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NNWSI PROJECT

ENVIRONMENTAL FIELD ACTIVITY PLAN

FOR

RADIOLOGICAL STUDIES

August 1988

Nevada Nuclear Waste Storage Investigations Project
Waste Management Project Office
U.S. Department of Energy
Nevada Operations Office
Las Vegas, Nevada

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PART I

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Chapter 1

INTRODUCTION

1. INTRODUCTION

The site characterization phase of the repository program began with Presidential approval of the Yucca Mountain site for characterization on May 28, 1986, when the Nevada Nuclear Waste Storage Investigations (NNWSI) Project Environmental Assessment (EA) (DOE, 1986a) was released. During site characterization, the U.S. Department of Energy (DOE) will collect detailed information on the geotechnical, geochemical, geologic, and hydrologic characteristics of the site. In parallel with site characterization, the DOE will conduct site investigations to collect information about other aspects of the site. As part of site investigations, information will be collected in the areas of environment, socioeconomics, and transportation.

As stated by the Secretary of Energy in DOE Order 5400.2, it is the policy of the DOE to conduct its operations in an environmentally safe and sound manner. To this end, the Office of Civilian Radioactive Waste Management is committed to ensuring the incorporation of national goals of environmental protection in the formulation and implementation of the repository program.

The NNWSI Project environmental program to be implemented during the site characterization phase is described in a document entitled the Environmental Program Overview (EPO) (DOE, 1988c) for the Yucca Mountain site. The EPO presents an overview of a comprehensive planning approach to satisfying the environmental requirements applicable to siting and licensing a mined geologic disposal system (MGDS) at Yucca Mountain. In order to do so, the EPO discusses the environmental programmatic requirements that must be addressed by the DOE in plans that cover specific requirements. These plans include: the Environmental Monitoring and Mitigation Plan (EMMP) (DOE, 1988a) and the Environmental Regulatory Compliance Plan (ERCP) (DOE, 1988b). Both plans identify the need to collect environmental field data in a number of environmental disciplines. Accordingly, discipline-specific Environmental Field Activity Plans (EFAPs) have been developed which are responsive to the

technical information needs outlined in the EMMP and ERCP. The EFAPs also address any data collection activities identified in the EA (DOE, 1986a).

1.1 PURPOSE AND SCOPE

Environmental Field Activity Plans (EFAPs) describe the site-specific field activities that will be conducted to support environmental site investigations at Yucca Mountain. To ensure that the NNWSI Project environmental field program comprehensively addresses the issues and requirements of the NNWSI Project, EFAPs will be prepared for the following environmental disciplines:

- Aesthetics
- Air Quality
- Cultural Resources
  - Archaeological Component
  - Native American Component
- Noise
- Radiological Studies
- Soils
- Terrestrial Ecosystems
- Water Resources

Additional site-specific EFAPs will be prepared if necessary. Each EFAP presents a description of the discipline-specific field studies to be conducted during site characterization, but concentrates initially on requirements driven by commitments made in the EA (DOE, 1986a), the EMMP (DOE, 1988a), and the ERCP (DOE, 1988b). As discussed previously, these plans are all components of a comprehensive environmental program described in the EPO for the Yucca Mountain site.

At intervals throughout the site-characterization phase, this EFAP will be updated in response to additional requirements identified for the NNWSI

Project environmental program. For example, this EFAP will be revised to include any additional requirements identified during the Environmental Impact Statement (EIS) scoping meetings. Modifications to ongoing studies may also be warranted to respond to changes in the site characterization program and to initiate studies needed prior to preparation of the EIS.

These EFAPs are written to implement the environmental data collection programs. In general, they provide: (1) a description of the field activity to take place during site characterization, (2) a rationale for studies proposed, (3) field techniques and methods, (4) equipment and materials required, and (5) quality assurance requirements. Technical Procedures will be prepared for the specific data collection techniques to be used in the field and for the subsequent analysis of the data.

The purpose of this Radiological Studies EFAP is to describe the environmental radiological field studies that will be conducted in response to the DOE programmatic requirements discussed in Section 2.2. The Radiological Studies EFAP addresses issues of concern with respect to potential radiological impacts discussed in Section 3.1.

1.2 DESCRIPTION OF THE SITE

The NNWSI Project site at Yucca Mountain is located in southwestern Nevada, approximately 26 km north of the town of Amargosa Valley (formerly Lathrop Wells). The site is located exclusively within lands controlled by the Federal government. Yucca Mountain lies within the Basin and Range physiographic province, a broad range of generally linear mountain ranges and intervening valleys. Figure 1.2-1 depicts the topography of the area in the immediate vicinity of Yucca Mountain. The climate of the area is identified with strong solar insolation, limited precipitation, low relative humidity, and large diurnal temperature ranges. Temperatures vary from highs of approximately 36°C during the summer to lows of approximately 2°C during the winter. Annual precipitation is typically 145 mm in the area. Winds from

Figure 1.2-1. Yucca Mountain Topography

the south account for a high percentage of the summer seasonal flow. On a diurnal basis, flow from the south predominates in the summer daytime hours, while northwest and north-northwesterly winds dominate nighttime hours. Winter wind distributions are dominated by the northwest and north-northwesterly flows. Southerly winds during the winter are greatly reduced from those that are observed during the summer.

Land use in the region includes agriculture, mining, recreation, and private and commercial development, all on a very limited basis. The Amargosa Valley and Pahrump Valley are the primary areas of agricultural significance. All production presently is beyond 24 km of the Yucca Mountain site. Land use information is summarized in the Yucca Mountain EA (DOE, 1986a).

The radiological studies area for the NNWSI Project is defined by a circle 84 km in radius, whose center is assumed to be located at the proposed site of the central surface facilities. Numerous monitoring and sampling locations are dispersed throughout this primary study area (Figure 1.2-2). The 16 km radius area in the center of the study area is designated as the near field (NF) study area, the remainder of the area (16-84 km) is called the far field (FF) study area. The NF area encompasses a region in which environmental radiological monitoring activities are relatively concentrated. The high density of monitoring activities in this NF area will ensure assessment of potential site characterization impacts in proximity to areas of expected significant surface-disturbing activities. Details of the comprehensive radiological assessment program are contained in the Radiological Monitoring Plan (RMP) for the NNWSI Project (SAIC, 1988).

1.3 PREVIOUS STUDIES

Various types of radiological studies have been conducted by numerous organizations and agencies in connection with the activities of the Nevada Test Site (NTS). Some NTS radiological studies date from early 1951, when

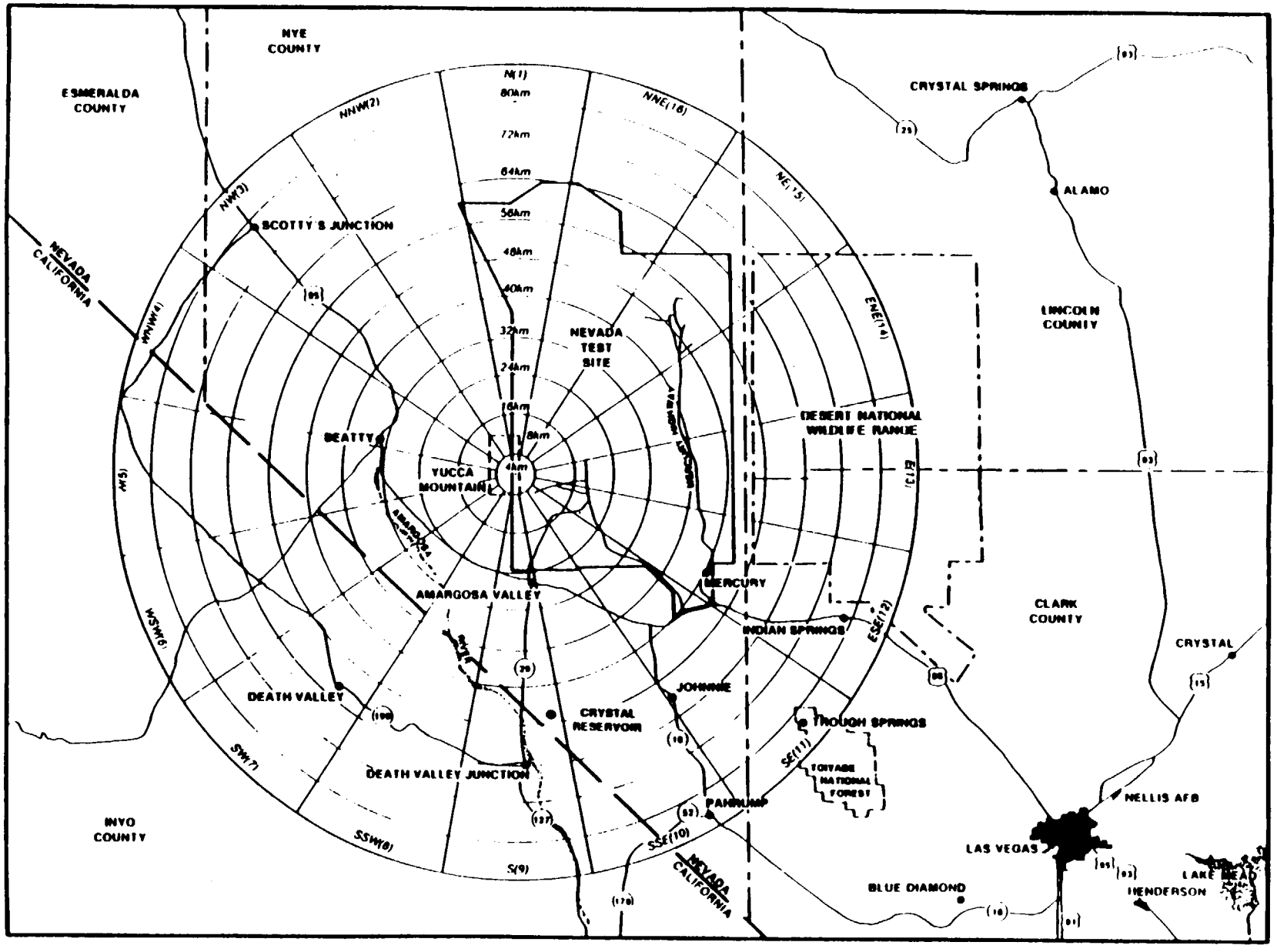


Figure 1.2-2. Yucca Mountain Radiological Study Area.

the first series of nuclear weapons testing was initiated (ERDA, 1977). The preponderance of these early studies are test specific and of limited value to the present NNWSI Project radiological studies. The U.S. Atomic Energy Commission (AEC) established a formalized NTS radiological environmental surveillance program in 1955. An intensified program of NTS environmental monitoring and surveillance continues today. Reynolds Electrical and Engineering Company Inc., (REECo) and the U.S. Environmental Protection Agency (EPA), Nuclear Radiation Assessment Division (NRAD) are responsible for the NTS onsite and offsite radiological environmental surveillance and monitoring programs, respectively.

Table 1.3-1 is an abbreviated listing of the NTS annual reports issued by REECo and EPA, NRAD. Both NTS-related annual environmental reports provide information concerning the radiological status of the environs. This information contains data relative to:

1. Concentration of certain radionuclides in various environmental media (i.e., soil, water. biota).

2. Ambient radiation levels at selected locations.

3. Relative activity of radioactive airborne particulates.

4. Effluent monitoring.

Though the REECo and NRAD monitoring data are of importance in developing a comprehensive environmental radiological monitoring program, very limited data are available specifically for the southwest region of NTS and the general Yucca Mountain area.

Table 1.3-1. Sample of NTS[a] Environmental Monitoring Reports

Title	Source	Document
Offsite Environmental Monitoring Report - Radiation Monitoring Around United States Nuclear Test Areas, Calendar Year 1982	NRAD[b]	EPA-600/4-83-032[c] (DOE/DP/0539-048)[d]
Offsite Environmental Monitoring Report - Radiation Monitoring Around United States Nuclear Test Areas, Calendar Year 1983	NRAD	EPA-600/4-84-040 (DOE/DP/0539-051)
Offsite Environmental Monitoring Report - Radiation Monitoring Around United States Nuclear Test Areas, Calendar Year 1984	NRAD	EPA-600/4-85-035 (DOE/DP/00539-055)
Offsite Environmental Monitoring Report - Radiation Monitoring Around United States Nuclear Test Areas, Calendar Year 1985	NRAD	EPA/600/4-86-022 (DOE/DP/00539-056)
Offsite Monitoring for the Mighty Oak Nuclear Test	NRAD	EPA/600/4-86-030 (DOE/DP/00539-057)
Offsite Environmental Monitoring Report - Radiation Monitoring Around the United States Nuclear Test Areas, Calendar Year 1986	NRAD	EPA/600/4-87-017 (DOE/DP/00539/058)
Offsite Environmental Monitoring Report - Radiation Monitoring Around United States Nuclear Test Areas, Calendar Year 1986	NRAD	EPA/600/4-87-017 (DOE/DP/00539-058)
Environmental Surveillance Report for the Nevada Test Site (January 1980 through December 1980)	REECo[e]	DOE/NV/00410-64
Environmental Surveillance Report for the Nevada Test Site (January 1981 through December 1981)	REECo	DOE/NV/00410-67

Table 1.3-1. Sample of NTS[a] Environmental Monitoring Reports (continued)

Title	Source	Document
Environmental Surveillance Report for the Nevada Test Site (January 1982 through December 1982)	REECo	DOE/NV/00410-076
Environmental Surveillance Report for the Nevada Test Site (January 1983 through December 1983)	REECo	DOE/NV/10327-4
Environmental Surveillance Report for the Nevada Test Site (January 1984 through December 1984)	REECo	DOE/NV/10327-19
Radiological Effluent and Onsite Area Monitoring Report for the Nevada Test Site (January 1985 through December 1985)	REECo	DOE/NV/10327-28

[a]NTS = Nevada Test Site
[b]NRAD = Nuclear Radiation Assessment Division
[c]EPA = Environmental Protection Agency
[d]DOE/DP = U.S. Department of Energy Defense Program
[e]REECo = Reynolds Electrical and Engineering Company

1.4 ORGANIZATION OF THE ENVIRONMENTAL FIELD ACTIVITY PLAN DOCUMENT

Chapter 2 of this document identifies the applicable Federal, State, and local statutes, regulations, and environmental program documents that determine the information requirements of and rationale behind the radiological studies. Chapter 3 presents the technical design and design rationale. Included in Chapter 3 is a description of the methods; the technical procedures, equipment, and materials that will be used; and a discussion of the analysis and application of the results. Chapter 4 describes the data management system. Chapter 5 discusses the study schedule and deliverables. Chapter 6 describes the organizational management structure of the Project. Chapter 7 discusses quality assurance. References cited are listed at the close of the document.

Chapter 2

STUDY RATIONALE AND INFORMATION REQUIREMENTS

2. STUDY RATIONALE AND INFORMATION REQUIREMENTS

Various Federal environmental statutes, regulations, and Executive Orders impose environmental protection and compliance requirements on Federal agencies, including regulations for Federal agencies to comply with certain State and local regulatory programs. The DOE will meet all substantive and procedural Federal environmental requirements set forth by Federal laws and regulations, Executive Orders, and DOE Orders. In regard to State of Nevada and local environmental regulations for which Federal sovereign immunity has not been waived by the Congress of the United States (such as State laws that do not derive their authority from a Federal law), it is the DOE's intention to address, at a minimum, substantive elements of the state permitting process. The foregoing should not, however, be construed as limiting or restricting the DOE's courses of action should any State or local regulations be inconsistent with fulfilling the DOE's responsibilities under the NWPA, Atomic Energy Act, and other Federal statutes. These regulatory requirements are discussed in the NNWSI Project Environmental Regulatory Compliance Plan (ERCP) (DOE, 1988b) and are summarized below, with regard to the particular discipline addressed by this Environmental Field Activity Plan (EFAP).

2.1 NUCLEAR WASTE POLICY ACT (NWPA)

The principal legislation governing the activities of the NNWSI Project is the Nuclear Waste Policy Act (the NWPA) of 1982 (Public Law 97-425). The NWPA directs the DOE to conduct its site evaluation in compliance with applicable Federal, State, and local requirements. Section 113(a) directs the DOE to conduct site characterization in a manner that will minimize any significant adverse environmental impacts, identified in the Yucca Mountain Environmental Assessment (EA) (DOE, 1986a) or in comments received on the EA, to the maximum extent practicable. Although no significant adverse impacts have been identified for site characterization, the monitoring and mitigation strategies described in Chapter 3 of the EA will serve to minimize any

unforeseen impacts. Section 114(f) requires compliance with the National Environmental Policy Act (NEPA) of 1969 through preparation of an Environmental Impact Statement (EIS) for repository construction and operation. Section 117 ensures responsiveness to affected States and Indian Tribes through consultation and cooperation agreements. Passage of the Nuclear Waste Policy Amendments Act (NWPAA) has not affected any of the above NWPA provisions.

2.2 DOE ORDERS AND OTHER DOE REQUIREMENTS

All radiological study activities shall be carried out in compliance with DOE Orders 5480.1A, Chapter XI, "Requirements for Radiation Protection;" 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements;" 5481.1A, "Safety Analysis and Review System;" 5000.3, "Unusual Occurrence Reporting System;" 5480.4, "Environmental Protection, Safety and Health Protection Standards;" and other applicable orders. Study methodologies are consistent with the methods provided in the DOE reference standard DOE/EP-0096, "A Guideline for Effluent Radiological Measurements at DOE Installations," and DOE/EP-0023, "A Guide for Environmental Radiological Surveillance at U.S. Department of Energy Installations." The proposed revisions to DOE Order 5480.1B for Environmental Safety and Health programs, draft DOE Orders 5480.11, "Radiation Protection", 5400.3, "Radiation Protection of the Public and the Environment," and 5400.1, "General Environmental Protection Program Requirements" also are considered applicable for guidance for Radiological Monitoring Plan (RMP) (SAIC, 1988) activities.

