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Health Physics Monitoring Plan
Uranium Mill Tailings Remedial
Action Project

Approval

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URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT (UMTRAP)

1.0 INTRODUCTION

This Health Physics Monitoring Plan describes Health Physics monitoring and protection at UMTRA mill tailings sites, disposal sites, and offsite contaminated vicinity properties. The Department of Energy (DOE), through its UMTRA Project Office, has been given responsibility (Public law 95-604) to accomplish remedial actions at designated mill sites and vicinity properties. Remedial actions are those measures taken to remove or stabilize and control mill tailings to the extent necessary to ensure that radiological and nonradiological hazards do not exceed public health-related standards established by the US Environmental Protection Agency (EPA). The EPA standards are reproduced in Section 4.0 of this monitoring plan.

The DOE has contracted with the Remedial Action Contractor, M-K Ferguson, to furnish all labor, material, facilities, services, equipment, superintendence, and administration necessary to accomplish engineering, design, construction, and inspection services for portions of the UMTRA project. This plan covers all UMTRA processing site, disposal site, and vicinity property Health Physics monitoring, within the scope of this contract.

Items discussed in this plan include:

1) Monitoring to ensure compliance with EPA, DOE and other standards.
2) Personnel radiation exposure monitoring and controls to minimize exposures.
3) Monitoring of transport vehicles.
4) Documentation and quality assurance.

The DOE provides statistical sampling protocols and technical information concerning physical standards, instrumentation, and measurement methods and techniques. New instrumentation will be developed, as the project progresses, by a number of contractors and vendors for the DOE UMTRA Project. New procedures based on the capabilities of these instruments will also be developed. Because new survey instruments and techniques may prove to be more cost-effective than current devices, it is not the intent of this monitoring plan to specify exact procedures to be employed throughout the duration of the UMTRA Project. Instead, general procedure specifications are discussed.

This Health Physics Monitoring Plan is intended to be a guideline document, summarizing techniques and instrumentation to be applied at all UMTRA facilities. As individual mill sites and vicinity property groups are designated for initiation of cleanup activities, site-specific detailed Health Physics Monitoring Plans will be prepared covering the following:

1) The level of Health Physics-related staffing for each site.

2) A description of details concerning radiation monitoring activities to be performed at each site including monitor locations and specific problems etc.

Each site Health Physics' manager is given the responsibility and authority to initially address unforeseen Health Physics questions. However, we anticipate the need for occasional referral of questions to a management-level committee including trained Health Physics personnel familiar with the UMTRA Project. Composition of the Management Safety committee is detailed in the RAC Construction Safety and Health Management Program Plan.

This monitoring plan is divided into three major sections:

a) Operational Health Physics and Environmental Monitoring, describing worker and public health protection;

b) Radiological Support describing general procedures to be used in defining contaminated areas and in verifying the remediation;

c) Quality Assurance documentation and reporting.

2.0 ORGANIZATION, STAFFING, AND TRAINING INTRODUCTION

This section outlines the RAC Health Physics Management and Training System, implemented by Chem-Nuclear Systems, Inc (CNSI), and includes minimum qualifications and position responsibilities.

2.1 Health Physics Organization

A functional organization chart of the RAC Health Physics Organization is presented as Figure 2.1. Several positions may be combined at any specific site depending on personnel assigned and size and complexity of the required tasks.

2.1.1 Managers

The Health Physics and Environmental (HP&E) Manager has overall authority for all Health Physics and radiological measurement related activities. The Environmental, Dosimetry and Verification Manager reports to the HP&E Manager, and is responsible for development and coordination of environmental monitoring, dosimetry, and compliance verification procedures at assigned sites and vicinity properties, and provides technical direction on instrumentation and HP procedures. The Operations Radiological Programs Manager reports to the HP&E Manager, and is responsible for development and application of Health Physics, dosimetry, verification and excavation control monitoring procedures and for personnel matters. All of the above positions are located in the Albuquerque Project Office. The Site Health Physics Manager is responsible for implementation of all Health Physics procedures as described in the site-specific Health Physics Monitoring Plan, Health Physics Procedures Manual, Remedial Action Plan, and any site-specific procedures for the assigned sites. The site HP Manager reports to the Albuquerque Radiological Programs Manager on administrative, radiological measurements, personnel, and health physics matters, and to the RAC Site Manager (an M-K Ferguson employee) operationally.

