowed. These lists are to be indented 25 spaces from the left margin. Any step involving action requiring completion of a data sheet or checklist is to be underlined. Steps involving decisions where transfer to other steps or activities (subsection) occur is to be enclosed in a rectangle. When steps occur to which a transfer is made and/or when a step is the first line on a page the section uppercase alphabetic identifier and a period is to precede the step number (e.g., B.7). The step number in such a case is to remain in its normal location on the page and the alphabetic identifier is to be moved to the left of the step numbers. (See Section VI-D for example.)

NOTE:

Typist should assure internal consistency in typing this document, however, a plus or minus 2 space actual variation is acceptable.

Enumerations (i.e., a.,b.,c....) are to never appear at the beginning of a page. Steps requiring verification by other parties (e.g., Quality Assurance personnel) are to be preceded by the word "Hold Point" after the step. "Hold Points" are to be centered on the procedure form. The only steps preceded by the "Hold Point" are to be completed until the required verification is completed and documented.

Three types of information inserts may be placed between steps. These are "Notes," "Cautions," and "Warnings." Notes are informational in nature and may be located before or after the step to which it applies. A Note is to be preceded by the word "Note" centered on the procedure form. The text of the "Note" is to be left justified and it is to be followed by two or more carriage returns. Cautions are intended to make the user aware of the possibility of potential safety hazards, equipment damage, data loss, or similar situations. The format of a Caution is the same as a Note except it always precedes the step to which it applies. A Warning is intended to make the user aware of an unusual potential safety hazard or a hazard that is likely to lead to physical impairment, radiation overexposure, or

death. Warnings have the same format as "Notes" except they always precede the step to which they apply and are underlined. The use of Warnings is to be minimized to assure its impact when used. "Notes," "Cautions," and "Warnings" may be used anywhere in an Environmental Radiological Monitoring Technical Procedure, but are typically associated with the steps in Section VI.

C. System Procedure Controls

All Environmental Radiological Monitoring Technical Procedures are to be issued on Forms VII-1 and VII-2 as shown in the "Forms" section of this procedure. The Task Manager is to assign a unique 3-digit identifier to each ERTTP. The procedure is to be identified by "TP-ER-" followed by the 3-digit identifier. The initial issuance of a procedure will be designated "Rev. 0" with future revisions identified sequentially ("i.e., Rev. 1, Rev. 2, etc."). Revised parts of the procedure will be identified by a vertical bar in the outer margin (right hand side of the page) with the revision number of the change to the outside of the bar. All approved ERTTPs, including changes, are to be issued by the T&MSS Document Control Specialist (DCS) and placed by the recipient in controlled copies of the "Environmental Radiological Monitoring Procedure Manual." The Task Manager of the Environmental Monitoring-Radiological will designate the recipients of the Environmental Radiological Monitoring Procedure Manual in a letter to the T&MSS Configuration Management Branch upon approval of this instruction and then on an as needed basis. Upon initial approval of this instruction and receipt of the letter designating the recipients, the DCS shall issue the ER Technical Procedure Manual. This instruction shall be placed in the ER Technical Procedure manual prior to any procedure. Additional copies will be issued as designated in writing by the Task Manager per NNWSI AP 1.5. The DCS shall recover and destroy (with the exception of appropriate file and documentation copies) the copies of withdrawn or revised procedures. T&MSS Configuration Management Branch will maintain copies of the current revision of each approved ER Technical Procedure in accordance with NNWSI Administrative Procedure 1.5. All ER Technical Procedures will be reviewed at least annually by the Senior Health Physicist and Task Manager to determine if any revisions are necessary. The Task Manager shall document this review in a letter to Quality Assurance, T&MSS Configuration Management, T&MSS Records Center, TD, and AD, per QP 5.1 "Instruction, Procedures, and Drawings."

D. Review and Approval Cycle

The development, review, and approval cycle for ER Technical Procedures, including revisions, shall be executed in accordance with QP 5.1 and the rules listed below.

- D.1. Senior Health Physicist determines the need for a ER Technical Procedure or a revision to an ER Technical Procedure.