2.3 OTHER FEDERAL REQUIREMENTS

This section address the Federal environmental regulations that are applicable during Yucca Mountain site characterization. This process, as described in the ERCP (DOE, 1988b), involved: (1) developing an understanding of what site characterization would involve, (2) performing an in-depth evaluation of the development, scope, and implementation of both Federal and State environmental regulations, and (3) examining each site characterization activity in light of its position under the regulatory scope of existing environmental laws.

2.3.1 Nuclear Regulatory Commission (NRC)

While the NRC does not have regulatory authority during the site characterization phase, the data generated may be used in subsequent topical reports, which may be used in support of the EIS and Safety Analysis Report (SAR); and in demonstration of compliance with 10 CFR Part 60, including the referenced 10 CFR Part 20, 40 CFR Part 191, 10 CFR Part 40, 10 CFR Part 19, and 10 CFR Part 50 Appendix B. All RMP data will be collected in a manner consistent with the NRC regulations, requirements, and guidance. The regulatory guides identified in BMI/ONWI-588 (Chang, 1986) are assumed to be a reasonable indication of NRC intent with emphasis on Regulatory Guides 1.21, 1.109, 4.1, 4.6, 4.13, 8.2, 8.6, 8.7, 8.8, 8.9, 8.10, 8.11, 8.13, 8.15, 8.20, 8.25, 8.26, 8.27, 1.23, 1.111, 1.112, 1.113, and 1.145 (AEC and NRC, various dates). Additional information on NRC Regulatory Guides is contained in the RMP (SAIC, 1988) and the Radiological Compliance Guide (RCG) (SAIC, to be issued(b)). All radiological study activities will evaluate applicable branch or generic NRC technical positions as guidance. As specific 10 CFR Part 60 Regulatory Guides and technical positions are issued, these NRC requirements will be implemented.

2.3.2 Other Statutes

Other Federal statutes and requirements, such as the Endangered Species Act of 1978, the National Environmental Policy Act (NEPA) of 1983, and the National Historic Preservation Act of 1966, may have indirect effects on the conduct of radiological monitoring activities, but do not provide requirements with respect to the development of the methodologies to be implemented.

2.4 STATE OF NEVADA

The Clean Air Act of 1977 and the Resource Conservation and Recovery Act (RCRA) of 1976 are two Federal statutes overseen by the EPA, but whose authority for implementation has been delegated to the State of Nevada. The Clean Air Act will affect reporting requirements with respect to the radiological monitoring activities if site characterization activities result in resuspension and release of off-site material that may have been previously deposited in the area. Unless mixed waste is generated during site characterization, RCRA will have no direct influence on the conduct of radiological monitoring activities.

The activities conducted during the siting will comply with the limits established in the Clean Air Act, specifically Subpart H of 40 CFR Part 61, and therefore will be consistent with Nevada Administrative Code 445.430-445.995 (State of Nevada, 1986) and related statutes. The Clean Air Act limits the yearly total dose to the public to less than 25 mrem/y whole body, and 75 mrem/y to any organ by the air pathway. The regulation requires the use of the codified version of AIRDOSE-EPA and RADRISK computerized risk assessment models (Moore et al., 1979; Dunning et al., 1980) or other approved methods to make the assessment. The Waste Management Project Office (WMPO) reports compliance with this regulation directly to the DOE/NV Health Physics and Environmental Division (HPED), which then submits data for all of the NTS to DOE/HQ, which in turn reports these results directly to the EPA.

2.5 Local Requirements

No local requirements exist for the NNWSI Project with respect to radiological monitoring.

Chapter 3 of the RMP describes radiological compliance and regulatory applicability for all radiological data collection activities in support of the NNWSI Project, detailing appropriate Federal, state and local requirements.

Chapter 3

TECHNICAL DESIGN OF THE STUDY

3. TECHNICAL DESIGN OF THE STUDY

The RMP (SAIC, 1988) describes in detail the design of the environmental radiological monitoring program in support of the NNWSI Project. The design basis of the RMP (SAIC, 1988) is comprehensive for all phases of NNWSI Project and is not limited to a program justified solely on the NNWSI Environmental Monitoring and Mitigation Plan (EMMP) (DOE, 1988a), Section 4.10 (Issues). The EMMP (DOE, 1988a), Section 4.10, presents two general radiological issues of concern: (1) radioactive material concentrations in air, soils, and groundwater, and (2) ambient radiation levels (background). These areas of concern were derived from the Yucca Mountain EA, Chapter 4 (DOE, 1986a) and from the methodology presented in the EMMP (DOE, 1988a), Chapter 2. The RMP (SAIC, 1988), Chapter 3., details all Project related requirements and commitments for environmental radiological monitoring activities. This section of the EFAP provides an overview of the RMP (SAIC, 1988), summarizing design, data collection, evaluational and impact assessment methodology, as appropriate to satisfy resolution of the EMMP (DOE, 1988a) issues.

3.1 DESCRIPTION OF THE STUDY DESIGN

To establish the site-specific radiological background, the environmental radiological monitoring program will collect data necessary to:

1. Characterize the work environment at the site.

2. Evaluate the potential impact of past and future NTS activities on the site.

3. Collect environmental data required to support facility design and preparation of the safety analysis report.

4. Monitor the impacts of site characterization on the environment.

5. Verify the acceptability of specific analytical techniques for evaluation of environmental levels of selected radionuclides.

6. Provide data necessary for the decontamination and decommissioning of the site, as necessary.

7. Demonstrate compliance with DOE, NRC, and EPA environmental requirements.

To monitor the site-specific radiological background, the environmental radiological monitoring program design includes field activities for evaluation of potential levels of radioactivity in soil and sediment samples, surface, drinking and/or ground water samples, airborne particulate and radioiodine samples, radon emanation monitoring, biota samples, and ambient radiation levels. Figure 3.1-1 depicts the overall RMP (SAIC, 1988) study area. Within this study area two regions of interest are identified:

1. Near field (NF): 16 km radius.
2. Far field (FF): 84 km radius.

The density of sampling locations and intensity of RMP activities is greater in the NF area than within the FF. Table 3.1-1 summarizes RMP site characterization sampling activities. The planned implementation phase for these sampling activities is summarized in Table 3.1-2. The types of analyses typically performed on a sample are presented in Table 3.1-3. Verification of analytical capabilities for selected nuclides of importance (i.e., I-129, Tc-99, C-14) is being evaluated by the EPA Environmental Monitoring and Support Laboratory (EMSL). The result of this EMSL evaluation may require changes to the present design of the RMP (SAIC, 1988), with respect to certain types and amounts of samples being collected. Section 4.3 of the RMP (SAIC, 1988) describes the design of the environmental radiological monitoring program in detail. Section 4.4 of the RMP (SAIC, 1988) details administration of program tasks and provides an overview of equipment and service needs. Section 3.5 of this document summarizes equipment information

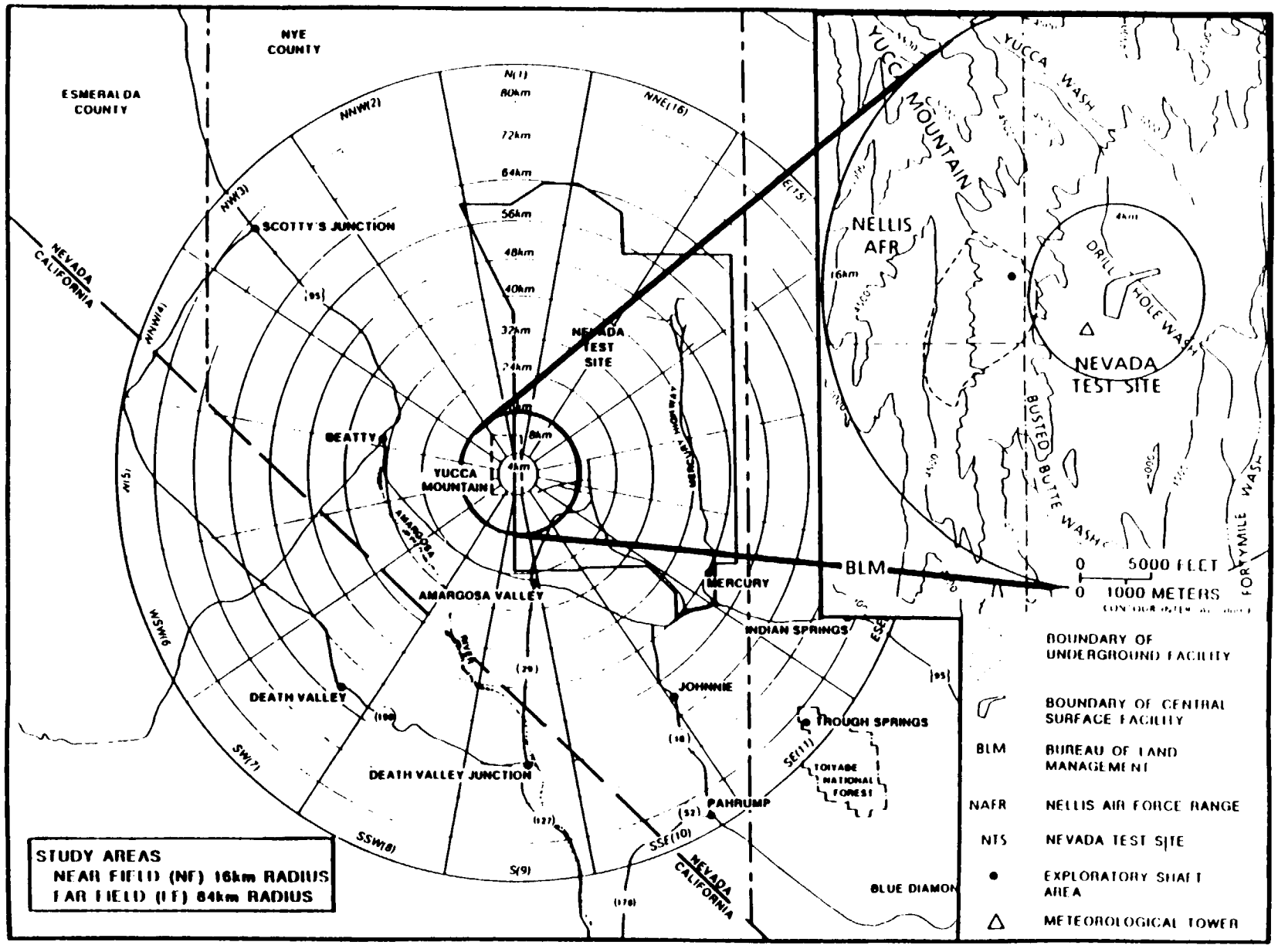


Figure 3.1-1. RMP Study Areas.

Table 3.1-1. Environmental Radiological Sampling

Sample type	Sample method	Nominal collection frequency
AIR		
Particulate filter	Continuous	Filter exchange weekly
Charcoal cartridge	Continuous	Cartridge exchange weekly
Cascade impactor filters	Intermittent	Near field stations once or twice a year
Radon	Integrating Continuous	Quarterly sampler exchange Weekly data collection
Tritium	Continuous	Weekly
Inert gas	Continuous	Weekly
WATER		
Ground/drinking water	Grab	Annual at far-field wells As available for USGS, near-field wells
Surface water	Grab	Annual
Ephemeral streams	Grab	As available
SEDIMENT		
Surface water bodies	Grab	Annual
Ephemeral streams		
Surface	Grab	As available
Depth	Grab	Once concurrent with initial surface sample
SOIL		
Surface	Grab	Annual at air sampling stations, once for archiving at all sample locations

Table 3.1-1. Environmental Radiological Sampling (continued)

Sample type	Sample method	Nominal collection frequency
Depth	Grab (TBD)[a]	Once at selected locations
Drift face	Grab	TBD
AMBIENT RADIATION		
Thermoluminescent dosimeters	Integrating	Quarterly dosimeter exchange
Pressurized ion chambers	Continuous	Weekly data collection
Aerial survey	Flyover	Once per Program phase
BIOTA		
Milk	Grab	Monthly
Produce		
Vegetable	Grab	Annually
Meat	Grab	Annually
Field crops	Grab	Annually
Forage species	Grab	Annually
Game birds	Grab	TBD
Indicator species		
Small mammals	Grab	Semi-annually
Large herbivorous mammals	Grab	TBD
Predators	Grab	TBD

[a]TBD = to be determined.

Table 3.1-2. Implementation Schedule of RMP Activities

Activity[a]	Implementation Phase
Air sampling/NF station 6	9/87[b]
Air sampling/NF stations	10/87 to 12/87
Air sampling/FF stations	10/87 to 2/88
Water sampling	10/87 to 2/88
Catch basin survey	1/88 to 6/88[c]
Water sampling (catch basins)	6/88 to 9/88
Radon integrating samplers	9/87[b]
Radon continuous monitoring	10/87[b]
Soil/sediment (NF) sampling	10/88 to 12/88
In situ gamma spectral analysis	11/87 to 6/88
Milk sampling	Ongoing[d]
Biota sampling (NF)	10/87 to 2/89
Land use survey (biota in human food pathway)	12/87 to 12/89
TLD monitoring	10/87 to 2/88
High-pressure ion chamber monitoring	10/87 to 2/88
Areal Measurements	To be determined
TLD monitoring (selected members of the public)	Ongoing[d]

[a]NF = near field, FF = far field, TLD = thermoluminescent dosimeter.
[b]Implementation per Preliminary Site Characterization Radiological Monitoring Plan (SAIC, 1987).
[c]Certain activities will not continue beyond the indicated implementation phase.
[d]This is an ongoing Nevada Test Site activity conducted by U.S. Environmental Protection Agency, Nuclear Radiation Assessment Division.

Table 3.1-3. RMP Sample Analysis

Sample Media	Analysis
AIR	
Air particulate filter	Gross beta counts - weekly filter(s) Gross alpha counts - weekly filter(s) Gamma spectroscopy - quarterly composite of weekly filters: Co-60, Cs-134, Cs-137/Ba-137m, K-40, Sn-126/Sb-126m/Sb-126, Ru-106/Rh-106, Sb-125/Te-125m, Ce-144/Pr-144, Pm-147 Alpha spectrometry or specific radiochemical analysis on quarterly filter composite: Po-210, Pb-210, Th-230, Np-237, Ra-226, Pu-238, Pu-239, Pu-240, Am-241, Am-243, Th-232, Cm-243, and Cm-244 Specific chemical analysis of quarterly composites: Sr-90/Y-90, Sr-89, Fe-55, C-14, I-129, Tc-99, and Pu-241 Total uranium (nonroutine analysis)
Charcoal cartridge	Gamma spectral analysis of weekly collected cartridge for I-131
Inert-gas monitor	Xe-133, Xe-135, and Kr-85 weekly collection liquid scintillation counting
Tritium	H-3 collected weekly, liquid scintillation counting
Radon	
Passive track etch type integrating sampler	Radon - quarterly collection
Continuously recording radon monitor	Radon - weekly data transfer
Augmented track etch	Radon daughter products - special quarterly sample

Table 3.1-3. RMP Sample Analysis (continued)

Sample media	Analysis
Particulate size sample	Low and high volume cascade impactor for size segregation and determination of weight fractions (nonroutine actual particle sizing)
WATER	
Ground water and surface water	Gross alpha and gross beta screening counts Gamma spectroscopy for gamma emitters (see AIR above for representative radionuclides of interest) Alpha spectroscopy on radiochemical analysis for alpha emitters: Np-237, Am-241, Pu-238, Pu-239, Pu-240, Cm-242, and Cm-244 Specific radiochemical analysis: Tc-99, Ni-59, Zr-93/Nb-93m, Pm-147, Fe-55, and H-3
Drinking water	Same as groundwater and surface water EPA drinking water criteria: Gross alpha and gross beta H-3, Sr-90/Y-90, Ra-226, Ra-228, and Rn-222 Total uranium
Ephemeral streams	Same analysis as surface water
Sediment	Same analysis as surface water

Table 3.1-3. RMP Sample Analysis (continued)

Sample media	Analysis
SOIL	
Surface soil	Gross alpha and beta (field screening) In situ gamma spectroscopy (periodic) Gamma spectroscopy for gamma emitters Specific radiochemical analysis: Sr-90/Y-90, Zr/Nb-95, Ce/Pr-144, Pu-238, Pu-239, Pu-241, Am-241, Ra-226, Np-237, Te-99, I-129, C-14, Po-210, and uranium (total)
Soil at depth	Same radionuclides as for surface soil Soil density Soil moisture
Drift wall	Same radionuclides as surface soil, plus: Th-237, Th-238, Th-230, Ra-228, Ra-224, Ra-226, U-238, U-234, and Po-210
BIOTA	
Milk	Gamma emitters (routine) H-3 (routine) Alpha spectroscopy Radiochemical analysis: I-129 (special) Sr-89 and Sr-90 (periodic)
Produce (human consumption)	Gamma emitters Alpha spectroscopy and specific radiochemical separation: Pu-239 and Pu-241 Specific radioanalytic analysis: C-14, Sr-89, Sr-90, and Ni-63
Beef	Gamma emitters Alpha spectroscopy and specific radio-analytical processes: Pu-239 and Am-241 Specific radioanalytic analyses: Sr-90, C-14, and I-129 (thyroid tissue)

Table 3.1-3. RMP Sample Analysis (continued)

Sample media	Analysis
Forage (deer and cattle)	Gamma emitters Alpha spectroscopy and specific radiochemical separation: Pu-239, Am-241, Cm-244, and Np-237 Specific radioanalytic analysis: Sr-90 and C-14
Indicator species (small mammal)	Gamma emitters Alpha spectroscopy and radioanalytical separation: Pu-239/240, Am-241, and Np-237 Specific radionuclide analysis: I-129, Pu-241, C-14, Tc-99, Sr-90/Y-90, Sr-89, Ni-63, and Ni-59
Ambient Radiation	
Thermoluminescent Dosimeter	Dose (mrem/qtr)
Pressurized Ion Chamber	Exposure rate (μR/hr)
Aerial survey	Exposure rate (Cs-137 equivalent μR/hr)

for implementation of field activities. Detailed descriptions of equipment and procedures for the operation, testing, and maintenance of equipment will be included in the Environmental Radiological Monitoring Technical Procedures Manual (SAIC, controlled document).