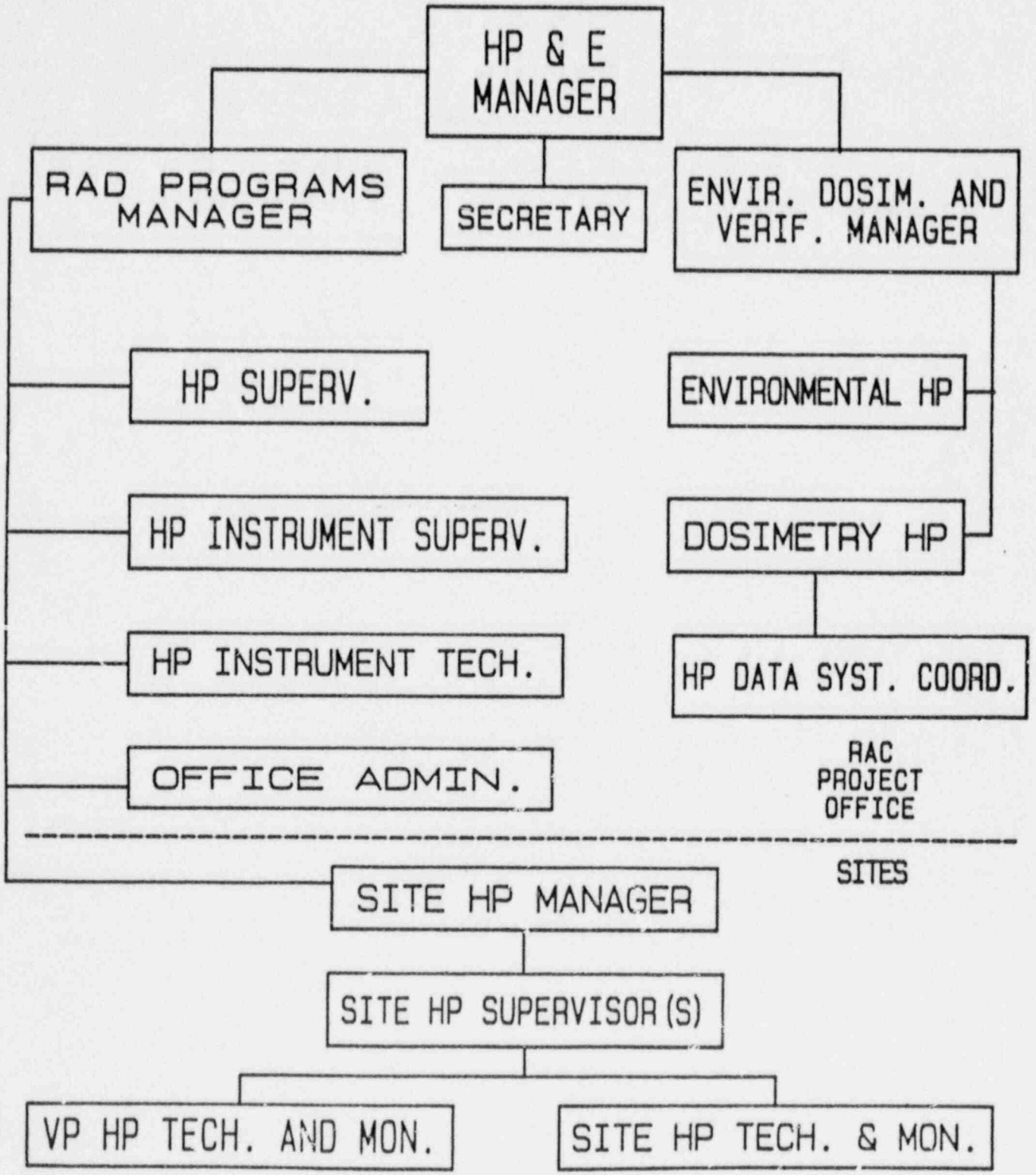
2.1.2 Site Radiation Safety Officers

The Site Radiation Safety Officer is defined to be the senior site Health Physicist, with responsibility for all Health Physics activities at that locale. The responsibilities include site operational Health Physics, environmental monitoring, and/or Health Physics support at vicinity properties, as applicable. On large sites this position may be designated as the Site Health Physics Manager. For smaller sites it may be designated as the Health Physics Supervisor.