2. Senior Health Physicist requests authorization to prepare/revise E RTP by submitting to the Task Manager, a copy of the Document Review Comment Sheet (Figure A.1-3) (DRC) for the Environmental Radiological Monitoring Technical Procedure, with the Title and a Justification section completed as item 1 in the "Reviewer's Comments" column.
3. If the Task Manager authorizes preparation by initialing the DRC, go to step D.4., otherwise proceed to step D.1.
- D.4. The Task Manager arranges for preparation or revision of the procedure.
5. Senior Health Physicist or procedure preparer obtains TP-ER number from the Task Manager, unless this is a revised procedure then he obtains the revision number, and records it on the DRC.
- D.6. Preparer prepares or revises procedure.
- D.7. Task Manager and Senior Health Physicist determine if a test run of the procedure is appropriate or feasible. Go to step D.9. if a test run is to be made, otherwise go to step D.8.
- D.8. The Senior Health Physicist documents why the test run was not completed in the Section 13 of the DRC, then go to step D.11.
- D.9. The Senior Health Physicist arranges to have a test run completed.
10. The Senior Health Physicist documents the results of the test run, on the DRC then continues to step D.11. if successful, otherwise go to step D.6.
- D.11. The Task Manager issues copies of the E RTP with the DRC for review and comment to the following individuals:
 - a. Task Manager,
 - b. Managers of the T&MSS Environmental, Licensing, and Transportation Branches,
 - c. The designee of the Health Physics Division of DOE/NV,
 - d. Senior Health Physicist,
 - e. T&MSS Quality Assurance Manager,
 - f. The TD and AD, and
 - g. Others designated by the preparer, TD or AD.

NOTE

The TD's and AD's are not required to submit review sheets as they are not considered part of the formal review cycle.

12. The reviewers evaluate the procedure and record their comments on the DRC and attachments.
13. Task Manager recovers the DRC and attachments from the reviewers.
14. The Senior Health Physicist and the preparer resolve the reviewer's comments and document the resolution or lack of resolution on the DRCs.
- D.15. Preparer and/or Senior Health Physicist revise(s) the procedure consistent with comments. If no technical comments are made, go to step D.16; otherwise return to step D.7.
- D.16. Task Manager sign the revised draft of the procedure.
17. Task Manager submits E RTP with reviewers' DRCs to the TD, AD, and Quality Assurance for approval. The TD, AD, and Quality Assurance will sign the DRCs on line 15 (Figure A.1-3) if comments are adequately resolved and then sign the approval block on the procedure form (Figure A.1-3).
18. The TD, AD, and Quality Assurance approve the E RTP, then go to D.19., otherwise go to D.6.
- D.19. The Technical Programs Division secretary sends the T&MSS approved E RTP to DOE/NV-WMPO for approval.
20. If DOE-WMPO approval is obtained, continue to next step; otherwise, go to step D.1.
21. The Technical Programs Division secretary records the date on all pages of the procedure (Figure A.1-1, A.1-2) and sends the approved E RTP, or revised E RTP, to the DCS. The DRCs are sent to the Task Manager, who sends them to the DCS for temporary storage until they are sent to the QA Records Coordinator for transmittal to permanent storage at the PRC.
- D.22. The Task Manager prepares a revised table of contents for the Environmental Radiological Monitoring Procedure Manual. The Task Manager submits this revised table of contents to the DCS.

NOTE

Informational data, such as training programs, authorized users list, manuals, and other data designated in writing by the Sr HP may be in the Environmental Radiological Monitoring Procedure Manual as Appendices, if they provide assistance to the user.

23. The DSC issues the new revised E RTP as per NNWSI AP 1.5 and retrieves the superseded E RTP revision, if applicable.
24. The Task Manager shall provide the approved procedure with DRCs to the T&MSS Records Center Management System in accordance with QP 17.1, QA Records.

NOTE

Revisions not affecting the technical content of a procedure follow the same cycle, except steps 1, 3, and 7-10 are deleted and reviewers c, and g in step 11 are deleted per QP 6.1 "Document Control."

VII. REFERENCES

- o NNWSI, "Nevada Nuclear Waste Storage Investigations Quality Assurance Plan," NVO-196-17 (Latest Revision) DOE/NV.
- o SAIC, "Science Applications International Corporation (SAIC) Technical and Management Support Services (T&MSS) Quality Assurance Program Plan (QAPP)", QAPP-1, (Latest Revision) and supporting documents.
- o SAIC T&MSS, "Environmental Radiological Monitoring Procedures Manual," (to be issued).
- o SAIC T&MSS, "Preliminary Site Characterization Radiological Monitoring Plan," (to be issued).
- o SAIC T&MSS, "Radiological Monitoring Plan," (R300), (to be issued).