The implementation of the activities discussed in this program is contingent on obtaining access to the required areas. Where private land is involved, specific agreements with the owners are required. Access to government land is being addressed by NNWSI Project negotiations with the Bureau of Land Management.

The analysis of data and assessment of impacts for the RMP (SAIC, 1988) is dependent on input from various groups and organizations within the Nevada Operations Office (NVO) of the DOE. Extensive data is obtained for DOE/NVO by EPA, NRAD (EPA, 1987) through numerous radiological monitoring and surveillance networks designated specifically to satisfy the analytical needs of NTS. This NTS/EPA data will provide the core of the RMP (SAIC, 1988) far field data for establishing a radiological background and begin assessment of potential NNWSI Project impacts.

In addition to the extensive radiological information to be obtained from EPA, support data containing information on meteorological conditions, population distribution, agricultural practices, hydrological, soil, and biota parameters are to be provided by other Project groups. This support data will initially be obtained as described by the various other EFAPs (i.e., Water Resources, Ecosystems, Cultural Resources, Land Use, Soils, and Air Quality), and Socioeconomics Field Activity Plans (SFAPs). Finalization of the SCP to provide detailed study plans for site characterization will also be needed to plan required changes in the monitoring activities and to analyze the data collected.

3.2 RATIONALE OF STUDY DESIGN

The RMP (SAIC, 1988), is the controlling program document for all environmental radiological monitoring and assessment activities implemented in support of the NNWSI Project. The data obtained through RMP (SAIC, 1988) implementation will be used to resolve the EMMP (DOE, 1988a), Section 4.10, Radiation Level, monitoring and mitigation issue. RMP (SAIC, 1988) Sections 3.0 and 4.0 discuss in detail radiological compliance requirements and program design, respectively. These RMP (SAIC, 1988) sections discuss in detail the various technical issues specific to environmental radiological monitoring for the NNWSI Project. As presented in the RMP (SAIC, 1988), impact assessment methodologies and regulatory criteria form the basis for determining specific data types and needs.

3.3 RATIONALE FOR SELECTION OF THE STUDY METHODS

Primary considerations in the selection of study methodologies are

1. Technical recommendations and good practices.
2. Regulatory requirements and criteria, including DOE orders.
3. Site and area characteristics.
4. Minimization of intrusion within the public sector.
5. Limiting potential impacts to the ecosystem.
6. Compatibility with existing NTS activities.

These criteria assure that the study methodologies will produce quality results with minimal potential impacts.

Technically accepted methods for assessment of potential radiological impacts are as follows:

1. Measure the potential source term, project the releases using site data, and estimate impacts based on existing models.

2. Measure the release at the point of generation (resuspensions from soils or radon emanation from materials), then calculate projected impacts using existing models.

3. Measure the effluent concentration at the site boundary, then project the impacts using existing models.

4. Make direct measurement of the radionuclide concentration in the various exposure pathways (inhalation, ingestion, and immersion) at specified locations and then use current models to assess the impacts.

5. Directly measure the impact by monitoring individual doses.

Implementation of the RMP (SAIC, 1988)in compliance with established criteria requires application of the above methods to provide the various levels of confirmatory evidence to adequately assess the potential impact, if any, due to radiological releases.

The RMP (SAIC, 1988) sampling programs discussed in the following paragraphs include air sampling, water sampling, soil and sediment sampling, biota sampling, and ambient radiation monitoring. These sampling programs are discussed in detail in Section 4.3 of the RMP (SAIC, 1988). Many of the sampling locations identified in subsequent sections and figures depict locations throughout southern Nevada, California, and Utah that represent existing EPA, NRAD monitoring and surveillance networks designed to support NTS activities. With EPA, NRAD providing direct support to DOE/NVO programs, including the NNWSI Project, the NTS surveillance network data will also be available in support of RMP (SAIC, 1988) assessment needs. All available EPA data may be neither appropriate nor necessary to satisfy NNWSI Project environmental radiological monitoring needs. Only that EPA data necessary to provide information specific to Project needs, such as monitoring of the

nearest population centers, even if the monitoring location is beyond the primary 84 km study area, will be used. Cooperative activities between the EPA, NTS, and NNWSI Project programs provide the most cost-effective means for ensuring that comprehensive impact assessments are conducted.

3.3.1 Air Sampling

The RMP (SAIC, 1988) airborne radioactivity monitoring program (air sampling) includes:

1. Continuous collection of airborne particulate and iodine samples using a particulate filter and charcoal cartridge attached to a constant flow controlled vacuum pump.

2. Intermittent airborne particulate collection for particle size evaluation.

3. Airborne tritium and inert gas sampling.

4. Radon and radon daughter products monitoring.

Table 3.3-1 highlights the primary rationale for the air sampling station grid.

The locations of the NNWSI Project continuous air samplers are shown in Figures 3.3-1 and 3.3-2. The EPA, NRAD air sampling network is shown in Figure 3.3-3. Particle size data will be collected intermittently at various locations, primarily onsite, throughout the site characterization phase. These sizing samples will be collected using both high and low volume cascade impactor systems.

Inert gases, specifically radioxenons and radiokrypton (excluding radon), are being monitored because of their presence as a result of NTS

Table 3.3-1. Air Sampling Stations

Station	Rationale for location
NEAR FIELD	
8, 9, 10, 11, 17	Monitor potential concentration of radioactivity airborne from NTS[a] source(s)
6[b]	Monitor concentration at the surface facility area
1	Monitor concentration at the exploratory shaft area
3	Monitor concentration on top of Yucca Mountain due to topography
13	Monitor concentration moving offsite from easterly winds
FAR FIELD	
2, 4, 6, 9, 10, 13	Monitor existing concentration potential leaving the NTS based on existing REECo[c] monitoring
14[b], 15, 16[b], 18, 2, 19, 22[b]	Monitor primary agricultural and rural population area
7, 8[b], 11[b], 14[b], 15, 17[b], 18, 20, 22[b]	Monitor existing concentration at nearby population centers
24, 23, 26	Monitor significant area of the wind rose not covered by other monitoring
1, 3, 5[b], 7, 8[b], 23	Supplement concentration data for an area where the population is very low, but limited data exists for the existing EPA[d] program
12[b]	Monitor closest urban area

[a]NTS = Nevada Test Site.
[b]Includes tritium and inert gas samplers.
[c]REECo = Reynolds Electrical and Engineering Company, Inc.
[d]EPA = U.S. Environmental Protection Agency.

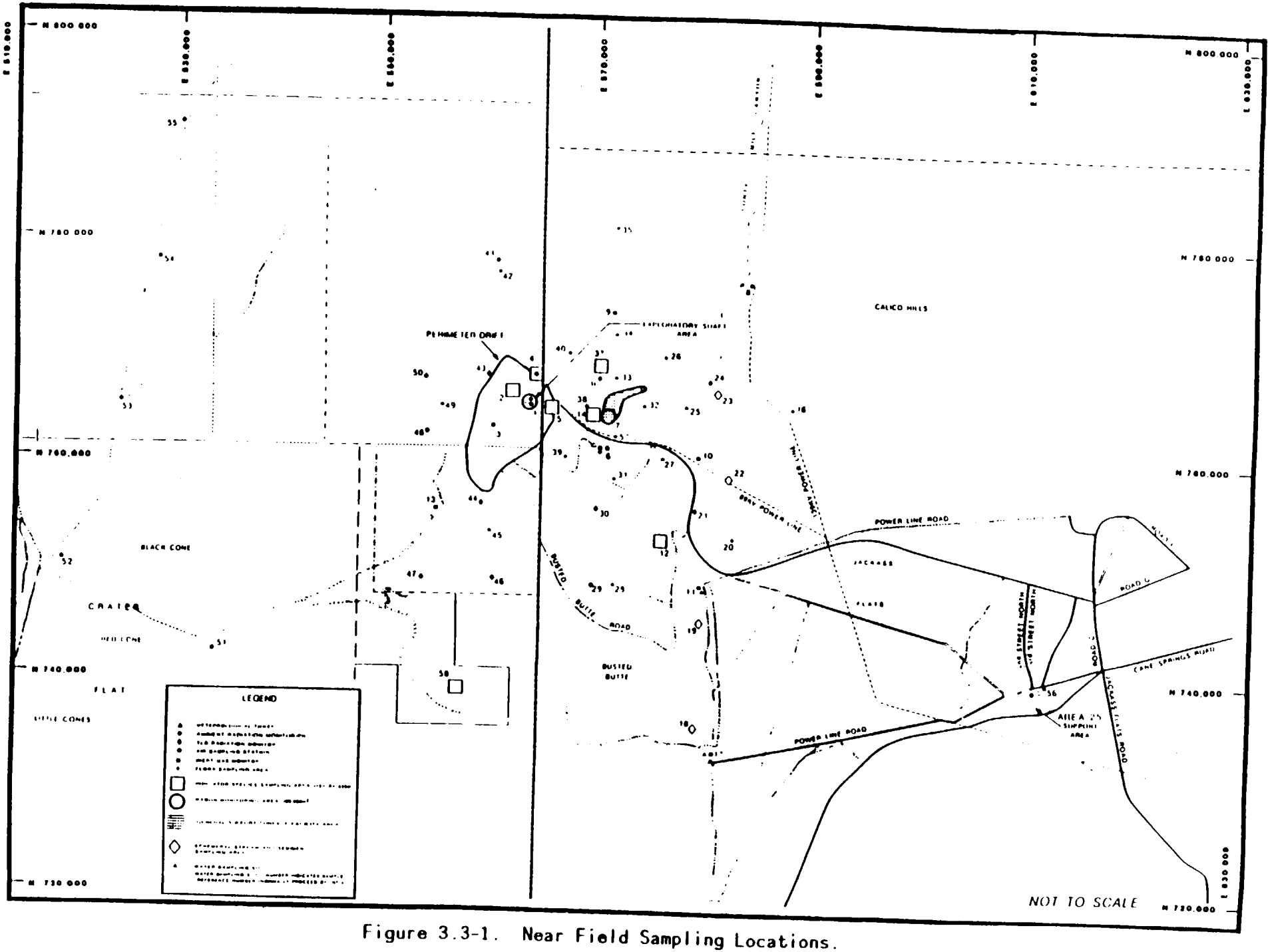


Figure 3.3-1. Near Field Sampling Locations.

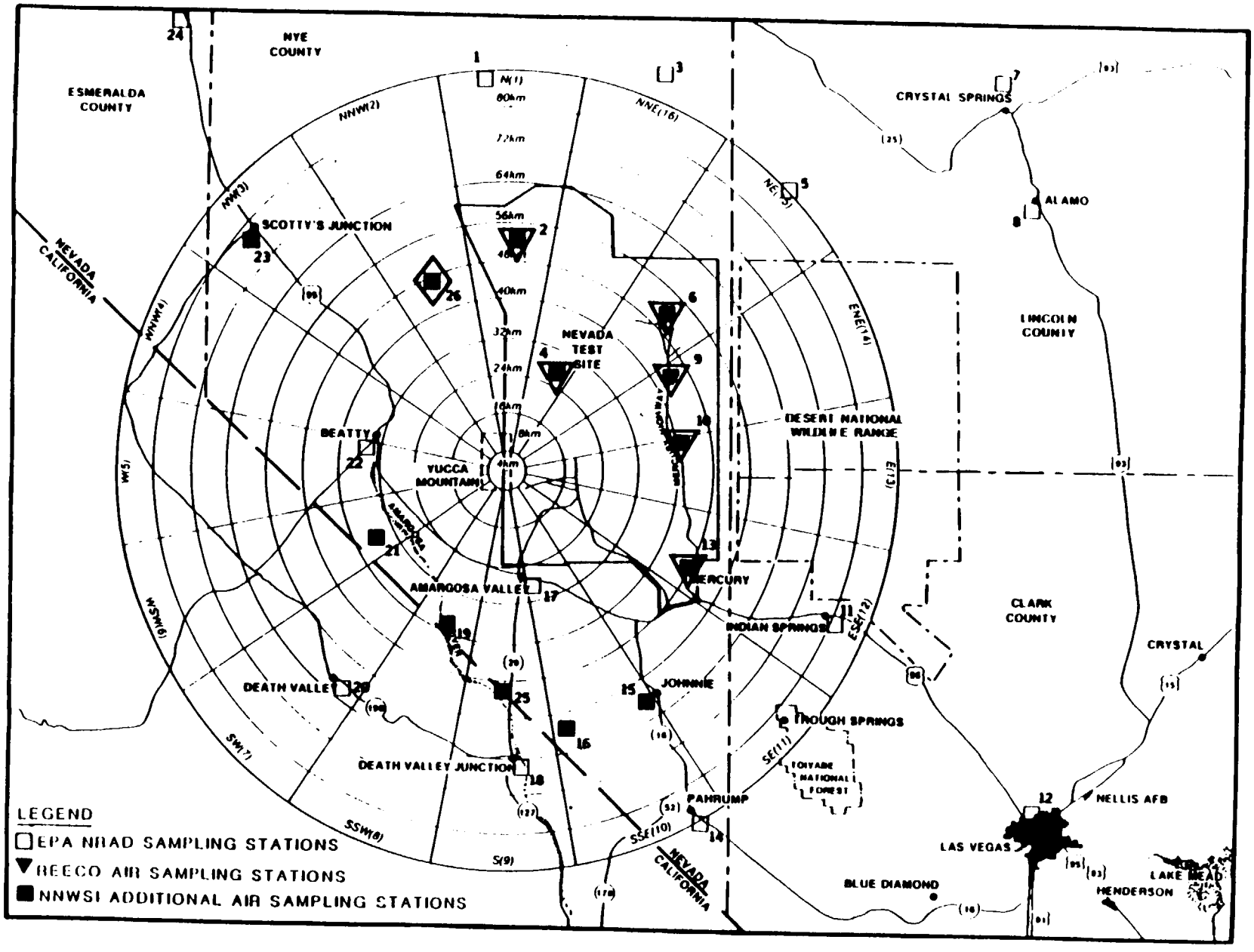


Figure 3.3-2. Far Field Air Sampling Locations.

Figure 3.3-3. EPA Air Surveillance Network Stations.

activities and potential influence on background assessments for the NNWSI Project. Figure 3.3-4 shows the location of inert gas and tritium (IGT) samples currently established by NRAD. Figure 3.3-1 shows the location of the near field IGT sampler for the RMP (SAIC, 1988). The tritium sampler is a refrigerated moisture trap, designed by the NRAD for the NTS monitoring support. The inert gas sampler is also an NRAD design with a compressed gas storage system.

The laboratory analysis and collection of many environmental radiological monitoring program air samples will be conducted by EPA. Table 3.1-3 provides a summary of the analysis conducted on various environmental media including air samples.

The locations for integrating radon sampling units are illustrated in Figures 3.3-1, 3.3-5, and 3.3-6. The radon monitoring system consists of both integrating samplers and continuous monitors. Terredex Type F track etch type integrating samplers for the measurement of radon concentrations are the primary sampling unit in the field. Continuous radon trace level monitors (CRMs) will be used to provide hourly data on radon uncertainities at selected sampling location. Typically, a CRM will be used to monitor radon concentrations at the 60 m meteorological tower and in the vicinity of the proposed exploratory shaft area. A CRM will also be available for making special radon measurements at other locations, as needed. Additional information about the radon monitoring equipment is available in Section 3.5.

3.3.2 Water Sampling

The RMP (SAIC, 1988) water sampling program includes the collection of ground (or well) water, surface water, and ephemeral stream sources. Water sampling will be conducted at the various locations shown in Figures 3.3-1, 3.3-7, and 3.3-8. Near field groundwater sampling location number 11 is Nevada Test Site (NTS) Well J-13. This well is of special interest because

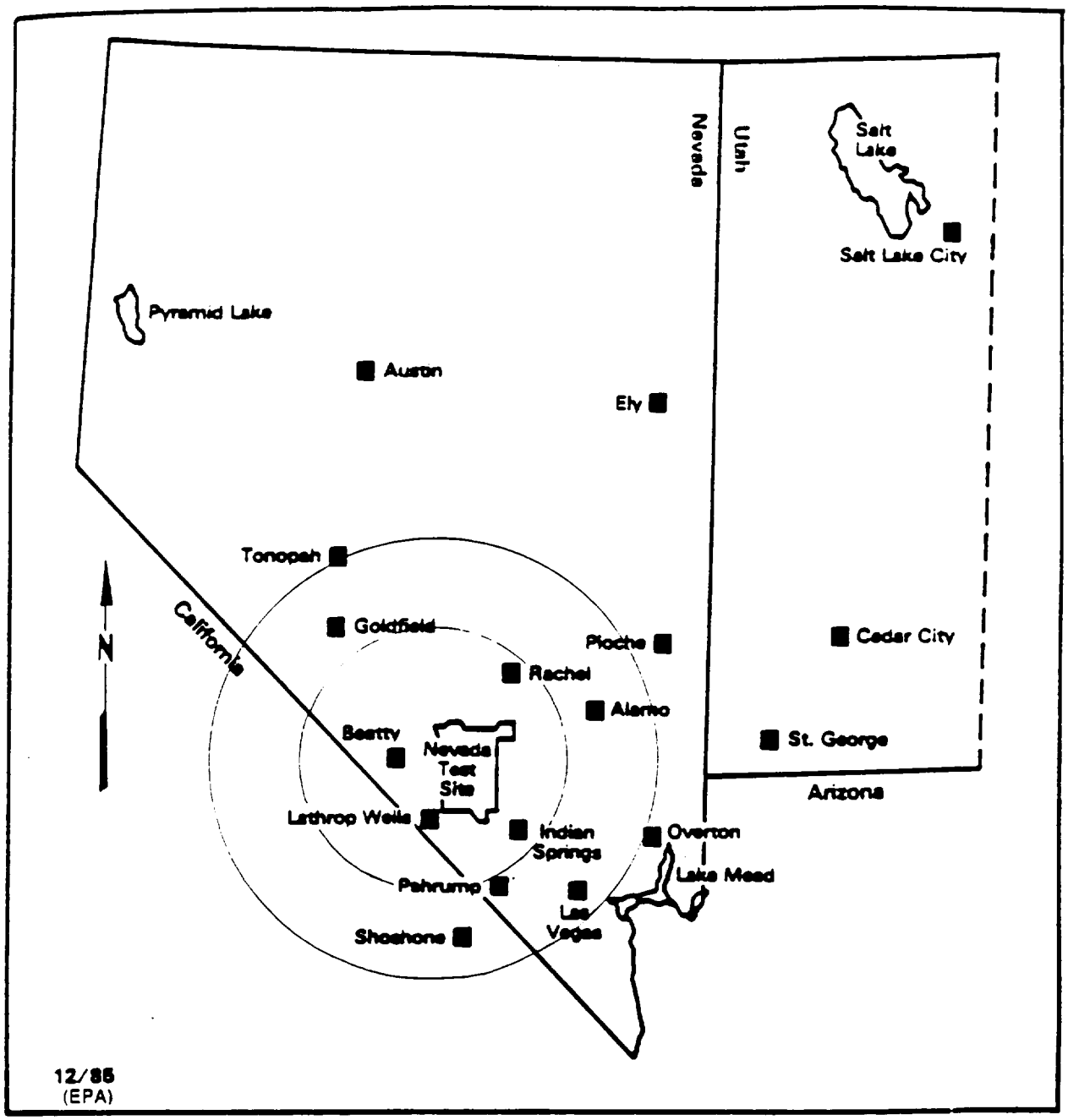


Figure 3.3-4. EPA Inert Gas and Tritium (IGT) Surveillance Network Sampling Locations.