2.1.3 Supervisors

The Health Physics Supervisors will be responsible for implementing site-specific procedures and supervising Health Physics Technicians and Monitors, and will report as indicated in Figure 2.1.

FIGURE 2.1
RAC HEALTH PHYSICS ORGANIZATION



NOTE: STAFFING LEVELS OUTLINED WILL VARY AT SPECIFIC SITES.

2.1.4 Technicians and Monitors

These individuals will be responsible for actual performance of Health Physics sampling and monitoring activities at the direction of H.P. supervisors.

2.2 Source of Health Physics Personnel

The Remedial Action Contractor will provide Health Physics personnel from CNSI internal sources and direct hire to the maximum extent possible. Should these resources prove inadequate, or not cost-effective due to timing or location, the RAC will assemble a list of qualified vendors to supply personnel as needed.

2.3 Health Physics Staff Qualifications

Health Physics and Environment (HP&E) Manager - This position is in overall charge of CNSI activities, and requires a minimum of a bachelor's degree in a physical science and eight years of related experience, with a minimum of two years in a management position. An advanced degree in Health Physics may substitute for some years of experience. A Certified Health Physicist is preferred.

Environmental, Dosimetry and Verification (EDV) Manager - This position requires a minimum of a bachelor's degree in a physical science, six years related experience, and a demonstrated knowledge of environmental dose assessment and measurement methodology. An advanced degree in Health Physics may substitute for some years of experience. Additional experience and technical training may substitute for the degree.

Operations Radiological Programs (OPS) Manager - A bachelor's degree in a physical science, six years of related experience, with at least two years experience managing decommissioning or related projects, and a demonstrated knowledge of Health Physics principles are required. An advanced degree may substitute for some years of experience. Additional experience and technical training may substitute for the degree.

Site Health Physics Manager - A bachelor's degree in a physical science and six years of related experience in Operational Health Physics are required for this position. Experience in managing a Health Physics Program for a temporary field project is preferred. Technical training may substitute for the bachelor's degree.

Health Physics (Site or V.P.) Supervisor - This position requires qualification to the "Health Physics Technician Requirements" (see RAC UMTRAP Radiological Training Guide [RTG],) and a minimum of four years' experience as a Health Physics Technician. Additional technical training and education may substitute for some years of experience.

Health Physics Technician. - This position requires qualification to the Health Physics Technician Requirements described in the RAC UMTRAP RTG.

Health Physics Monitor - This position requires onsite Health Physics and monitoring training as described in the RAC UMTRAP RTG.

2.4 Health Physics Training Program

A radiological training program, including discussion of the biological effects associated with exposure to ionizing radiation, shall be provided to all site workers. The program includes discussion of radiological safety procedures, emergency procedures and instructions concerning prenatal radiation exposure. Practical demonstrations of equipment usage will be incorporated, where appropriate. Literature concerning biological effects of radiation will be provided to workers, as will copies of USNRC Reg. Guide 8.13, "Instructions Concerning Prenatal Radiation Exposure."

3.0 OPERATIONAL HEALTH PHYSICS, ENVIRONMENTAL MONITORING

3.1 Standards

The radiological standards and procedures in this document are based on recommendations and requirements of the following agencies: 1) Environmental Protection Agency (EPA) which has incorporated functions of the Federal Radiation Council, 2) the National Council on Radiation Protection and Measurements (NCRP), 3) the International Commission on Radiological Protection (ICRP), 4) the U.S. Department of Energy (DOE), 5) the U.S. Nuclear Regulatory Commission (NRC), 6) the U.S. Naval Reactors Program, and 7) on standards which have been reviewed and accepted by the U.S. Public Health Service and the Department of Labor.

All reasonable precautions shall be taken to ensure the health and welfare of workers and the general public.

The standards referenced in this Health Physics Monitoring Plan are to be considered minimum standards required for compliance.