VIII. FORMS

- o First page (approval page) of Environmental Radiological Monitoring Technical Procedure (Figure A.1-1).
- o Second and subsequent pages of an Environmental Radiological Monitoring Technical Procedure (Figure A.1-2).
- o Document Review Comment Sheet (Figure A.1-3).
- o Document Review Comment Continuation Sheet (Figure A.1-4).

Figure A.1-1

	TECHNICAL & MANAGEMENT SUPPORT SERVICES ENVIRONMENTAL RADIOLOGICAL MONITORING TECHNICAL PROCEDURE		T-AD-035 8/86
	Title	No. Date Page	
[Empty space for content]			
APPROVALS			
Task Manager	Date	Administrative Director	Date
QA Manager	Date	Technical Director	Date

Figure A.1-2

	TECHNICAL & MANAGEMENT SUPPORT SERVICES ENVIRONMENTAL RADIOLOGICAL MONITORING TECHNICAL PROCEDURE T-AD-035 8.86
Title	No. Rev. Date Page of

Figure A.1-3

SAIC		DOCUMENT REVIEW COMMENT SHEET		T-QA-066 7/86
1 Originating Organization of Document _____				
2 Document No _____		3 Revision _____	4 Date _____	
5 Document Title _____				
6 Date Received _____		7 Comments Required Date _____		
8 Reviewed By _____				
9 Comment Sheet Forwarded To _____			On (Date) _____	
10 Comments Resolved By _____			On (Date) _____	
11 Item No	12 Page, Para. and Line No	13 Reviewer's Comments	14 Originating Organization's Resolution	
15 Review Approval _____			Date _____	
				16 Page _____ of _____

Figure A.1-4

SAE	DOCUMENT REVIEW COMMENT CONTINUATION SHEET			T-QA-066 7/86
11 Item No.	12 Page, Para. and Line No.	13 Reviewer's Comments	14 Originating Organization's Resolution	

15 Page _____ of _____

Issued: _____

Technical Director

Administrative Director

Quality Assurance

Task Manager

Senior Health Physicist

A-2. TP-ER-002: Receipt, Operation, Exchange, Termination, and Shipment of Integrated Radon Samplers

This procedure will provide information on the receipt, exchange, operation, and shipment of Integrating Radon Samplers (IS). The ISs will be obtained from an off-site vendor through arrangements made by the Senior Health Physicist. This procedure will emphasize the importance of documented chain-of-custody and documentation of all steps in this activity that can effect the quality of the data obtained from the ISs.

The section of this procedure addressing receipt of these devices shall address:

1. Chain-of-custody of the ISs,
2. Storage of the ISs before exchange,
3. The procedure for the Health Physics designee (designated in writing by the Senior Health Physicist) to obtain the ISs for installation/exchange,
4. The procedure for initiating exchange activities and determining the number of ISs needed, based on Sample Location Log (including verification that the copy of the signed Sample Location Data Sheet is in the log), and
5. Documentation of the chain-of-custody and issuance of the ISs for installation/exchange.

The section of this procedure addressing exchange and operation of the ISs shall:

1. Specify procedures for transporting the ISs, any associated equipment, and data sheets for documentation of sampling location;
2. Specify procedures (including documentation requirements) for the IS removal, operation, termination of operation, and accountability;
3. Specify procedures (including documentation requirements) for installing an IS and initiating its operation;
4. Specify procedures (including documentation requirements) for removing the exchanged ISs from the NTS and the transport of the ISs and associated documentation to SAIC-LV offices; and
5. Specify procedures (including documentation requirements) for the shipment of the ISs to the vendor for evaluation including spiked or blank ISs prepared per TP-ER-010. (This will include verification by a representative designated by the Manager of Quality Assurance that the shipment has been prepared as specified in this procedure.) This will also address interaction with RAMTROL and REECO property control on the removal of these items from the site.

The termination section of the procedure will address the documentation action required when an IS is not to be re-installed at a location during an exchange. This will include elimination of this location for future exchanges, if appropriate. This action will be initiated by the Senior Health Physicist and documented in the PSCRMP Log.