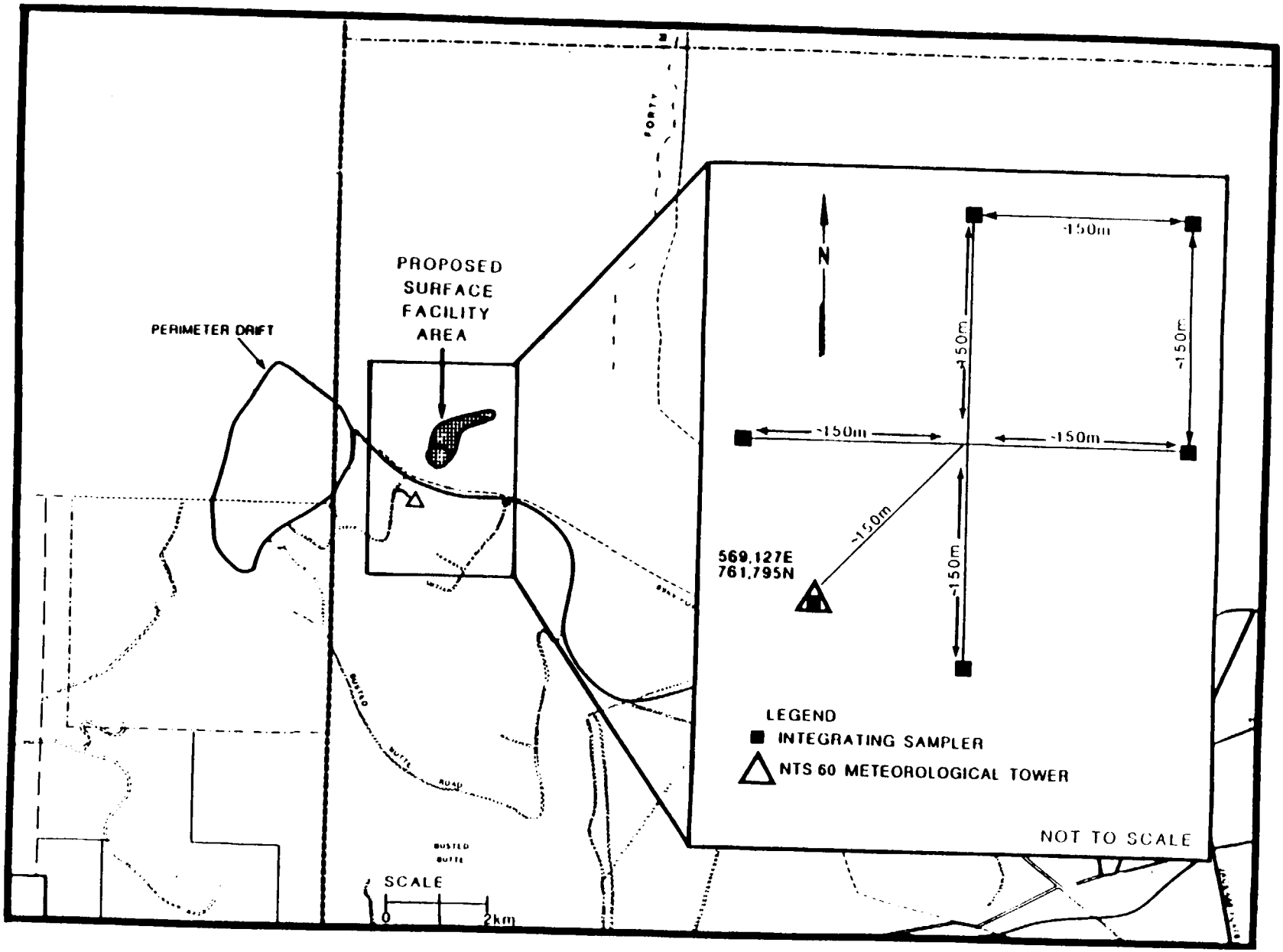


Figure 3.3-5. Radon Sampling Areas: Proposed Surface Facility Site.

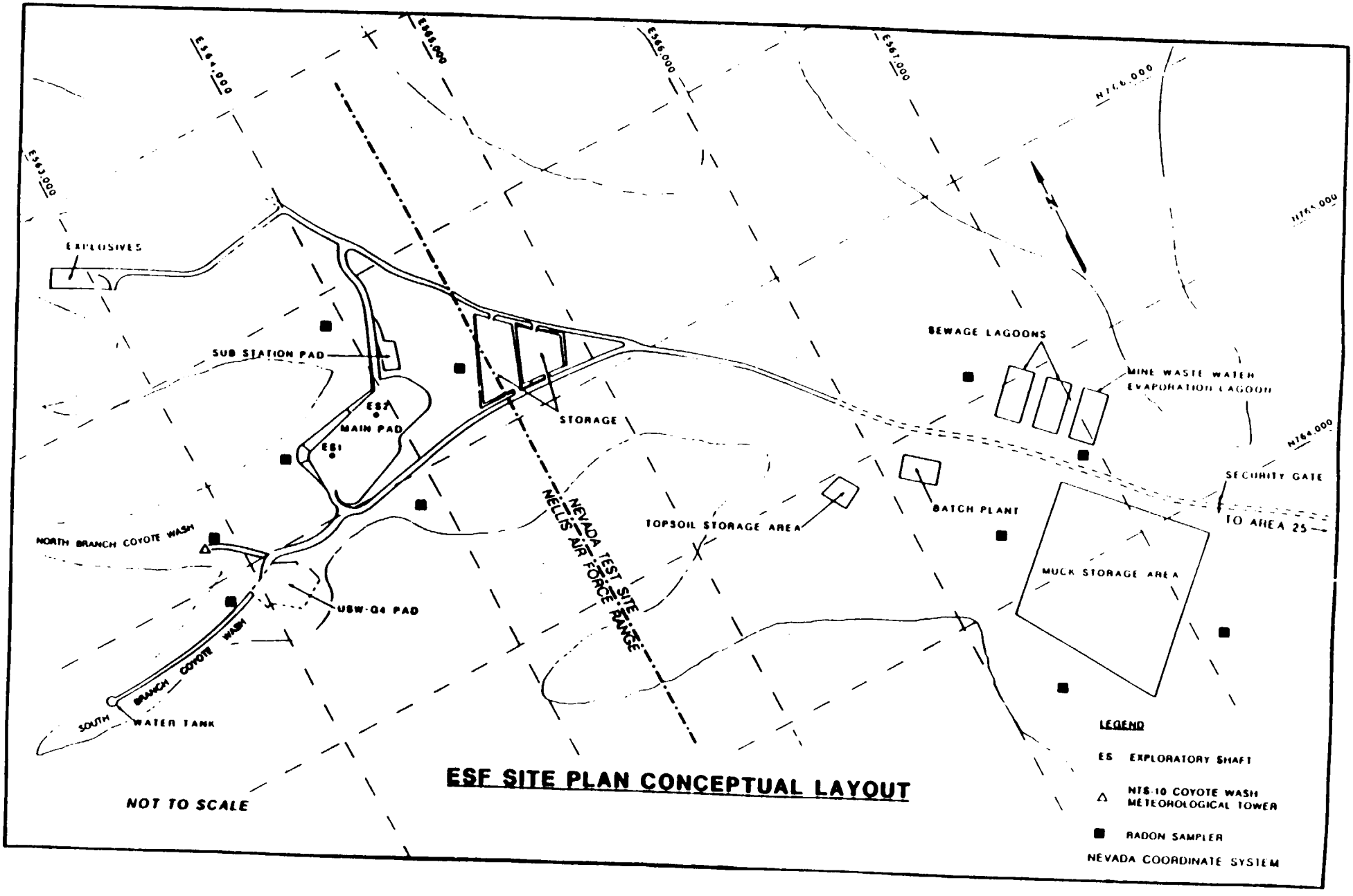


Figure 3.3-6. Exploratory Shaft Facility: Radon Sampling Locations.

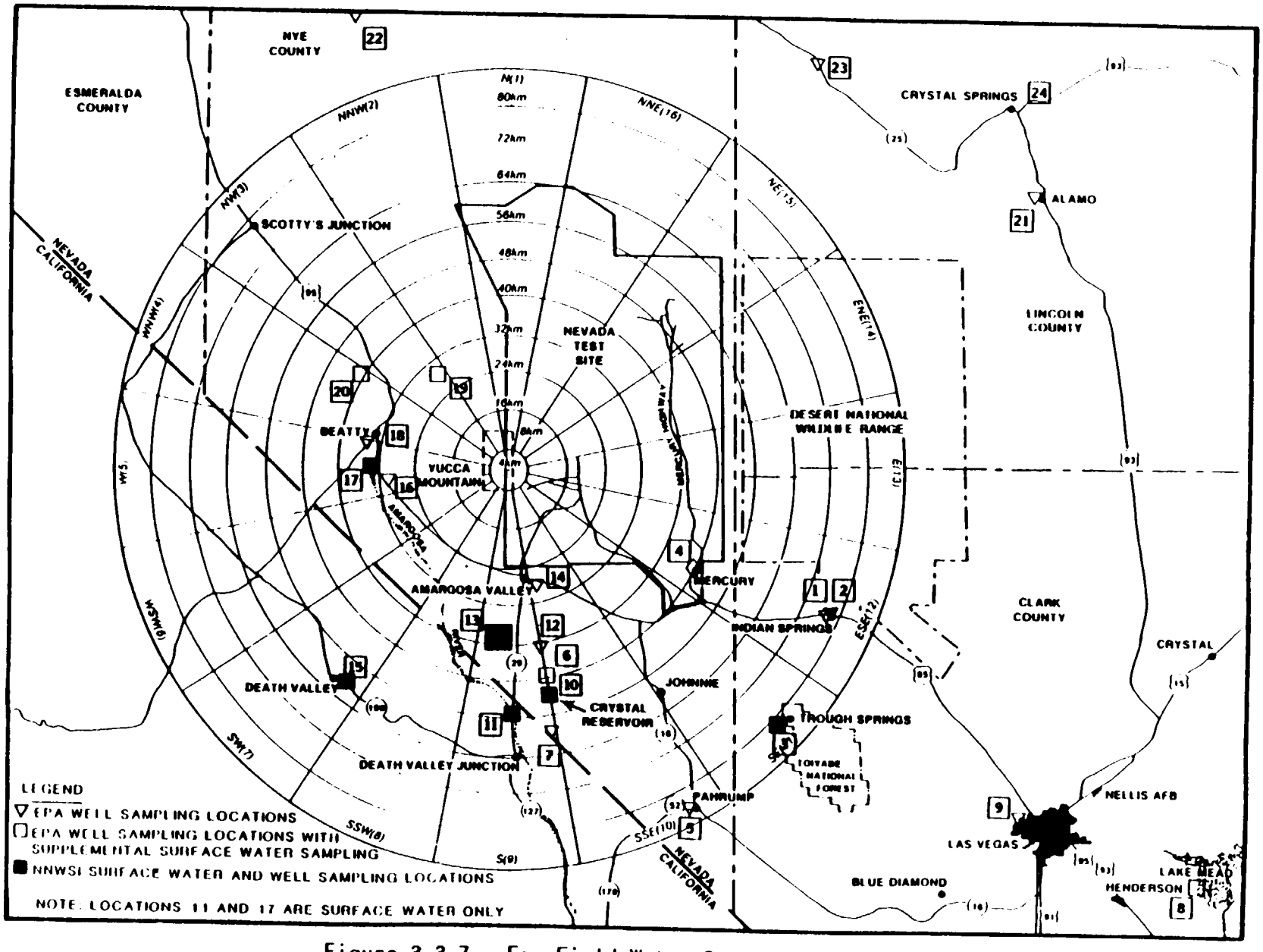


Figure 3.3-7. Far Field Water Sampling Locations.

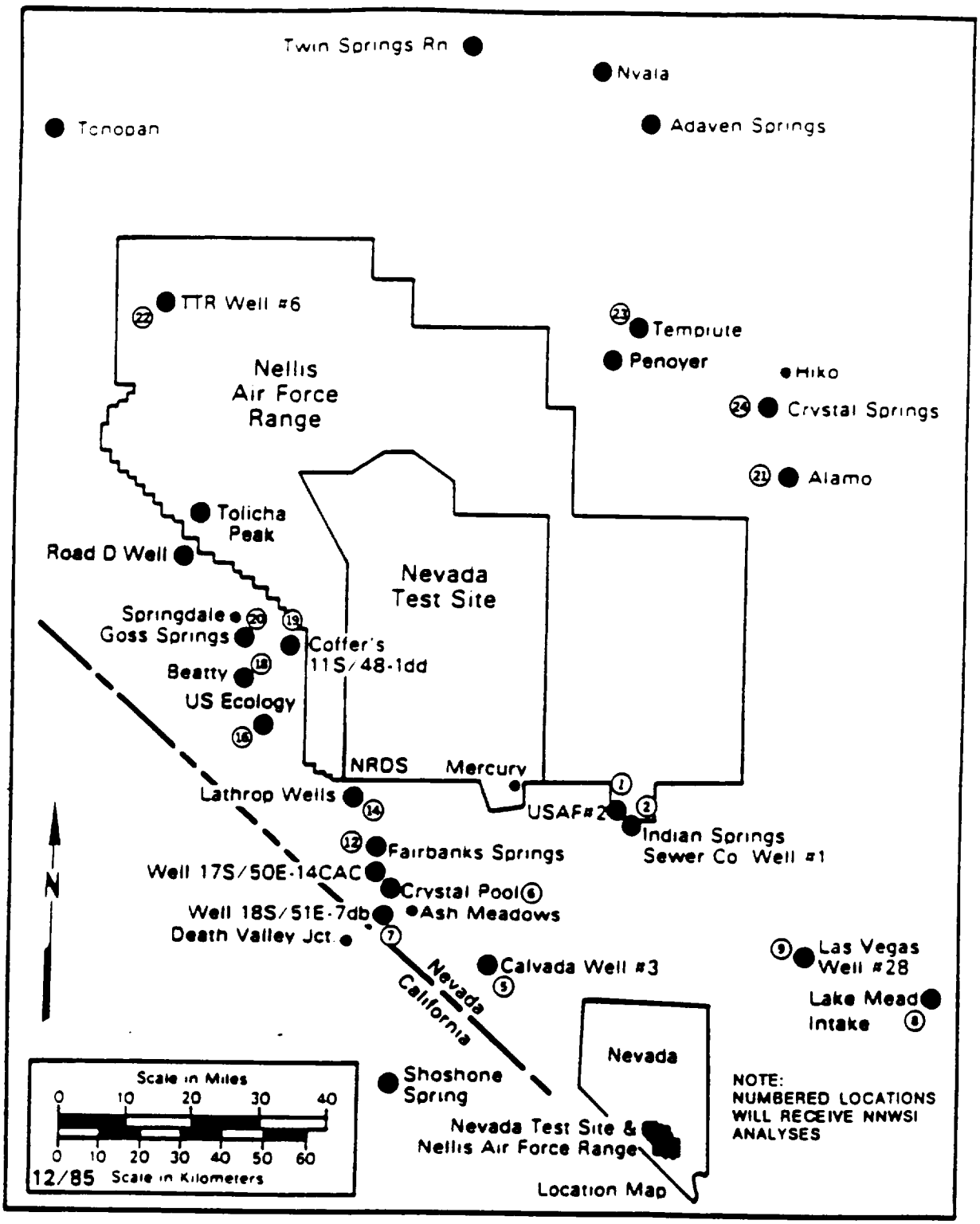


Figure 3.3-8. EPA Water Sampling Network.

it is expected to be the primary source of water used during site characterization. Surface water samples will be collected at those limited locations where surface water occurs. No perennial streams occur at or near Yucca Mountain within the NF study area. The only reliable sources of surface water are beyond 30 km from the proposed repository site at springs in the Oasis Valley north of Beatty, NV; in the Amargosa Desert southeast of Amargosa Valley; in Death Valley, southwest of Amargosa Valley; and at Crystal Reservoir in Ash Meadows, south of Amargosa Valley. Based on preliminary evaluations (SAIC, to be issued (a)) groundwater is not a significant exposure pathway and annual samples will provide adequate background information.