3.1.1 Personnel Exposure Standards

3.1.1.1 Direct Exposures

The major purpose of this section is to provide minimum standards which when met assure that satisfactory control is exercised over personnel radiation exposure and radioactive contamination. All personnel exposure to radiation will be kept As Low As Reasonably Achievable (ALARA). At all times, Health Physics operations shall be conducted to ensure that a worker will not accrue a dose exceeding the limits specified in Table 3.1.

Table 3.1 Radiation Worker Maximum Exposure Standards

Type of Exposure	Exposure Period	Dose Equivalent (Dose or Dose Commitment)
Whole body, head and trunk, gonads, lens of the eye, red bone marrow, active blood-forming organs.	Year	5
	Calendar Quarter	3
Unlimited areas of the skin (except hands and forearms). Other organs, tissues, and organ systems (except bone).	Year	15
	Calendar Quarter	5
Bone	Year	30
	Calendar Quarter	10
Forearms	Year	30
	Calendar Quarter	10
Hands	Year	75
	Calendar Quarter	25

*REM

To ensure that these limits (as specified in the UMTRA Project Health and Safety Plan) are not exceeded, administrative control levels, as indicated in the Health Physics Procedures will be established by the site Radiation Safety Officer (RSO). Individuals will not be allowed to exceed the administrative control level without written authorization of the site RSO. No radiation worker will be allowed to exceed 90 percent of the quarterly or annual limit, except in an emergency situation.

An individual under age 18 shall neither be employed in, nor allowed to enter, radiologically controlled areas.

3.1.1.2 Airborne radionuclides.

The UMTRA Project Health and Safety Manual (June 1983) states (p.A-2) that "air concentrations will be compared to the radionuclide concentration guides (MPC) of 10 CFR 20, App. B".

When concentrations exist in excess of MPC, or when weekly exposure hours exceed 25% of 40 MPC hours, precautionary procedures (e.g., increased surveillance, work time limits, respiratory protection) shall be used to limit any 7 day exposure to as far below 40 MPC hours as is reasonably achievable.

3.1.2 General Public

Every attempt will be made to prevent or minimize project-related radiation exposure to the general public. Although it is unlikely that significant exposure will occur, the following standards (Table 3.2) will apply for purposes of evaluating such exposure.

Table 3.2 Dose Limits for the Public or Occasionally Exposed Individual

Individual or occasional	0.5 rem in any one year
Population	
Genetic	0.17 rem/yr
Somatic	0.17 rem/yr

3.2 Personnel Monitoring

Personnel monitoring will be required at the mill site locations, and at other locations at the discretion of the site RSO.

3.2.1 Dosimetry

All site personnel expected to access controlled areas for more than the time periods specified in the Health Physics Procedures will be issued a radiation dosimeter badge. Storage of the dosimeters will be in a low background radiation area when not in use. Dosimeters will be exchanged quarterly. The dosimetry records will be summarized and reviewed regularly by the site RSO. Higher than expected personnel exposures shall be investigated by the site RSO.

3.2.2 Bioassay

Bioassay samples will be required of key radiation workers, prior to commencement of their work in controlled areas, quarterly, and upon worker's termination of employment. Additional bioassay samples may be required in accordance with requirements in the Health Physics Procedures.

3.2.3 Radon and Progeny Sampling

In general, radon and radon progeny are of concern principally in enclosed structures. When monitoring is deemed necessary by a site RSO or HP supervisor, the radon daughter concentration (RDC) will be measured initially before personnel enter work areas. Ventilation normally will be used as a measure to control RDC. When this type of control is required, RDC will be measured under the ventilation conditions used during worker occupation of the structure. The frequency of measurement will be determined by the site RSO.

3.2.4 Access Control Monitoring

Areas having the potential for continuous occupancy, and which exceed 240 micro R/h average gamma ray exposure rate, 10 mCi of Ra-226 in soil total; or, areas in which more than 600 dpm/100cm^2 transferrable surface contamination exists are to be considered controlled areas. These areas are to be posted at points of potential access with signs bearing the radiation caution symbol and an appropriate warning.