The procedure will also address the transmission of the original copies of all documentation to the Manager of the Environmental Branch for storage in a 2 hour fireproof file/safe (or for dual storage) and the transmission of copies of the documentation to the Senior Health Physicist, T&MSS Project File, T&MSS QA Records, and T&MSS Quality Assurance. In addition, the procedure will require that a copy of the documentation of the exchange be placed in the Sample Location Log identifying the sampler installed at each location. A monthly QA review of the accuracy and completeness of the documentation required in this procedure will be made. The Senior Health Physicist will be notified as soon as practicable of any deficiencies.

A-3. TP-ER-003: Receipt Inspection and Acceptance Testing
of Continuous Radon Monitors

This procedure will provide a detailed description of the receipt inspection and acceptance testing of a Continuous Radon Monitor (CRM). A detailed listing of equipment, documentation, spare parts, and calibration equipment supplied in the shipment will be required. The procedure will identify operability test requirements based on the user's manuals (see Section 4 for data sheets). In addition, the accuracy of the equipment, relative to the calibration data, will be verified using the calibration source and procedure TP-ER-005. The activities described in this procedure will be documented and a CRM Log for this equipment will be obtained from the Senior Health Physicist, by the Health Physics designee. The receipt inspection data will be recorded in the CRM log. If the equipment fails to pass the receipt inspection, the Health Physics designee will contact the Senior Health Physicist who will arrange for repair or replacement of the equipment. A representative of T&MSS QA will be present during the receipt inspection to verify adherence to required procedures.

Arrangements with RAMTROL for control of the radioactive source supplied with this equipment, and for accuracy verification will also be addressed. The original copies of all documentation (except for duplicate manuals, which will be turned over to the Senior Health Physicist for disposition) will be sent to the Manager of the Environmental Branch with copies to the Senior Health Physicist (except in cases where he already has copies), T&MSS Quality Assurance Record Center, T&MSS Project Files, and T&MSS Quality Assurance. It should be noted that the Continuous Radon Sampler Log is not part of this documentation and is a working document maintained by the Health Physics designee.

A-4. TP-ER-004: Siting, Installation, and Testing of a Continuous Radon Monitor (CRM)

The location of the CRM will be determined by the Senior Health Physicist based on Preliminary and Site Characterization activities. The Senior Health Physicist shall designate the position at which the CRM will be installed/reinstalled, as specified in this procedure. The Senior Health Physicist will document the basis for this choice in the PSCRMP Log.

This procedure shall specify how the location designated was determined and the installation location documented. In addition, this procedure shall describe the installation of this portable instrument and how it must be completed and documented. The procedure shall also specify how the equipment is tested, including accuracy testing after installation and how this testing is documented. The location and testing shall be documented in the CRM Log. If equipment fails the testing specified, 1) the equipment shall be removed from service, 2) the failure shall be noted in the CRM log and testing documentation, and 3) the Senior Health Physicist shall be contacted to arrange repair or replacement. The Senior Health Physicist is responsible for assuring initiation of a nonconformance report required by QP-15.1. When the equipment is returned to service, TP-ER-004 will be implemented and a description of any repairs noted on the documentation, in the PSCRMP Log, and the CRM Log (maintained by the Health Physicist designee). The procedure will also specifically reference TP-ER-011 for control of the radioactive source used in accuracy verification and testing of this equipment.

T&MSS QA shall verify that the installation of this equipment is consistent with the procedure.

The original copies of all documentation shall be sent to the Manager of the Environmental Branch for storage in a 2 hour fireproof file/safe or dual storage facility. Copies of the documentation shall also be sent to the Senior Health Physicist, T&MSS QA Project Records, the Project Files, and T&MSS Quality Assurance. It shall be noted that the above-specified documentation does not include logs that are controlled working documents and will be maintained by those designated in the procedure.

All radioactive sources used during this procedure shall be returned to RAMTROL, as specified in TP-ER-011.

A-5. TP-ER-005: Operation and Accuracy Verification and Acceptance
Testing of Continuous Radon Monitors

This procedure will describe the routine operation of a Continuous Radon Monitor (CRM). The operability of the CRM will be verified weekly, using a NBS traceable source and the data-output magnetic tape library changed at the same time. The completion of TP-ER-004 may be substituted for these activities. The paper output will be changed at a frequency specified by the manufacturer. The magnetic tape data and paper tape data will be identified on the media when changed for documentation purpose and cross referenced on the data sheet specified in this procedure. The Health Physics designee will document this activity on the datasheets and in the CRM Logbook.