A survey of catch basins in the Yucca Mountain area will be conducted and sampling expanded to include appropriate basins serving as natural watering stations for wildlife. Water samples will typically be collected once a year. Ephemeral surface water flows in Fortymile Canyon will be sampled as available at the locations indicated in Figure 3.3-1. Figure 3.3-8 depicts the NRAD water sampling network. The NNWSI Project radiological studies will also use results available through the NRAD program. Near-field ground water sample collection will be coordinated with the hydrology studies at Yucca Mountain as detailed in the RMP and Water Resources EFAP (the latter to be released in July, 1988).

3.3.3 Soil and Sediment Sampling

In addition to the annual collection of soil and sediment samples from each air sampling location and Fortymile Wash, soil and sediment samples (as appropriate) will be obtained from all sampling locations during the first year of implementation or as a location is established. Special soil samples will be collected from each area selected for indicator species (biota) sampling. A process for randomized collection of soil samples within a designated area (Gilbert, 1987) is being evaluated. Future areas of intense construction disturbance will also be sampled. In general, most samples will

be archived for future analyses. Soil samples from air sampling locations and the sediment samples from Fortymile Canyon will be split, so that a portion of the sample can be analyzed and the balance archived. EPA, NRAD is providing the primary analytical support for analysis of soil samples. In situ gamma spectral analysis will also be performed at each soil sampling location.

3.3.4 Biota Sampling

Samples of locally produced food crops of importance in the human food chain exposure pathway or plants that may be indicative of localized agricultural conditions will be collected within the FF study area. Distribution of local graze (for cattle, sheep, etc.), local produce, meat, and poultry production will be evaluated to determine the required sampling scheme. The nearest agriculturally active area is within the Amargosa Valley, which is more than 24 km southwest of the proposed repository facility. Once the initial stages of this agricultural evaluation are completed (FY 88) the overall RMP (SAIC, 1988) for the NNWSI Project will be revised to include the details of agricultural sampling for the biota program.

Currently EPA, NRAD has an extensive milk sampling network (MSN) for NTS offsite radiological environmental monitoring. No additional milk sampling locations are anticipated for NNWSI radiological studies. Figure 3.3-9 depicts the current NRAD MSN. Analytical results obtained through this EPA network will be supplemented by special radiochemical analysis on selected samples to provide the additional information necessary to satisfy RMP (SAIC, 1988) requirements.

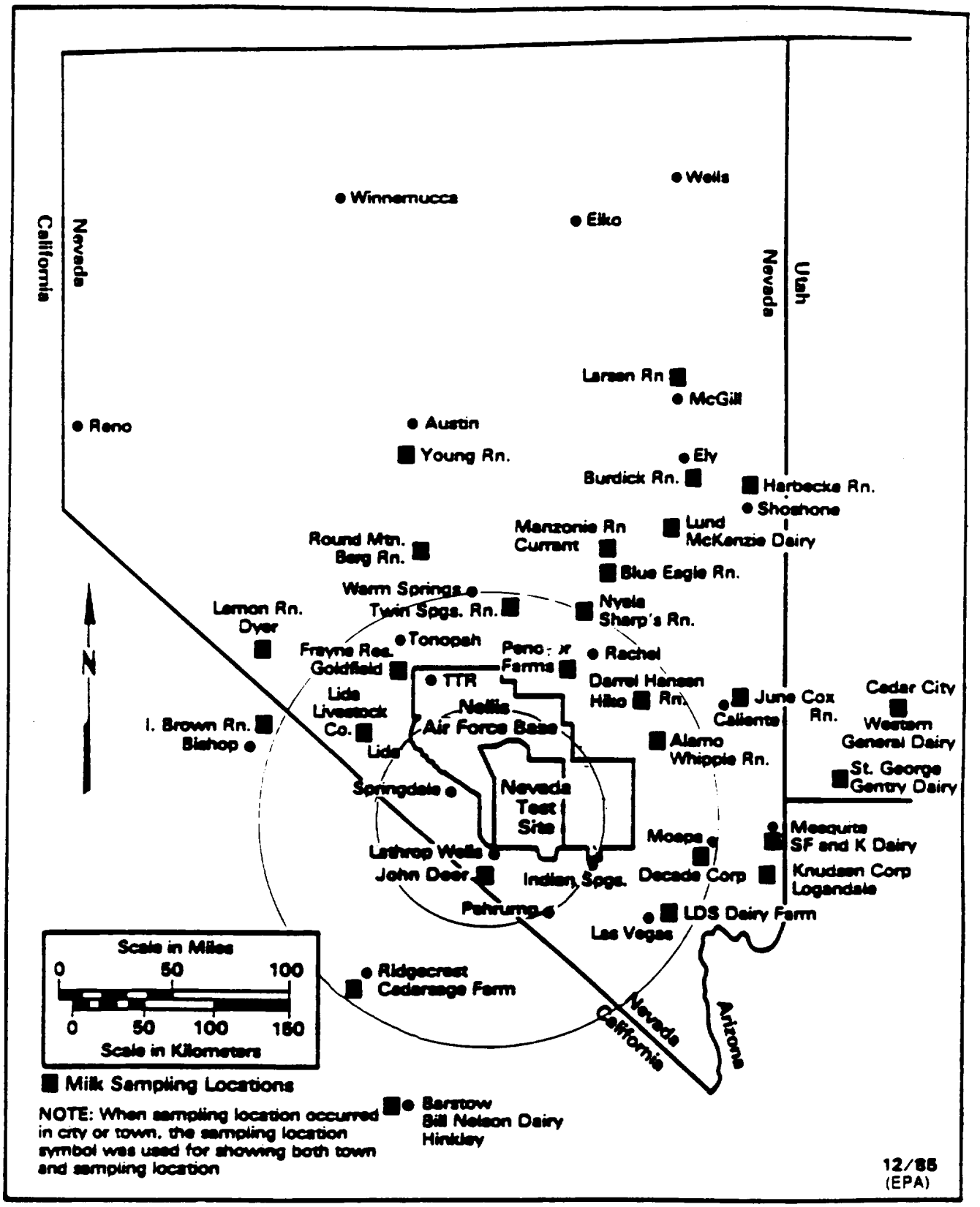


Figure 3.3-9. EPA Milk Sampling Network.

3.3.5 Ambient Radiation Monitoring

The monitoring of ambient radiation will be conducted primarily by using thermoluminescent dosimeters (TLDs) on a quarterly exchange period (three month field exposure cycle). TLDs will be placed at each air sampling location and at NF locations depicted in Figure 3.3-1. Figure 3.3-10 depicts the FF TLD locations that will be supplemented by the existing NRAD TLD network represented in Figure 3.3-11.

In addition to the TLDs, high-pressure ion chambers will be used to monitor ambient radiation levels. The PICs will be used to continuously monitor exposure rates at various locations. The locations in Figure 3.3-12 are a part of NRAD's existing Dosimetry Monitoring Network. Figure 3.3-1 indicates the NNWSI NF locations for deployment of pressurized ion chambers (PICs). A portable PIC unit will be available to augment the PIC monitoring network.

The EG&G Energy Measurements, Aerial Measurements System group will conduct an airborne radiometric survey (Jobst, 1984) of the Yucca Mountain area. DOE/NV is currently being requested to arrange this survey. This survey will produce external exposure rate isophleths (μR/h at 1 meter) for the NF area.

3.3.6 Individual Monitoring

NRAD currently monitors a limited number of members of the general public (individuals). This NRAD TLD data will be used to supplement the RMP (SAIC, 1988) activities. Currently no expansion of this program relative to NNWSI Project activities is projected during the site characterization period.

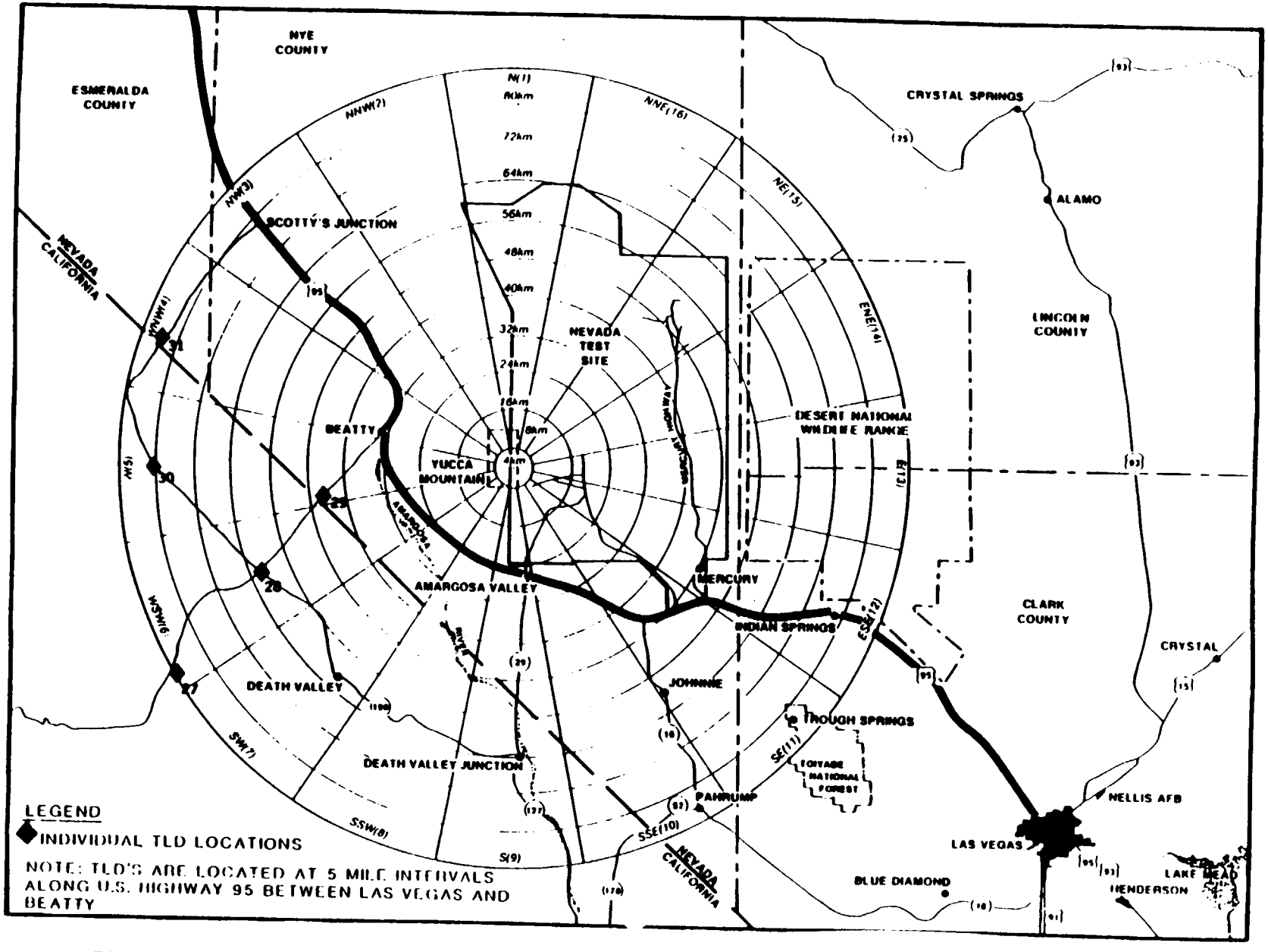


Figure 3.3-10. NNWSI Far Field Thermoluminescent Dosimeter (TLD) Monitoring Locations.

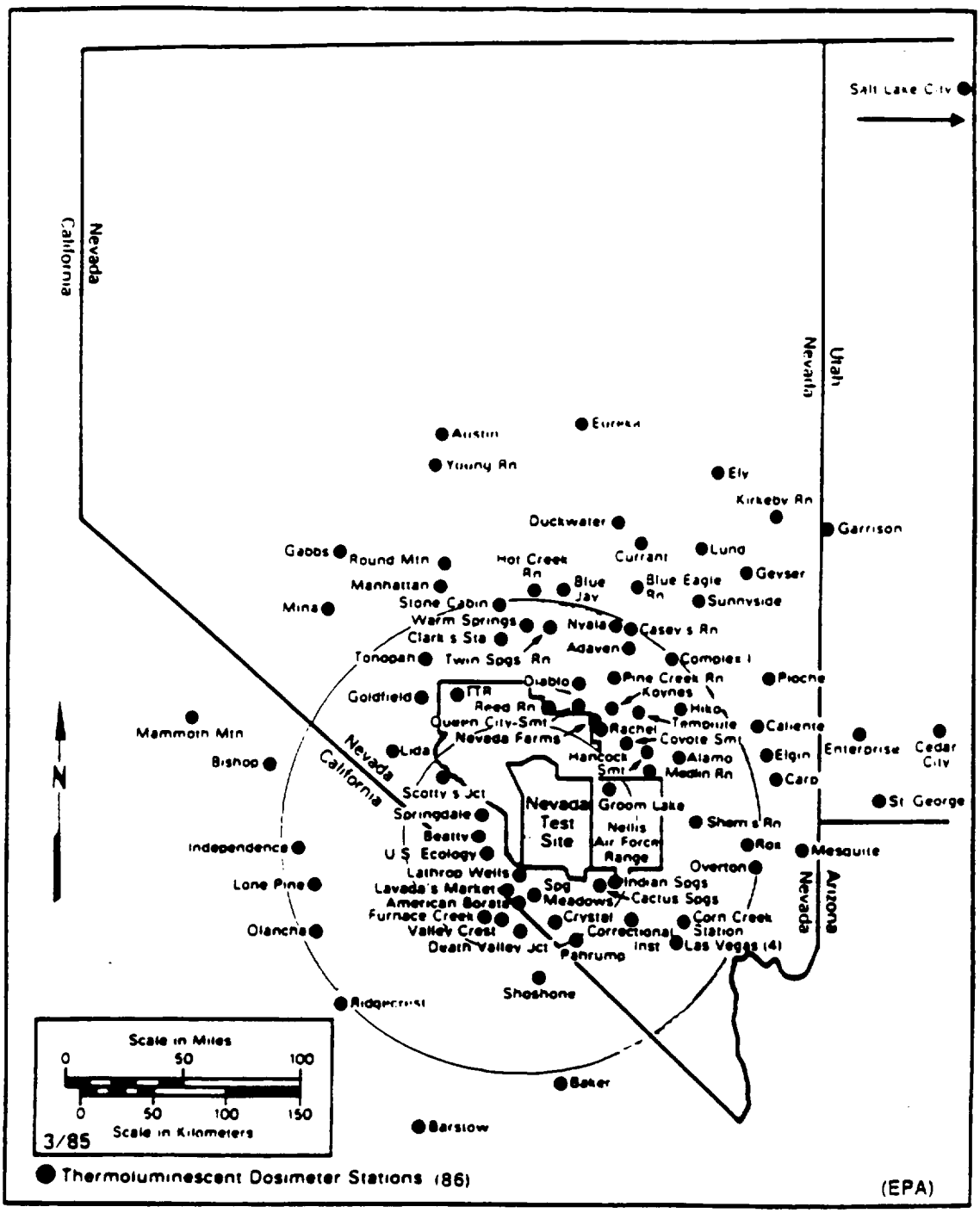


Figure 3.3-11. EPA Thermoluminescent Dosimeter (TLD) Monitoring Network.

Source: DOE/DP/00539/058(EPA/600/4-87/017)

Figure 3.3-12. EPA Pressurized Ion Chamber (PIC) Surveillance Network.

3.4 APPLICABLE TECHNICAL PROCEDURES

The technical procedures to be followed in the collection of the environmental radiological monitoring data are addressed in detail by type of monitoring in Section 4.3 of the RMP (SAIC, 1988). The primary bases for the selection of the analytical techniques are NUREG-0745, DOE/EP-0023, and EML/HASL-300 (Conti, 1978; Corley et al., 1981; Volchok and dePlanque, 1986). Specific procedures and instructions for conducting radiological monitoring activities are compiled in the NNWSI Project contractors' Environmental Monitoring Radiological Technical Procedures manual, NRAD technical procedures and Quality Control (QC) plans, and the procedures of each individual contractor or subcontractor who participates in the scope activity of the RMP.

3.5 EQUIPMENT AND MATERIALS

The equipment and services specified in Tables 3.5-1 and 3.5-2 are necessary to support implementation of the Radiological Monitoring Plan, which is the controlling document for all NNWSI Project environmental radiological activities, including the EMMP-related radiological studies. In addition to the services indicated in this table, the following organizations support RMP implementation as indicated.