Sites designated as controlled areas shall be controlled for access of personnel, vehicles, and equipment. Controls will vary from site to site depending on the magnitude of contamination and duration of the job. Access to these areas will be controlled by barriers, rope, signs or other methods of control to prevent inadvertent exposures. Smoking, drinking, chewing and eating are prohibited in controlled areas.

Access to controlled areas shall be through an entry point controlled by Health Physics personnel specifically trained in access monitoring techniques. All personnel and equipment leaving the controlled area are subject to being monitored with an appropriate instrument and decontaminated (if necessary) to acceptable levels. Skin contamination will be removed by washing with luke-warm water and soap or mild detergent. Appropriately trained individuals may monitor themselves. Potentially contaminated equipment (trucks, tools, etc.) leaving the controlled area for use in an uncontrolled area are subject to being monitored by qualified Health Physics personnel and decontaminated, by the construction subcontractor, if necessary. In addition, when contamination of the cab area is suspected, smear samples from the cab area shall be taken. The record of vehicle contamination incidents at the site can influence sampling frequency. A record of minimal contamination may be interpreted by the site RSO as sufficient to reduce the frequency of vehicle and equipment monitoring in accordance with the DOE UMTRA Environmental Health and Safety Plan.

3.3 Radiological Control Monitoring

Radiological control monitoring involves those measurements, surveys, and samples used on a daily basis to identify potential radiation hazards and to indicate the existence of radioactive contamination.

3.3.1 Routine Surveys

Routine gamma surveys may be required in specific work areas. These surveys will be recorded on a diagrammatic sketch of the building, work area, or vicinity property.

Gross alpha air concentration evaluation may be required in work areas where airborne levels are expected to exceed 90% of 40 MPC hours in one week. The levels measured in air may be compared to the ^{230}Th occupational MPC in air from 10 CFR 20, Appendix B, Table I. Daily samples taken may be composited for specific radionuclide analyses.

3.3.2 Respiratory Protection

Respiratory protection shall be required for any individual working in airborne contamination whose projected weekly inhalation exceeds 40 MPCa hours (10 CFR 20 App. B), if other control measures prove ineffective. A "qualitative fit" program shall be implemented prior to use of respirators. Respirator training is required for individuals using respiratory protection. Other methods of control shall be considered prior to use of respiratory protection equipment. Other methods of control include use of sprayed water to reduce wind-blown and equipment-generated dust levels outdoors, and forced or natural ventilation of buildings prior to personnel entry. Respirators will be required when radon daughter concentration weekly averages are projected to exceed 40 x 0.33 WL hours.

3.3.3 Protective Clothing

Coveralls may be worn by workers expected to contact significant quantities of contaminated material or contaminated dust generated by operations. Rubber boots and/or gloves may be required depending on weather and/or work conditions. Protective clothing requirements will be determined by the site RSO.

3.3.4 ALARA Considerations

In accordance with the UMTRA Environmental, Health and Safety Plan all reasonable efforts will be made to keep radiation exposures, as well as releases of radioactive material to unrestricted areas, as far below the limits specified in 10 CFR 20 and DOE Order 5480.1A as is reasonably achievable. Toward this end, several ALARA principles shall be considered for planning purposes:

1. The site RSO shall have sufficient delegated authority to enforce regulations and administrative practices concerning any aspect of the radiological safety program.

2. The site specific Health Physics Monitoring Plan and operational procedures shall be implemented by the Remedial Action Contractor and subcontractors.

3. Surveillance, including audits and inspections, will be required. Routine and special reports will be reviewed and audited internally.

4. Personnel will be trained in radiation safety procedures and ALARA philosophies to a level commensurate with their work scope.

3.4 Environmental Monitoring

This section describes methods for measuring and reporting environmental releases due to remedial actions.

Environmental monitoring will normally be required during periods of major activity at the sites; however, the level of effort should be commensurate with the specific task at hand. A site-specific plan shall be developed designating sampling stations, types of samples required, and types of radioanalyses required. The information acquired will be used to:

1) Estimate maximum potential annual radiation exposure of the public resulting from remedial action activities.

2) Ensure that the regulatory requirements of the DOE and other appropriate agencies have been met.

3) Evaluate dispersion controls.

4) Determine the environmental impact of remedial action activities.