The originals of the data sheets will be sent to the Manager of the Environmental Branch for storage in a 2 hour fireproof file/safe or dual storage facility. Copies of the data sheets will be sent to the Senior Health Physicist, Project File, QA Project Records, and QA. The magnetic and/or paper tapes will be delivered to the Senior Health Physicist for processing as per TP-ER-008. The CRM Logbook is a working controlled document and, as such, will not be distributed.

A-6. TP-ER-006: Receipt Inspection of Continuous Air Sampler

This procedure will provide a detailed description of the receipt inspection of a Continuous Air Sampler (CAS). The procedure will require a detailed listing of equipment, documents, spare parts, and calibration equipment supplied in the shipment. The acceptance test requirements will be prescribed. The procedure shall include tests to verify that the CAS performs as specified in Appendix B-3. In addition, the accuracy of the equipment, relative to the calibration data, will be verified using an NBS traceable flow meter in accordance with procedure TP-ER-007. The activities described in this procedure will be documented and a CAS Log for this equipment will be obtained from the Senior Health Physicist by the Health Physics designee. The receipt inspection data will be recorded in the CAS Log. If the equipment fails to pass the receipt inspection, the Health Physicist designee will contact the Senior Health Physicist, who will arrange for repair or replacement of the equipment and initiation of a nonconformance report as per applicable QA procedures (QP-15.1). A representative assigned by the Manager of T&MSS QA will be present during the receipt inspection to verify the receipt inspection. The procedure will also describe the inspection and documentation of the CAS installation, as described in the specification in Appendix B-5. In addition, the operability test and accuracy verification for receipt inspection will be repeated, following installation. The installation, operability test, and accuracy verification will be documented on data sheets, and in the CAS Log.

The original copy of all documentation (except for duplicate manuals, which will be turned over to the Senior Health Physicist for disposition) will be sent to the Manager of the Environmental Branch with copies sent to the Senior Health Physicist (except in cases where he already has copies), T&MSS Quality Assurance Records Center, T&MSS Project Files, and T&MSS Quality Assurance. It should be noted that the CAS Log is not part of this documentation and is a controlled working document maintained by the Health Physics designee.

A-7. TP-ER-007: Operation and Accuracy Verification of
Continuous Air Samplers (CAS)

This procedure will specify the routine operation of a continuous air sampler (CAS). The weekly exchange of filtration media will be documented as described in this procedure. This procedure will emphasize the importance of documented chain-of-custody, sample handling, and documentation of all steps in this activity that can affect the quality of the data obtained from the CASS.

The section of this procedure addressing exchange and operation of the CAS shall specify the steps for:

1. Obtaining the appropriate filtration media, any associated equipment, and data sheet for documentation to the sample.
2. Removing the filtration media, and/or addressing missing or damaged filtration media and documentation of the removal, air flow rate and pressure differential across to the filters prior to removal.
3. (Including documentation requirements) installing a filtration media and initiating its operation and documentation of the installation, air flow rate and pressure differential across to the filters).
4. Removing the exchanged filtration media from NTS and the transport of the filtration media to SAIC-LV's offices and associated documentation.
5. Storage of the filtration media prior to shipment to an analytical laboratory including documentation of chain-of-custody.
6. The shipment of the filtration media, including samples prepared per TP-ER-013 to the laboratory for evaluation. This will include a verification by Quality Assurance that the shipment has been prepared as specified in this procedure.

The procedure shall also specify that the air samplers flow rate meters will be verified for accuracy every quarter using an NBS traceable flow rate meter. The procedure will also address documentation, identification and resolution of equipment failure. The procedure will describe the steps to be followed in this verification and the required documentation. The completion of the accuracy verification will be confirmed by T&MSS QA.

The procedure will also address the transmission of original copies of all documentation to the Manager of the Environmental Branch for storage in a fire-proof file/safe and the transmission of copies of the documentation to the Senior Health Physicist, T&MSS Project File, T&MSS QA Records, and T&MSS Quality Assurance. In addition, the procedure will require that a copy of the documentation of the exchange be placed in the CAS Log. A monthly review of the accuracy and completeness of the documentation required in this procedure

will be made by the Task Manager. The Senior Health Physicist will be notified as soon as practicable of any deficiencies and assure initiation of any nonconformance reports as per the applicable QA procedures (QP 15.1).