1. EPA/NRAD (Las Vegas) provides support in the collection and analysis of samples.

2. EG&G (Santa Barbara) provides support in the identification and collection of biota samples.

3. REECo (Las Vegas) provides general site support services.

Table 3.5-1. Equipment (page 1 of 2)

Item	Function	Number	Reference Information
Continuous Radon Monitor (high sensitivity)	Continuous radon monitoring	3	Pylon, Model PMT-TEL
Limited sensitivity radon detector	Radon monitoring (short timeframe)	1	Pylon, Model PRD-1
Working level detector for radon monitor	Working level measurement	1	Pylon, Model AEP-47
Continuous air sampling station	Particulate and iodine sampling	25	RADECO, Model HD-28A (K-flow)
Low energy photon detector with shielding and electronics	I-129 and Tc-99 measurements	1	EG&G/ORTEC
Glasswire for C-14 analysis (specified system)	C-14 measurements	N/A	N/A
Radioactive standards to support analysis activities	All measurements	N/A	NBS traceable or equivalent (various suppliers)
High pressure ion chamber	Environmental exposure rate measurements	6	Reuter-Stokes, Model RSS-1012
Tritium monitor	Monitor Tritium	3	EPA/NRAD Instrumentation
In situ Gamma Spectral Analysis Equipment	In situ Gamma Spectral Analysis	1	Nuclear Data, ND66 XP system with PGT 77K detector

Table 3.5-1 Equipment (page 2 of 2)

Item	Function	Number	Reference Information
Noble gas monitors	Monitor noble gases	3	EPA/NRAD, EMSL-LV-539-7 Panasonic, Model UD-800 Series
TLD for environmental measurement	Ambient radiation monitor	12	
Particulate AED samplers and support equipment	Measurement of AED	2	Anderson, Model 210 Cascade Impactor and Model 112 sampler (K-flow)
Soil/sediment sampling equipment	Collection of soil samples	1 set	AMS, Soil Recovery Auger system
Analytical balance	Measurement of AED and various samples	1	Sartorius, Analytical Model A120S/FW
Water sampling equipment	Water sample collection	1 set	TBD
Biota sampling equipment (traps, etc.)	Sampling biota	100	Sherman live traps
ADP analysis support equipment	Data collection and analysis	3	VAX compatible
Beta/gamma portable survey instrument	Field surveys	2	Eherlin, ESP-1
Alpha portable count rate meter	Field surveys	2	Ludlum, Model 65

Table 3.5-2. Services and Expendable Materials (page 1 of 2)

Item	Function	Units per station per year	Reference Information
Radon monitors	Radon monitoring	12	Terradex, track etch samplers
Radon daughter monitors	Radon daughters product monitoring	12	Rad Services samplers
Air sampler filtration media	Particulate air sampling	52	Gelman, 44mm glass fiber filter media or equivalent
Charcoal cartridges for air samplers	Iodine air sampling	52	
Calibration of radon monitoring equipment	Radon monitoring	1	EPA radon calibration facility
Air sampler calibration and repair	Air sampling	2	EPA calibration and repair facilities (EMSL-LV)
Soil/water/sediment sample bottles	Sample storage	2	Various suppliers (UWR, Fisher, Forestry Supply, ACE Scientific, etc.)
Core sample containers	Sample storage	1	" "

Table 3.5-2. Services and exp. lable materials (page 2 of 2)

Item	Function	Units per station per year	Reference Information
Particle AED filters and support materials	AED measurement	10	Various suppliers (Anderson, Sierra Misco, INTOX, etc.)
Particulate chemical analysis	Chemical analysis of airborne radioactivity	(see Table) 3-3	EPA, EMSL
Ion chamber calibration	Environmental exposure for monitoring	3	EPA, EMSL or manufacturer
Miscellaneous outside analyses	Special and QC samples	N/A	TBD
Noble gas/tritium sampler maintenance	Noble gas/tritium measurements		EPA equipment repair facility
ADP Maintenance and supplies	Data analysis and collection	-	N/A

4. EPA/Office of Radiation Programs (ORP) (Las Vegas) provides support for calibration and quality control sample preparation for radon monitoring activities.

5. EG&G (Las Vegas) provides support in the conduct of aerial surveys.

The procurement process is controlled in accordance with latest revision NVO-196-17, Nevada Nuclear Waste Storage Investigations Quality Assurance Plan, directly implementing applicable ANSI/ASME NQA-1 et. seq. (ASME, 1986) requirements. The procurement of items and services is controlled to ensure conformance with the Project contract requirements. The selection of suppliers and subcontractors will be based on an evaluation of their capabilities to provide the items or services. The selection of suppliers is generally based on the following, as appropriate to the designated quality level (I, II, III, or NA) for an item or service:

1. Direct survey.
2. Evaluation of the supplier's history.
3. Evaluation of the supplier's quality records.

Procurement is initiated three to six months prior to scheduled need for a specific item to ensure receipt and acceptance testing are completed prior to field use.

3.6 DATA ANALYSIS

Chapters 4 and 5 of the RMP (SAIC, 1988) provide detailed information on sample and data collection methodologies, sample analysis techniques, data reporting formats, and use of analytical results in assessing potential impacts to the site as a result of activities at Yucca Mountain.

3.6.1 Data Collection

The sampling and monitoring locations established to support environmental radiological monitoring activities are selected such that they are physically representative of the general area of interest. The various sampling programs discussed in Section 3.3 of this EFAP provide various types of data as indicated by the different types of analyses performed on a sample.

3.6.2 Data Reduction

Data reduction for the RMP (SAIC, 1988) is basically the summarization of all numerical data (digital and not digital) in a statistical manner (i.e., data groups, distribution plots, and time sequence averages), to reduce the number of data points to a manageable number for analysis and reporting.

Proper statistical treatment practices are essential for the production of quality results. Because sampling data and analytical results tend to exhibit a wide variety of distribution types, data reduction and evaluation frequently requires the use of various statistical treatments to allow for interpretation of data. It is important to characterize the environmental radiological data collected in an evaluation matrix, which relates meteorological data and other site parameters to the radiological data being evaluated.

The environmental radiological monitoring data will be reviewed using the following basic criteria:

1. Uncertainty (95 percent confidence level) in the value, based on counting statistics.

4. Consistency with practical range of know[illegible]a. [illegible], based on past data and existing National Council on Radiation Protection and Measurements information on environmental radiation background (see NCRP, 1984).

5. Instrument problems and/or calibration data.

6. Quality control sample results.

When data quality has been evaluated against the above criteria, the raw data will be placed in the Project technical data base for use by appropriate technical staff and for informational purposes to designated Project participants and interested parties including tribal, State, and local officials.

3.6.3 Data Analysis

There are some generally accepted practices for examining environmental radioactivity sampling data (Watson, 1980). Data acquired may be grouped according to geographical location, sample media, radionuclide results, and/or time of sample collection. Characterization of each of these groups of data will constitute a major emphasis in data analysis. Characterization may be numerical and/or graphical and typically will involve determination of statistical values which estimate central value (arithmetic mean, geometric mean, and midrange) and dispersion (standard deviation). Analysis of data demonstrating nonstandard distributions (skewed or mixed distributions), the presence of outliers, and numerous values that fall below the limit of detection is not simple and the same analysis procedure will generally not a[illegible]y to different data groups.

to a set degree of accuracy using a limited number of data points. Spatial and temporal variations must be determined, usually on a case-by-case basis. Typically estimates of precision, sequential plotting, distribution analysis and group analysis are applicable for use in characterizing time indicators and dose estimators, whereas corrections for bias are generally applied to dose estimates only.

3.7 APPLICATION OF RESULTS

Environmental radiation data obtained as a result of data collection will be used in conjunction with meteorological information and site-specific parameters to develop input data for approved computer modeling codes and assessment methodologies, which in turn provide the method of estimation of site impacts. The following represents the logic that will be used in radiological analysis.

1. Using soil data, local airborne concentrations and particle size data to estimate resuspension rates.

2. Using soil data and resuspension rates to project source terms in routine and enhanced (by site activities) offsite releases of radioactivity.

3. Using localized airborne concentrations as source terms to estimate routine and enhanced (by site activities) offsite releases of radioactivity.

4. Measuring offsite airborne concentrations directly, before and during site activities.

6. Using b a and drinking water measuremen to revise or confirm ingestion pathway dose assumptions (supports item 5).

7. Measuring the radon releases to calculate offsite concentrations.

8. Using radon emanation rate data, meteorological parameters and site disturbance information to project radon releases offsite.

9. Estimating radon emanation rates from meteorological data, site activity, and material data to support activity 8.

10. From item 5 and appropriate population densities, an assessment of public risk will be made.

The exact programs/models have not been established. The determination of appropriate models is being addressed in Section 5 of the RMP (SAIC, 1988). Currently identified models or programs for consideration include:

1. AIRDOS-EPA/RADRISK for estimation of offsite doses/risk from particulates and gaseous releases.

2. CRRIS system for estimation of offsite doses/risk from particulates and gaseous releases.

3. MILDOS for the estimation of offsite doses from radon releases.

4. RAECOM for the estimation of radon emanations from materials.

Resuspension models such as those discussed in BNWL-1996 (Hall et al., 1977) and NVO-178 (White and Dunway, 1977) are also being evaluated for possible use.

Chapter 4

DATA MANAGEMENT

4. DATA MANAGEMENT

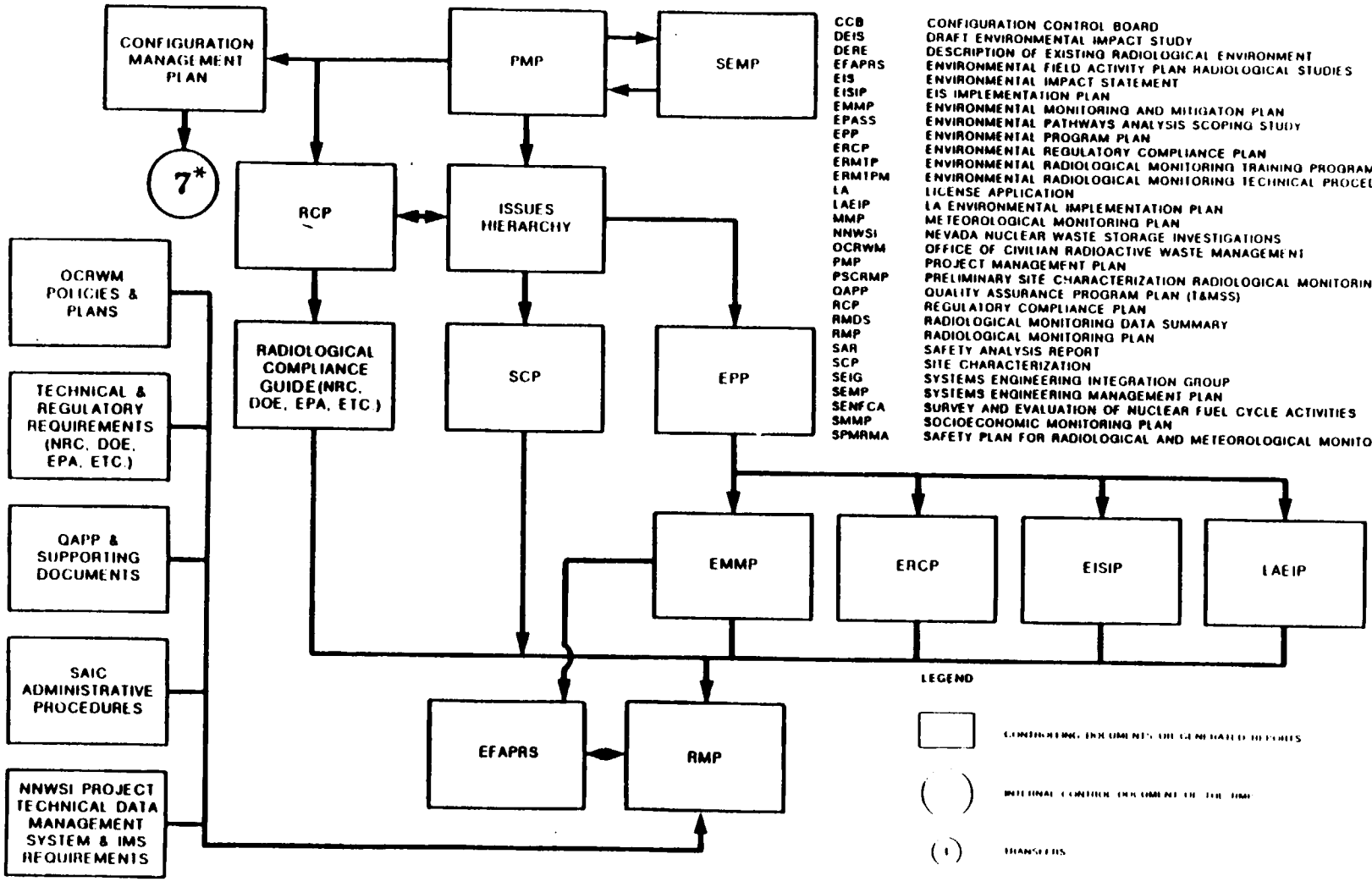
This section provides an overview of the management and reporting of field data produced by the Radiological Monitoring Plan (RMP) (SAIC, 1988) and this Environmental Field Activity Plan (EFAP). Included is a brief description of the strategy for managing the data to ensure a secure and efficient method for handling and accessibility for technical and general information needs.

In addition, it is anticipated that a variety of Topical Reports will be prepared under each discipline in support of a variety of requirements. These include permit applications, Environmental Monitoring and Mitigation Plan (EMMP) (DOE, 1988a) Progress Reports, Environmental Impact Statement preparation and compilation, and other as yet unidentified needs. In all cases, the data used to compile such reports will be data that is already a part of the reference data base to the Project.

4.1 DATA MANAGEMENT

The data will be handled and collected in a manner consistent with the NNWSI Project requirements. Figure 4.2-1 shows the document hierarchy for the collection and reporting of radiological environmental data. The original copies of all data sheets, data printouts, strip charts, laboratory reports, and related items will be submitted to the NNWSI Project records center(s). After review of the data per the criteria listed in Section 3 of this document, and the addition of notations on validity, the data are added to the NNWSI Project technical data base.

All data (analytical laboratory results, digital count rates, and integrated exposure values) will be input into the NNWSI Project VAX computer system data base designed to accommodate the various types of field data obtained during radiological field studies (Figure 4.2-2). Data entry will



ACRONYMS

CCB	CONFIGURATION CONTROL BOARD
DEIS	DRAFT ENVIRONMENTAL IMPACT STUDY
DERE	DESCRIPTION OF EXISTING RADIOLOGICAL ENVIRONMENT
EFAPRS	ENVIRONMENTAL FIELD ACTIVITY PLAN RADIOLOGICAL STUDIES
EIS	ENVIRONMENTAL IMPACT STATEMENT
EISIP	EIS IMPLEMENTATION PLAN
EMMP	ENVIRONMENTAL MONITORING AND MITIGATON PLAN
EPASS	ENVIRONMENTAL PATHWAYS ANALYSIS SCOPING STUDY
EPP	ENVIRONMENTAL PROGRAM PLAN
ERCP	ENVIRONMENTAL REGULATORY COMPLIANCE PLAN
ERMTP	ENVIRONMENTAL RADIOLOGICAL MONITORING TRAINING PROGRAM
ERMTPM	ENVIRONMENTAL RADIOLOGICAL MONITORING TECHNICAL PROCEDURES MANUAL
LA	LICENSE APPLICATION
LAEIP	LA ENVIRONMENTAL IMPLEMENTATION PLAN
MMP	METEOROLOGICAL MONITORING PLAN
NNWSI	NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
OCRWM	OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
PMP	PROJECT MANAGEMENT PLAN
PSCRMP	PRELIMINARY SITE CHARACTERIZATION RADIOLOGICAL MONITORING PLAN
QAPP	QUALITY ASSURANCE PROGRAM PLAN (T&MSS)
RCP	REGULATORY COMPLIANCE PLAN
RMDS	RADIOLOGICAL MONITORING DATA SUMMARY
RMP	RADIOLOGICAL MONITORING PLAN
SAR	SAFETY ANALYSIS REPORT
SCP	SITE CHARACTERIZATION
SEIG	SYSTEMS ENGINEERING INTEGRATION GROUP
SEMP	SYSTEMS ENGINEERING MANAGEMENT PLAN
SENFCA	SURVEY AND EVALUATION OF NUCLEAR FUEL CYCLE ACTIVITIES
SMMP	SOCIOECONOMIC MONITORING PLAN
SPMRMA	SAFETY PLAN FOR RADIOLOGICAL AND METEOROLOGICAL MONITORING ACTIVITIES

* NOTE: TRANSFERS FROM 7 ARE USED ONLY WHEN REVISING DOCUMENTS.

Figure 4.2-1. Document Hierarchy.

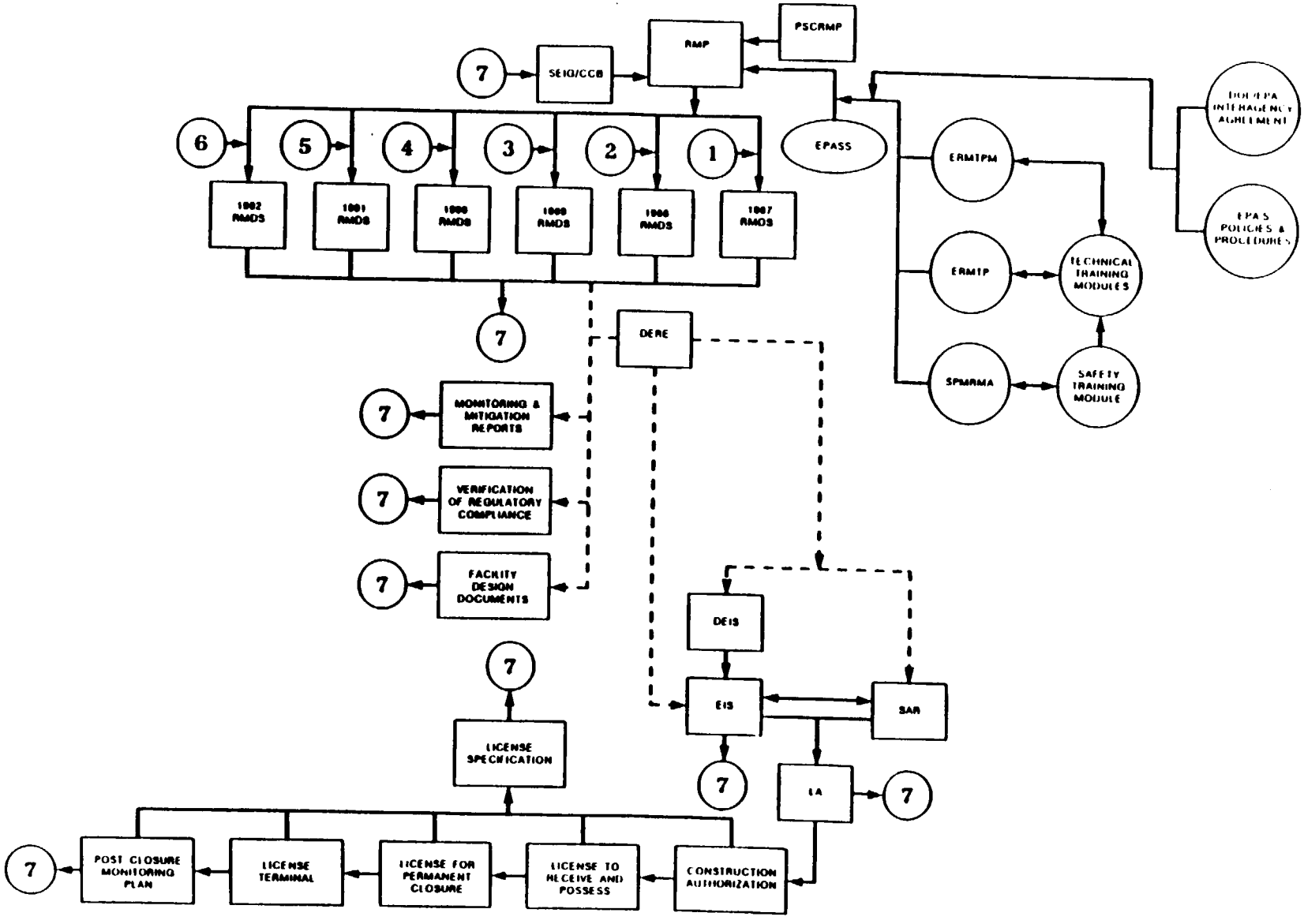


Figure 4.2-1. Document Hierarchy (continued).