5) Assist in evaluating operating conditions experienced by workers.

6) Evaluate the need for modifications to the monitoring program at future sites.

3.4.1 Air Sampling

In accordance with the UMTRA Enviro ental, Health and Safety Plan (August 1985) for processing sites, disposal sites, or vicinity properties with significant quantities of Ra-226 in soils an Air Particulates Sampling Program will be initiated during the preoperational remedial action phase. Air sampling will be continued as long as deemed necessary.

If comparable air particulate sampling data is not available for a particular site, at least one month of preoperational air data shall be generated. Site boundary air sampling stations will be required, as will a background station. More stations may be required depending on the size of the site and specific activities at the site.

The sampling locations shall be determined based on the following:

1) Average meteorological conditions (wind speed, wind direction and atmospheric stability), either site specific or regional if site specific data is not available.
2) Prevailing wind direction.
3) Site boundaries closest to the tailings area.
4) Direction of nearest occupiable structure or residence.

The sample containers shall be properly labeled as per the CNSI Systematic Sample Numbering System for identification.

Gross alpha activity will be determined after sufficient decay time as specified in the site-specific monitoring plan.

Representative preoperational and background air particulate samples will be analyzed as indicated ths site specific HP Monitoring Plan. Samples collected during major remedial action activities will be screened by a gross alpha activity determination which may be compared to the ^{230}Th MPC limit in 10CFR20 Appendix B, Table 2.

3.4.2 Water Sampling

This section defines minimum surface water sampling requirements to monitor and track the effects of remedial action on surface waters. Ground water monitoring is performed by the Technical Assistance Contractor (TAC).

3.4.2.1 Surface Waters

Wastes discharged into any off site surface drainage systems must be sampled to ensure compliance with effluent standards.

Major surface water drainage systems shall be sampled prior to remedial actions, then quarterly as feasible. Analysis shall be as indicated in the site-specific monitoring plan. The surface water drainage systems sampled shall be designated as the site-specific design criteria and remedial action plans are developed.

Any unusual releases that are not part of normal remedial action activities shall also be sampled and analyzed as noted the site specific-plan.

3.4.3 Radon Monitoring

When Radon monitoring is required at sites, samplers should be located next to continuous air particulate sampling stations where feasible. Radon monitoring procedures shall conform to those established in the RAC Health Physics Procedures. Pre-remedial action Rn-222 monitoring shall be performed to establish local background data. During operations, daily measurement and readout of offsite Rn-222 values may be required to establish average Rn-222 exposure of the public. Post-remediation, integrating monitors may be required to establish remedial action effectiveness.

3.4.4 Transport, Fate, and Dose Modeling

The need for modeling will be determined by coordination with the DOE. The environmental monitoring program previously discussed will provide data for modeling. The need for modeling will be assessed as the UMTRA Project progresses.

3.4.5 Background Environmental Monitoring

Background monitoring will include the following:

1. Gamma dose rate upwind and distant from the site
2. Ra-226 soil concentrations
3. Th-230 soil concentrations
4. Air particulate gross alpha activity.

The numbers of samples required for the estimation of background level monitoring will vary from site to site.

Samples shall be identified as per the CNSI Systematic Sample Numbering System, and information about sampling parameters (e.g., air samples; flow rate, volume sampled and activity collected) shall be documented.

In addition to the above requirements, special sampling may be required by Federal, State or local agencies. These requirements will be coordinated with the ABQ HP&E Manager.

3.5 Response to Unusual Occurrences

3.5.1 Responsibilities

The purpose of this policy is to:

1. Protect lives, property, and the public health and safety.
2. Maintain continuity of management.
3. Maintain essential operations.
4. Effectively utilize personnel and facilities under conditions of radiological, operational, natural, and other emergencies.

The responsibilities of all RAC Health Physics personnel are as follows:

1. Report an actual or potential emergency upon discovery.
2. Evacuate personnel promptly from the immediate danger area.
3. Take action as outlined in the applicable emergency procedure.