A-8. TP-ER-008: Documentation of On-Site and Off-Site Data Analysis Reports

This procedure addresses the review and documentation of data and data analysis reports associated with the environmental radiological monitoring activities. This will include the cross-comparison of hardcopy and electromagnetic data and the evaluation of results from non-T&MSS activities.

The on-site generated data that exists in both hardcopy and electromagnetic media will be cross compared. At least three readings for each day will be compared. Any disagreement will be reviewed and documented in writing by the Senior Health Physicist, including an indication of the data quality. Hard copies of the data will be transmitted to the T&MSS Manager of the Environmental Branch for storage in a 2 hour fireproof file/safe or dual storage facility. Hard copies of the electromagnetic data will be sent to the Manager of the Environmental Branch (for storage with the original hard copy data), the Senior Health Physicist, T&MSS Project Files, T&MSS Project QA Records, and T&MSS QA.

The off-site data reports will be reviewed by the Health Physics designee for anomalous results and the accuracy of results from the quality control samples compared to the expected values. This review will be documented by the Senior Health Physicist, to include documentation in the PSCRMP Log. If the accuracy of the results above the established minimum detectable activity is consistently not within the 95% confidence boundaries, or if the readings are clearly anomalous, the Senior Health Physicist will arrange remedial action by the off-site laboratory or obtain laboratory services elsewhere. The results of such activities shall be documented in a letter and noted in the PSCRMP Log. The Senior Health Physicist shall also assure initiation of the appropriate nonconformance report as per applicable QA procedures (QP-15.1).

The originals of all documentation and off-site data reports will be sent to the Manager of the Environmental Branch. Copies will be sent to the T&MSS Senior Health Physicist, T&MSS Project Files, T&MSS QA Records, and T&MSS QA.

A-9. TP-ER-009: Preparation of Quality Control Filtration Media Samples

This procedure shall specify the process for obtaining NBS traceable spiked filtration media, handling blank samples, and assuring the quality control sample submitted to the laboratory is indistinguishable from an actual sample. Detailed records of the radioactivity present on these quality control samples shall be maintained on the documentation of the sample and in the PSCRMP Log book. It is projected that spiked samples will be obtained from the EPA's "Environmental Radioactivity Laboratory Intercomparison Studies" laboratory (see Jarvis, 1981). The identity of all filtration media (spikes and blanks) in the quality control sample will be documented on data sheets and the spiked sample contents documentation will be provided by the supplier of the spiked sample. Quality Assurance will verify the preparation as specified in this procedure of quality control samples.

All documentation of the Quality Control Samples will be sent to the Manager of the Environmental Branch for storage in a 2 hour fireproof file/safe or a dual storage facility. Copies will be sent to the Senior Health Physicist, T&MSS Project Files, T&MSS QA Project Records, and T&MSS QA.

A-10. TP-ER-010: Preparation of Quality Control Integrating Radon Samplers

This procedure shall specify the procedure for obtaining NBS traceable exposures of Integrating Radon Samplers (IS), handling blank IS, and assuring the quality control sample submitted to the laboratory is indistinguishable from an actual sample. Detailed records of the exposure of these quality control ISS shall be maintained on the sample documentation and in the PSCRMP Log book. The choice of whether a spike or blank is sent with each set of ISS analyzed will be determined randomly by the T&MSS Senior Health Physicist, although at least 25% of the samples will be spikes.

It is projected that the spikes (NBS traceable exposures of the ISS) will be obtained through the Office of Radioactive Programs (ORP) office of the EPA in Las Vegas. These ISS will be exposed to a known concentration of Rn-222, in equilibrium with its daughter products, for a measured time period. Otherwise, the monitors will be stored in the same manner as blanks.

Blanks will be prepared by storing the monitor, while not in operation, in the designated storage in the T&MSS offices in Las Vegas, NV. Blanks may also be prepared at the discretion of the Senior Health Physicist by running the monitor in a sealed container chosen to minimize radon diffusion into the container. It should be noted that the blanks are actually background values and not zeros.

The identity of all spikes and blanks in the quality control sample will be documented on data sheets and the spiked sample contents documentation will be provided by the supplier of the spiked sample. A T&MSS Quality Assurance will verify the preparation of quality control samples as specified in this procedure.