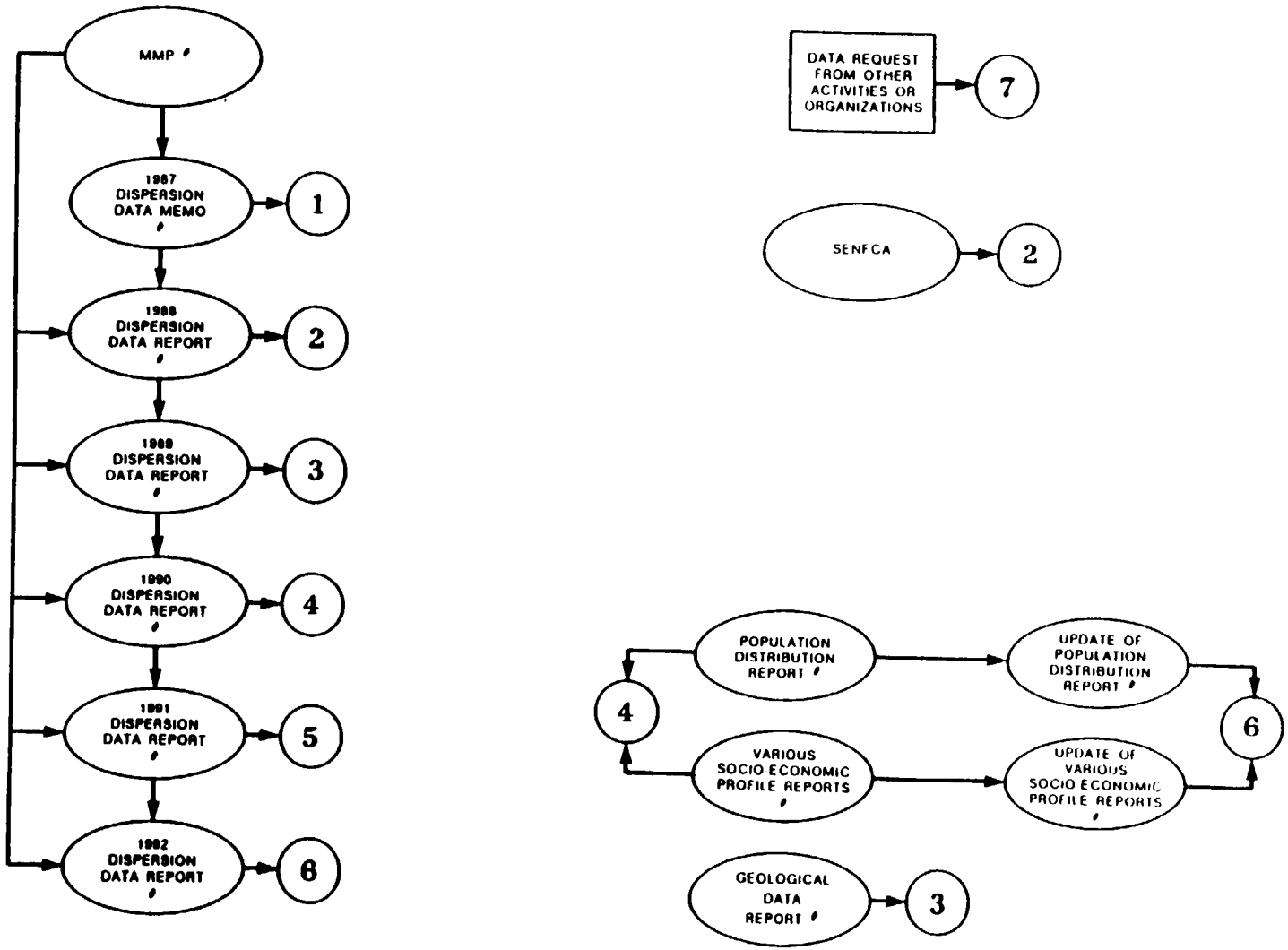


Figure 4.2-1. Document Hierarchy (continued)

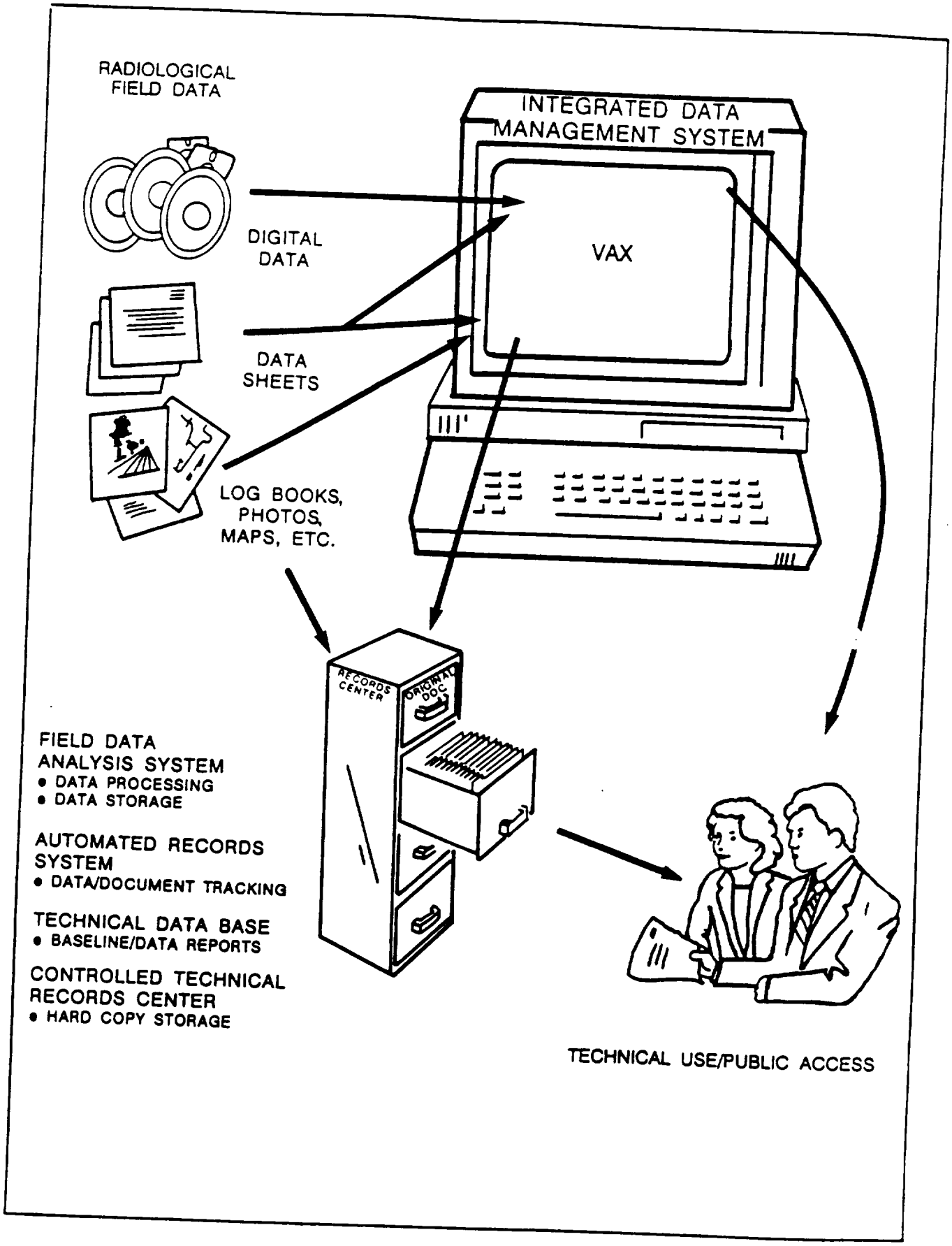


Figure 4.2-2. Flow Diagram of Radiological Data.

be accomplished using established procedures for data base management and routine checks for outliers and inadmissible data. Field data can be entered manually or automatically via data logger depending on data type and mode of acquisition. Section 7.0 of the RMP describes data handling activities. Additional data management methodologies are detailed in the Environmental Radiological Monitoring Technical Procedures Manual and support documentation.

4.2 DATA REPORTING

The reporting of the results of this field study will be included in the yearly "Radiological Monitoring Data Summary," which will be submitted to the NNWSI Project Manager each May for distribution to the Health Physics and Environmental Division of DOE/NV and others. This report will include data mandated by DOE reporting requirements as well as other requirements, including the Clean Air Act. The entire data set will be available through the various hierarchies of the NNWSI Project data base. New data will be available to Project participants as it is reviewed and input into the data base. There will be a mechanism developed by the NNWSI Project for read-only access to this data base by interested parties that have been approved for access to this information by the DOE.

Chapter 5

SCHEDULE AND MILESTONES

5. SCHEDULE AND MILESTONES

This chapter provides information on the duration of and interrelationships among the principal activities associated with conduct of the study, including setup and data collection. Key milestones and relationships to concurrent studies are presented.

5.1 STUDY SCHEDULE

The full scope of environmental radiological monitoring activities as detailed in the RMP (SAIC, 1988) will be initiated upon approval of the plan. The EFAP Radiological Studies portion of the RMP (SAIC, 1988) will be implemented during FY 88 and will extend for at least 6 months beyond the completion of the site characterization phase. Table 3.1-2 in Chapter 3 of this document indicates the planned implementation schedule for environmental radiological field activities. Certain of the EFAP-initiated activities may continue indefinitely in support of other Project phases as indicated in the RMP (SAIC, 1988). All RMP (SAIC, 1988) field activities will be initiated as scheduled pending resolution of NNWSI Project uncertainties, including land access and actual start of site preparation and characterization activities.

5.2 MILESTONES

The milestones for the radiological field activity associated with the EFAP are shown in Table 5.2-1. These milestones can be related to the major Project activities and milestones shown in Figure 5.2-1.

Table 5.2-1. Radiological Studies EFAP Milestones

Site Phase	Radiological Activities[a] Initiate	Proposed NNWSI Activities Compute
1		Issue EA/Site Selection (5/86)
2	PSCRMP[b]/RMP[c] Field Activities (9/87)	Site Characterization/ Impact Assessment (EMMP)[d] (6 months post-SC)[e]
3	RMP Revision (mandated due to Project phase change) (6 months prior to end of SC)	EIS/Baseline Environmental Radiological (10/93) (prior to completion of DEIS)[f]

[a]See Figure 5.2-1 and Table 3.1-2 for additional information.
[b]PSCRMP - Preliminary Site Characterization Radiological Monitoring Plan, DOE/NV/10270-14 (SAIC-86/8007).
[c]RMP - Radiological Monitoring Plan, DOE/NV-10576-6 (SAIC-87/8000), 1988.
[d]EMMP - Environmental Monitoring and Mitigation Plan (DOE, 1988a).
[e]SC - site characterization.
[f]DEIS - Draft Environmental Impact Statement (EIS - Environmental Impact Statement).

RADIOLOGICAL MONITORING TIMELINE

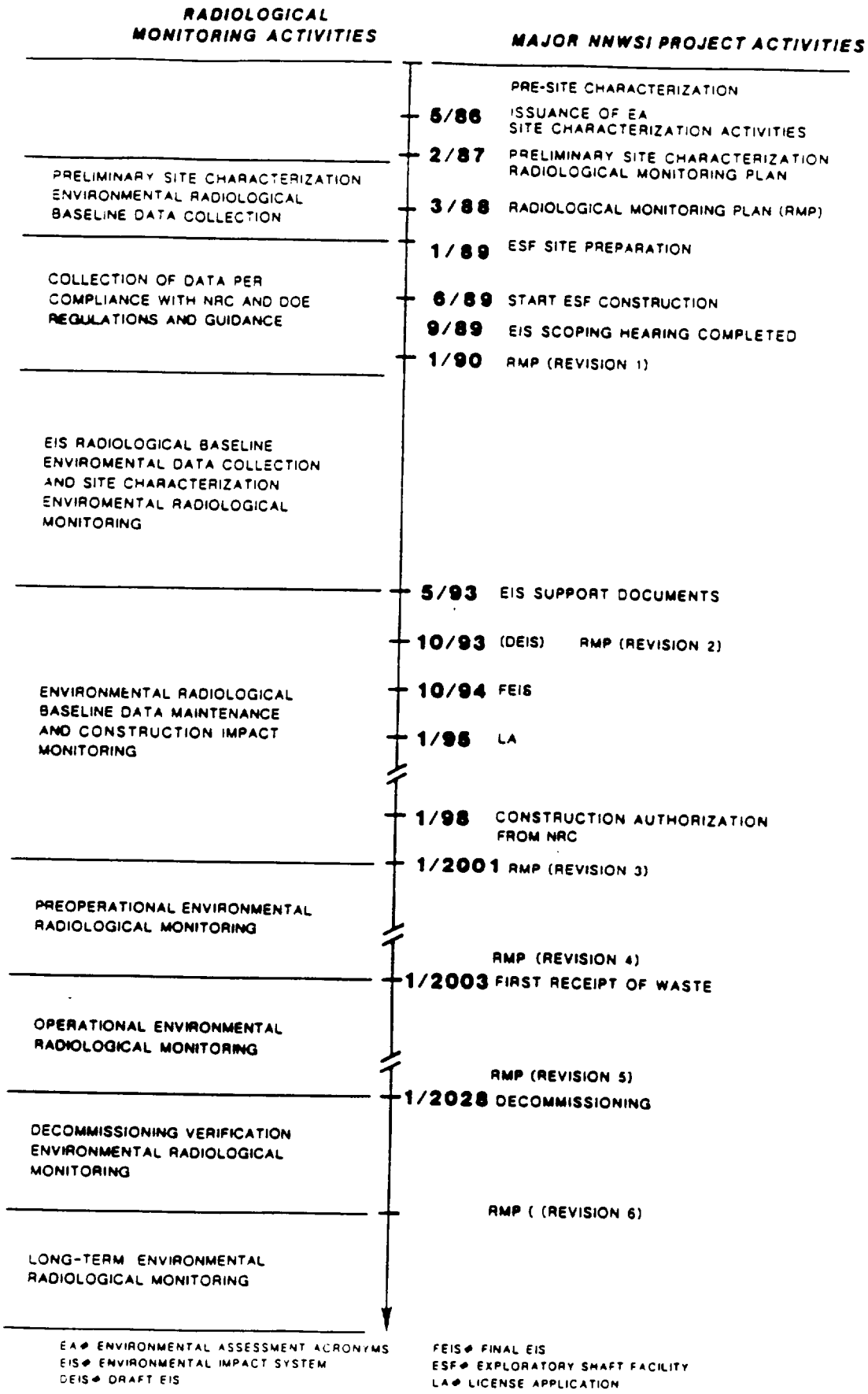


Figure 5.2-1. Radiological Monitoring and Major NNWSI Project Milestone Timeline.

5.3 CONCURRENT STUDIES

This study plan draws data from the soils, hydrological, meteorological, socioeconomic (population, cultural, and agricultural data) and other field activities as indicated in Figure 5.3-1 for use in analysis of radiological results and impact assessment. In addition, the agricultural data from socioeconomic activities will be needed to identify required far field biota monitoring.