The responsibilities of the site RSO are as follows:

1. Anticipate potentially hazardous conditions, alerting the MK-F site manager and the project office.
2. Train personnel to cope with emergencies in accordance with applicable site emergency procedures.
3. Alert personnel in time of emergency.
4. Determine the need for evacuation of local areas and assist in implementing evacuation.
5. Meet and direct outside emergency service units (e.g., the fire department), to the scene of the emergency, as required by the MK-F site manager.
6. Evaluate emergency procedures and performance of personnel.

3.5.2 Response to a Truck or Train Spill

The MK-F site manager and the RSO at each Remedial Action Site shall be responsible for the implementation of the accidental spill response plan based on local conditions and available personnel. As a minimum, the following actions shall be taken:

1. Notify the MK-Ferguson Site Manager or his designee and the site RSO or his designee immediately upon occurrence of any significant offsite spill.
2. Mobilize sufficient personnel and equipment to clean up the spill quickly and with minimal radiological exposure to workers and the general public. The site RSO or his designee shall supervise offsite spill response health physics activities.
3. Immediately notify offsite local authorities as necessary to control traffic or to provide other emergency assistance. Notification shall include information as to location of the spill, the RSO's initial estimate as to its radiological significance, and whether the problem is of sufficient magnitude to require special assistance from local police, fire or other agencies. Frequent communication with local authorities should then be maintained to ensure that complete and correct information is available and to ensure that no unnecessary actions are initiated by local authorities.

4. Communicate with the ABQ RAC project office immediately, detailing spill magnitude, location, response procedures being implemented, and summarizing assistance from local authorities. The ABQ office will communicate (through the MK-Ferguson Director or designee) with DOE, state, tribe and other authorities, as necessary, immediately upon receipt of spill information.

3.6 Onsite Laboratory and Equipment

Certain equipment will be required to aid in the interpretation of WL, excavation control monitoring, and air samples in a timely manner.

The following are necessary:

1. Gamma spectroscopy (NaI).
2. Alpha counters.
3. Flow calibration instrumentation for checking of air sampling instruments.
4. Soil sample preparation.
5. Water sample preparation and collection equipment.
6. Other specialized equipment may be required at specific sites.

4.0 RADIOLOGICAL SUPPORT PROCEDURES AND MEASUREMENTS

This section provides a discussion of procedures and measurements required of Health Physics staff to support subcontractor excavation control and other activities. Excavation/remediation construction activities will be guided by Health Physics personnel in a time-efficient manner consistent with the need to ensure proper and safe remediation. Remediation will be controlled by applicable EPA standards.

4.1 EPA Standards

The Environmental Protection Agency (EPA) provided final UMTRA standards (40 CFR 192) on January 5, 1983. These standards provide performance criteria for remedial action compliance. Part 192, entitled "Health and Environmental Protection Standards for Uranium Mill Tailings" is divided into three subparts as follows:

Subpart A provides for the control of residual materials at inactive uranium processing sites. Control shall be designed to:

(a) Be effective for up to one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years.

(b) Provide reasonable assurance that releases of radon-222 from residual radioactive material to the atmosphere will not:

(1) Exceed an average release rate of 20 picocuries per square meter per second, or

(2) Increase the annual average concentration of radon-222 in air at or above any location outside the disposal site by more than one-half picocurie per liter.

Subpart B provides standards for cleanup of land and buildings contaminated with materials from inactive uranium processing sites.

Remedial actions shall be conducted so as to provide reasonable assurance that, as a result of residual radioactive materials from any designated processing site:

(a) The concentration of radium-226 in land averaged over any area of 100 square meters shall not exceed the background level by more than

(1) 5 pCi/g, averaged over the first 15 cm of soil below the surface, and
(2) 15 pCi/g, averaged over 15 cm thick layers of soil more than 15 cm below the surface.

(b) In any occupied or habitable building--

(1) The objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL. In any case, the radon decay products concentration (including background) shall not exceed 0.03 WL and

(2) The level of gamma radiation shall not exceed the background level by more than 20 microroentgens per hour.

Subpart C provides actual guidance for specific implementation, criteria for applying supplemental standards, and explanations of supplemental standards. This subpart allows for the possibility of exemption to the remedial action standards when permission is granted from the Federal agencies implementing subparts A and B.