A-11. TP-ER-011: Control of Calibration Sources

This procedure will address the control of NBS traceable radioactive calibration sources used in the Environmental Radiological Monitoring activity. The emphasis in this procedure will be on:

1. Assuring the health and safety of the public and workers.
2. Complying with existing NTS procedures and all applicable regulations.
3. Assuring the traceability of the source.

The procedure will address storage and documentation of all T&MSS traceable sources used in this program. The sources will be transported and used on-site as specified in existing NTS procedures as implemented by RAMTROL and REECo Health Physics Department (including documentation and materials control procedures).

These sources will be exempt quantities of radioactive materials relative to State, NRC, and DOT regulations.

Documentation of content and accuracy of the sources will be sent to the Manager of the Environmental Branch. Copies will be sent to the T&MSS Senior Health Physicist, T&MSS Project Files, T&MSS QA Project Records, and T&MSS QA.

A-12. TP-ER-012: Installation of Integrating Radon Samplers

This procedure will provide information on required materials and specific details on how the locations of Integrating Radon Samplers (IS) are designated. It will then describe how the designated locations are found, and how the monitoring brackets and labels are installed. The procedure will specify how the location is documented (photograph, geographical, and in the data system). This documentation will include signatures by the personnel completing the procedure and the Quality Assurance representative verifying this documentation.

The procedure will then:

1. Reference the chain-of-custody procedures in TP-ER-002 for control of the IS prior to installation.
2. Complete installation and operation of the IS in accordance with TP-ER-002.
3. Ensure that documentation of the installation and operation of the IS is consistent with TP-ER-002.
4. Describe the preparation of the field data notebook section.

The Senior Health Physicist designee will assure that the originals and copies of all documentation are sent to the Manager of T&MSS Environmental Branch for storage in a 2 hour fireproof file/safe or dual storage facility. Copies of the documents will also be sent to T&MSS Project Files, T&MSS QA Records, the T&MSS Senior Health Physicist, Quality Assurance and a copy will be placed in the front of the Sample Logbook. The Sample Logbook is a loose-leaf notebook which contains copies of all the data sheets for each sample location and is maintained by the Health Physics designee.

APPENDIX B

SPECIFICATIONS

TECHNICAL SPECIFICATIONS FOR
INTEGRATING RADON MONITORING SERVICE

(Technical data for inclusion in procurement documents)

PURPOSE:

The devices supplied and evaluated by the vendor will be used to monitor the monthly average of ambient outdoor radon concentration/daughter product concentration in the environment surrounding Yucca Mountain at the Nevada test Site (NTS). This performance assumes a known ratio of Rn-220 to Rn-222.

PERFORMANCE:

1. The sampler shall be capable of measuring an ambient radon concentration of at least 0.2 ± 0.1 pCi/liter of Rn-222/Rn-222 daughter product at the 95% confidence level, with a one month sampling period. Improved performance above this value is preferred. The detection level of 0.1 ± 0.05 pCi/liter at the 95% confidence level, with a one month sampling period, would provide equivalent value for a bid twice as high. Additional costs incurred with improved accuracy specify both values as bid options. Performance of $.05 \pm .01$ pCi/liter at the 95% confidence level, with a one month sampling period, is not desired.
2. The device shall be able to operate unattended for seven consecutive days. (No power source is presently available; however, if required, a battery or solar powered system is preferred).

3. The device shall be capable of meeting the performance objectives in the following environmental conditions:
 - a. 0.1% to 99% humidity, and
 - b. -20°F* to 110°F.

4. The device shall be capable of meeting performance objectives during rain and/or snowfall conditions. Any limitations in this area should be specified and will be evaluated in determining service acceptability.

Quality Assurance

Quality Level I procurement.

* The low temperature requirement may be met by the use of insulation and/or a heat source in conjunction with the proposed battery powered system indicated in Item 2.

TECHNICAL SPECIFICATIONS FOR A CONTINUOUS

RADON GAS MONITOR

(Technical data for inclusion in procurement documents)

PURPOSE:

The device will be used to monitor the airborne radon gas levels in the area associated with the NNWSI Project exploratory shaft activity near Yucca Mountain on the Nevada Test Site. This assumes a known ratio between Rn-220 and Rn-222.