Figure 5.3-1. Matrix of planned site characterization field activities and areas of concurrent Data Requirements (page 1 of 2)

Planned Site Chatacterization Activity / Area of Potential Impact	Land Use (Far-field)	Ecosystems	Meteoro-logical & Air Quality	Water Resources	Soil	Cultural Archeological Resources
Exploratory Shaft Facilities						
Site Preparation	x	x	x	-	x	x
Construction of main access	-	x	x	-	x	x
Construction and use of Surface Facilities	-	x	x	x	x	x
Excavation of shafts and disposal of mined debris	-	x	x	x	x	x
Field Activities						
Site preparation for drill sites, some geophysical studies, trenches, pavement, and infiltration studies	x	x	x	-	x	x
Construction of access roads to activity sites (listed above)	-	x	x	-	x	x

Figure 5.3-1. Matrix of planned site characterization field activities and areas of concurrent Data Requirements (page 2 of 2)

Planned Site Chatacterization Activity / Area of Potential Impact	Land Use (Far-field)	Ecosystems	Meteoro-logical & Air Quality	Water Resources	Soil	Cultural Archeological Resources
Exploratory drilling and testing, including transport and disposal of drill-site wastes	-	x	x	x	-	-
Geophysical surveys	-	x	x	-	x	x
Geological mapping	-	x	x	-	x	x
Monitoring of existing sites	-	x	x	-	x	-

Chapter 6

PERSONNEL REQUIREMENTS AND ORGANIZATION

6. ORGANIZATION/MANAGEMENT PLAN

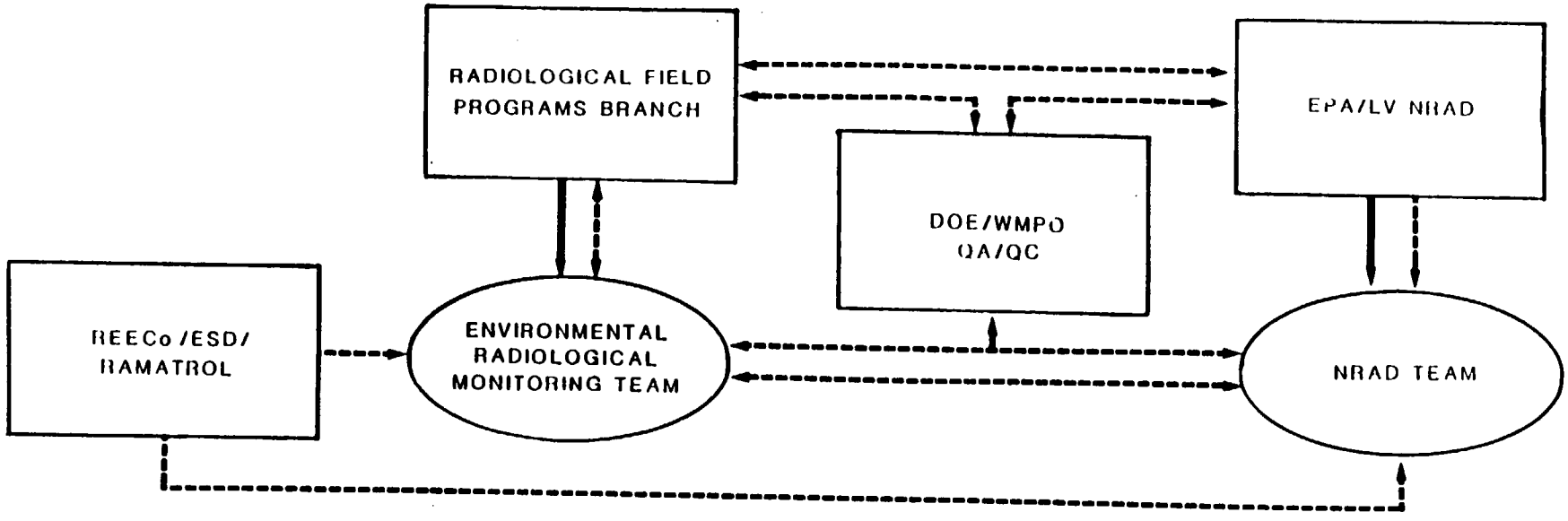
6.1 PERSONNEL REQUIREMENTS AND ORGANIZATION

The activities associated with this study plan will be completed by the Radiological Field Programs Branch (RFPB) within the Project Operations Department (POD) of SAIC, the Technical and Management Support Services contractor to the DOE/WMPO for the NNWSI Project. The principal investigator for all field activities is the RFPB manager. The bulk of the sample collection activities will be performed by the Environmental Radiological Monitoring Team (ERMT). The ERMT organization is illustrated in Figure 6.1-1. The document hierarchy on the administrative control for the RMP activities is illustrated in Figure 4.2-1. All activities will be controlled by the process described in the overall NNWSI Project Radiological Monitoring Plan (RMP) (SAIC, 1988) and implemented according to approved NNWSI Project Environmental Radiological Monitoring Branch Technical Procedures.

6.2 SAMPLE MANAGEMENT/ARCHIVAL

Once sample media is procured or data is taken, a documented chain-of-custody procedure will be implemented to maintain samples. Upon collection, samples are either transferred to the appropriate laboratory for analysis or immediately archived. Archived samples are transferred to the NNWSI Project Sample Management Facility (SMF). Samples transferred to a laboratory for analysis after collection activities have been properly documented will be processed according to the following procedure:

1. Discarded if the sample is altered or destroyed by the analysis process.



LEGEND

TECHNICAL INPUT

TECHNICAL DIRECTION

Figure 6.1-1. Environmental Radiological Monitoring Activities Organization Chart.

2. Maintained by the commercial vendor.

3. Returned to the appropriate principal investigator, who will then transfer the samples to the Sample Management Facility.

Soil/sediment samples and water samples will be split into several portions after collection (typically four); three are to be archived and one is to be used for analysis. Data sheets and sample analysis records are treated in the same manner as samples, except that they are archived in the SAIC local records center.

All sample collection, handling, transfer, and analysis activities will be conducted using appropriate documented procedures and instructions. These instructions shall address the need for maintaining chain-of-custody and preserving the quality of the sample.

6.3 HEALTH AND SAFETY

A safety plan will be prepared and implemented for all NNWSI Project environmental field activities. This plan will address implementation of the DOE Orders which address radiological and nonradiological safety. The plan will address, where applicable, hazards identification, accident prevention, minimization of worker risk, and related safety training.

SAIC Radiological Field Branch training requirements mandate that all personnel with responsibility for and participating in any field task must satisfactorily demonstrate an understanding of the most recent revision of the safety plan and the wide range of potential hazards that could threaten their health and safety. The POD addresses both radiological and nonradiological hazards and potential hazards.

Safety equipment and clothing is supplied, as appropriate, and strict adherence to all safety rules is mandatory. Basic first aid is included in

the general training requirements. Periodic safety requalification and periodic safety meetings ensure that all personnel are aware of new or changing potential hazards as well as being reminded of existing concerns or hazards.

Chapter 7

QUALITY ASSURANCE

7. QUALITY ASSURANCE

7.1 CONFORMANCE WITH DOE/OGR QUALITY ASSURANCE PLAN

This Project has been developed and is implementing a Quality Assurance (QA) program in accordance with The Quality Assurance Plan for High-Level Radioactive Waste Repositories (DOE, 1986b). The QA program is documented in the Project QA Plan and QA administrative procedures. The Project QA Plan assures that all applicable criteria in Appendix A of the NRC Review Plan: QA Programs for Site Characterization of High Level Waste Repositories are satisfied. In addition, the Project QA Plan and/or appli-cable QA administrative procedures shall describe the following as applicable:

1. Process for the Project Office review and approval of the QA programs of their contractors.

2. Program being implemented for the indoctrination and training of Project Office personnel who perform activities affecting quality. Identify the areas that will require training, qualification, and certification, and describe the method for accomplishing this.

3. Measures applied by the Project Office to assure that the design is defined and changes to the design bases are controlled. Describe the Project Office process for monitoring contractors' design controls and the extent of participation of the Project Office in design reviews.

4. Project Office peer review process and the controls applied by the Project Office over peer reviews performed by the contractor.

5. Project Office program for controlling internal documents as well as documents being transmitted to and from contractors and other

Project participants to assure controlled transmittal, receipt, internal distribution, and recall.

6. Methods used by the Project Office to monitor contractors' inspection, testing, calibration, and sample identification activities.

7.2 NNWSI PROJECT QUALITY ASSURANCE REQUIREMENTS

As stated in Section 7.1, the NNWSI Project has developed and maintained the NNWSI Project Quality Assurance Plan (QAP), NVO-196-17 (NNWSI, controlled document (a)), to incorporate the requirements delineated in the Office of Geologic Repositories (OGR) Quality Assurance Plan for High-Level Radioactive Waste Repositories, OGR/B-3, and other related DOE and NRC QA requirements. Additionally, quality-related NNWSI Project Administrative Procedures (APs) have been developed in order to supplement the requirements contained in the NNWSI Project QAP, NVO-196-17 (NNWSI, controlled document (a)). Each NNWSI Project participant, including the Waste Management Project Office (WMPO), is responsible for the development and maintenance of a Quality Assurance Program Plan (QAPP) and supporting procedures that provide the methodologies needed to effectively implement the requirements of the NNWSI Project QAP, NVO-196-17 (NNWSI, controlled document (a)), and the quality-related NNWSI Project APs. All work associated with the implementation of this EFAP shall be performed in accordance with the respective QAPPs and supporting procedures.

7.2.1 Introduction

The primary activities implemented by the QAPP are QA Level I activities as designated in the QA Level Assignment Sheets (QALAS) for Radiological

Field Programs Branch activities. QALAS for all SAIC QA Level I and II activities are included in the task specific Scientific Investigation Plan (SIP) required by T&MSS QA and administrative procedures. The QAPP and supporting procedures are supplemented by technical procedures and instructions, providing a comprehensive quality control program implemented by the Environmental Radiological Monitoring Team (ERMT). The organizational QA and administrative hierarchy for the ERMT is depicted in Figure 7.2-1.

All procurement shall be made in a manner consistent with the QAPP and applicable supporting documents. 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 point rather than the minimum of three points required for a calibration. Field verification tests and calibration schedules are determined on the basis of manufacturers' recommendation, specific operational criteria, previous operation, practical experience and accepted practice in an effort to ensure minimal loss of data and equipment downtime. 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 by 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 three point calibration) at least yearly. All accuracy verification and calibration shall be traceable to National Bureau of Standards (NBS) or appropriate established standards. All activities of the program shall be designed to ensure overall data accuracy, accountability, traceability, and repeatability.

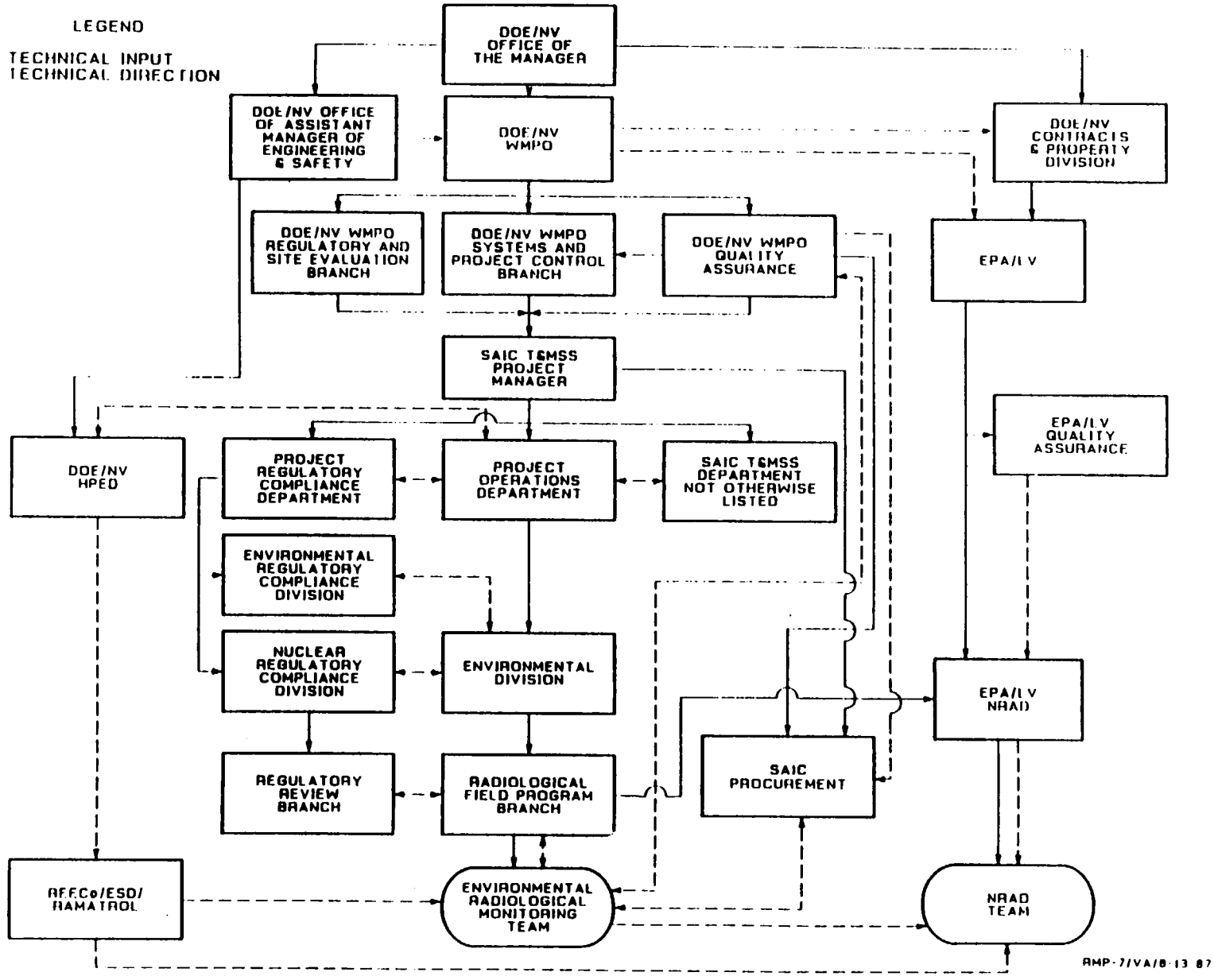


Figure 7.2-1. RMP Organizational Hierarchy.

NNWSI Project QA ensures by audit, surveillance, and monitoring activities that applicable QA activities are performed in accordance with the QAPP and supporting procedures as well as supplementary procedures-instructions.

7.2.2 Field Quality Control Activities

The Radiological Field Programs Branch Manager for this field activity provides administrative control for all activities. The Senior Health Physicist provides technical direction to the ERMT, which performs the activities. QA personnel verify completion of hold points as specified in the Environmental Radiological Technical Procedures. RAMTROL (REECo) 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 signatures and initials of persons authenticating records for RMP (SAIC, 1988) activities will be documented.

7.2.2.1 Equipment Receipt, Inspection, Acceptance Testing, and Installation

Samplers and monitors used as a part of this program will be received and handled as indicated in Environmental Radiological Monitoring Technical Procedures. Documentation of the receipt of all equipment will be on data sheets. The initial quality control tasks include an inventory, a thorough

inspection upon receipt, and acceptance testing of all equipment prior to installation.

Equipment inspection will be performed by the trained technician or Health Physics professional according to Environmental Radiological Monitoring Technical Procedures. Acceptance testing will be conducted according to approved procedures. Any nonconforming condition will be documented in accordance with the SAIC 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 procedures. These activities will be thoroughly documented in the appropriate 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.

7.2.2.2 Calibrations and Precision Assessment

All instrumentation calibrations must be traceable to a 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 equipment will be recalibrated based on manufacturer's recommendation or at least every two years.

Laboratories performing analyses 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 appropriate intercomparison studies run by the EPA or the DOE. The Senior Health Physicist will submit blind, blank, and/or spiked samples for analysis with the actual samples where feasible. The spikes and blanks will

be used to assess the accuracy of the results in conjunction with the data reported by the laboratory.

7.2.2.3 Maintenance and Spare Parts

To provide continued proper operation of the monitoring systems, a scheduled maintenance program will be implemented using 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. Semiannual lubrication and/or replacement of moving parts as per applicable procedures.

3. Weekly checking of all sensor cables, tie-downs, and power cords.

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.

7.2.3 Data Handling Activities

7.2.3.1 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 NNWSI Project facilities in Las Vegas, Nevada, on a weekly basis. Upon receipt, the data will be inspected by the NNWSI Project Health Physicist who, in turn, will notify the individuals involved to correct the errors and document the problem as specified in approved procedures. The Senior Health Physicist shall assure that procedures for nonconformances are 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, according to approved procedures. Nonconformances and corrective actions will be handled in accordance with the QAPP and applicable supporting procedures and written instructions.

7.2.3.2 Laboratory Reports

Data reported by the laboratories will be transmitted to the Senior Health Physicist. Upon receipt of such reports the Senior Health Physicist shall

1. Transmit copies of the data to the Quality Assurance, Correspondence Control Facility, SAIC local records center, and the SAIC Radiological Field Programs Branch Manager.

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 ensure initiation of appropriate nonconformance reports, as specified in the QAPP and applicable supporting procedures.

7.2.3.3 Internally Generated Data

Data from the continuous radon monitor and flow-rate data for air samplers are examples of internally generated data for these activities. 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 approved procedures. The Senior Health Physicist will then transmit copies of the data to QA, the SAIC Correspondence Control Facility, SAIC local records center, and the SAIC Radiological Field Programs Branch Manager, as well as initiate any nonconformance reports if required by QAPP and applicable supporting procedures.

7.2.4 Independent System and Performance Audits

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

1. System Audits encompass all aspects of the monitoring program (e.g., sampler siting, data handling activities, calibration techniques, and maintenance schedules).

2. 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 semiannual 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 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 NNWSI Project file.

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.

The QA staff shall monitor the internal data handling and analysis activities and will ensure that nonconformances are identified and handled as required by the EPA regulations (EPA, 1980). The NNWSI Project participates in the EPA National Performance Audit Program.

Chapter 8

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8. REFERENCES

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Nick C. Aquilina, Manager, NV

TRANSMITTAL OF THE YUCCA MOUNTAIN PROJECT ENVIRONMENTAL PROTECTION IMPLEMENTATION PLAN (EPIP)

Enclosed is the subject report and accompanying transmittal letter addressed to the appropriate individuals identified in U.S. Department of Energy (DOE) Order 5400.1. This EPIP satisfies the requirement to prepare an implementation plan to ensure that facilities are operated and managed in a manner that will protect, maintain, and restore environmental quality; minimize potential threats to the environment and the public health; and comply with environmental regulations and DOE policies.

If you have any questions, please contact Glenn M. Doyle at 794-7595 or Bob Kaiser at 794-7954.

Carl P. Gertz, Project Manager
Yucca Mountain Project Office

YMP:GMD-680

Enclosures:
1. EPIP
2. Ltr Aquilina to Distribution w/encl (dtd 11/7/89)

cc w/encls:
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