PERFORMANCE:

1. The monitor shall be able to measure an airborne Rn-222 concentration at an equilibrium of 1 ± 0.5 pCi/liter at the 95% confidence level. Options for improved performance above this value should be included for consideration, if available.
2. Documentation shall provide a demonstrated NBS traceable calibration of the measurement system and an NBS traceable license exempt source provided to allow field accuracy verification of the equipment. This documentation shall include any flow rate calibration required. The equipment (includes all items necessary) required to complete field accuracy verification will be supplied, if required. Also, written documentation of the basis for not requiring such verification shall be included if the vendor indicates it is not required.
3. The instrument shall record hourly and daily averages on hard copy in a manner reliably referenceable with regard to time and date. In addition, as an option, a capability to output up to 8-day copies of

this data on magnetic tape, on demand, using a portable tape recorder or backup magnetic tape of the hard copy data.

4. The equipment shall be capable of operating on AC power, 115 volts, 50/60 hertz, and at less than 5 amps.
5. The equipment shall be capable of meeting the performance requirements in the following environmental conditions:
 - a. 0.1% to 99% humidity,
 - b. -20°F* to 110°F, and
 - c. general outdoor environments (with a sunshade).
6. The instrument shall be reasonably portable and weigh less than 125 pounds. The equipment should be adjustable for unlevelled surfaces.

Quality Assurance

Quality Assurance Level I Procurement.

* The use of outside insulation and/or thermal heating within the power limits to meet the lower temperature requirement is acceptable.

TECHNICAL SPECIFICATIONS FOR A CONTINUOUS LOW VOLUME

PARTICULATE SAMPLER

(Technical data for inclusion in procurement documents)

PURPOSE:

This device will be used to collect airborne particulates on a 47 millimeters filtration media in the outdoor environment near Yucca Mountain at the Nevada Test Site.

PERFORMANCE:

1. The sampler shall have a sampler holder consistent with ANSI N13.1 for 47 millimeters filtration media.
2. The sampler shall be capable of drawing a flow rate of at least 2 standard cubic centimeters per second through a 47 millimeters filtration media. The flowrate shall be maintained at the 20% value when a second layer of filtration media is added. The filtration media is Whatman 41 filter paper or an equivalent.
3. The pump in the system shall be oil-free. A flow rate measurement through the filtration media and a pressure differential across the filter measurement device shall be included in the system.
4. NBS traceable calibration with an accuracy of at least $\pm 20\%$ of the flow rate/pressure measure system shall be provided.

5. The device shall be provided in a weather proof housing and be capable of meeting the performance requirements in the following environmental conditions:
 - a. 0.17% to 99% humidity, and
 - b. -20°F to 110°F.
6. The device shall be supplied with at least 50 pieces of 47-millimeters Whatman 41 Filtration Media or equivalent substitute approved by the purchaser.
7. The device shall weigh less than 80 pounds.
8. The filter holder shall be connected using American Standard Pipe fitting to facilitate in-the-field accuracy verification or calibration.
9. The laboratory analyzing these results shall demonstrate that they have a Quality Assurance Program acceptable to the NRC (10 CFR 50), Appendix B) implemented for these analyses.

Quality Assurance

Quality Level I Procurement.

TECHNICAL SPECIFICATION FOR
PARTICULATE FILTER RADIOLOGICAL
ANALYSES SERVICE

(Technical data for inclusion in procurement documents)

PURPOSE:

This service will analyze quarterly composite air filters to determine the amounts of specific radionuclides present. The analysis will consist of a gross alpha and beta count, and a gamma spectral analysis of each filter. In addition, quarterly composite will be analyzed for Pu-239 (Pu-240), Am-241, and Sr-90 (Sr-89).

PERFORMANCE:

1. The laboratory completing these analyses shall participate in the EPA's Environmental Radiological Laboratory Intercomparison Studies Program (Jarvis and Siv, 1981). Their performance in these studies and other intercomparison studies will be the primary basis of selection. This participation must include the nuclides of interest, if available, in the program.
2. The facility shall have a Quality Assurance program acceptable to the NRC (per 10 CFR Part 50, Appendix B). This facility shall show they have successfully passed NRC licensing or DOE QA audits in the past.
3. All results will include uncertainty at the 95% confidence level.
4. Results shall be supplied within 60 days of the receipt of the samplers for analysis.

Quality Assurance

Quality Level I Procurement.

93-001

Box 12