5.0 QUALITY ASSURANCE DOCUMENTATION AND REPORTING

The RAC is committed to a comprehensive program of Quality Assurance designed to ensure cost-effective compliance with UMTRAP goals. All radiological instruments and procedures used in compliance verification will be controlled according to ANSI/ASME NQA-1; 10CFR 50 App. B as per the RAC Quality Assurance (QA) Program Plan. All H.P. equipment will be calibrated, maintained and controlled as specified in the RAC QA Plan and as described in the health physics procedures. Documentation and reporting procedures and scheduling for Quality Assurance related purposes will be as described in the QA Program Plan, the Health Physics Procedures and within this Health Physics Monitoring Plan.

Records of significant daily functions will be maintained in official log books by the site RSO. Records of general operations will be generated and maintained as per the health physics procedures.

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UNITED STATES
DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE

APPENDIX B
OF THE
HEALTH PHYSICS MONITORINC PLAN
UMTRA PROJECT

CANONSBURG, PENNSYLVANIA SITE AND VICINITY PROPERTIES

HEALTH PHYSICS MONITORING PLAN

June 1984

Prepared by:

Chem-Nuclear Systems, Inc.

For

Morrison-Knudsen Company, Inc.

Remedial Action Contractor

Remedial Action Contractor - Health Physics Monitoring Plan

APPENDIX B. CANONSBURG HEALTH PHYSICS PLAN

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CANONSBURG HEALTH PHYSICS PLAN

1.0 INTRODUCTION

This Appendix to the UMTRA Remedial Action Contractor (RAC) Health Physics Monitoring Plan (HPMP December, 1983) comprises the Canonsburg, Pennsylvania Site Specific Health Physics Plan. It outlines requirements for health physics and radiological support at vicinity properties and the mill site located at Canonsburg. Specific implementing methods and procedures are found in the RAC Procedures Manual. Details concerning vicinity property implementation are found in the RAC VP Management and Implementation Manual.

Implementing procedures will be maintained by the Site Health Physics Manager and will be available at the Canonsburg site for audit.

2.0 TRAINING

2.1 Radiation Worker

All individuals who regularly enter a restricted area to perform work will receive radiation worker training as described in the RAC Health Physics Monitoring Plan. This training will be given at the site by Health Physics staff. The Site Health Physics Manager will maintain the specific training procedures as well as the individual training records (RAC-003). These records will be available for audit.

2.2 Industrial Safety

All individuals working on the site will attend a safety indoctrination session. This training will be presented by the RAC Construction Safety and Health Manager or his designee. The RAC Site Manager will maintain documentation of these training sessions.

2.3 Health Physics Staff

The Health Physics staff will meet the standards of the RAC Health Physics Monitoring Plan. If not previously qualified, individuals will be trained and qualified by the site Health Physics Manager, assisted by RAC staff. The site Health Physics Manager will maintain training procedures and documentation regarding site Health Physics Staff. These records will be available for audit.

3.0 OPERATIONAL AND ENVIRONMENTAL HEALTH PHYSICS

3.1 DOSIMETRY

3.1.1 Thermoluminescent Dosimetry

Personnel requiring access to controlled areas for more than 40 hours in any three consecutive months, (i.e. radiation workers) shall be issued thermoluminescent dosimeter (TLD) badges. Such personnel shall receive health physics indoctrination training as described in the RAC HPMP. Appropriate records (see Procedure RAC-003 and 004) of past and current exposure shall be maintained for such personnel by the site Health Physics Manager.

TLD's shall be exchanged quarterly and read by the issuing vendor. A unique TLD number shall be assigned to each individual. Control TLD's shall also be read quarterly. No individual shall be allowed to exceed 90% of the annual limits specified in the HPMP, Section 3.

3.1.2 Self Reading Dosimeters

Individuals not required to wear TLD's (i.e. visitors) shall be issued self-reading dosimeters (SRD's) prior to entry into radiologically controlled areas. Dosimetry for a group of visitors remaining together while within controlled areas may be provided by one SRD carried by a member of the group, providing exposure potential is low. Visitors will be required to log in and out in a visitors log book. Signature, SRD No., date and date of birth will be required. Visitors should be escorted by Health Physics trained staff while in controlled areas. SRD's will be read and doses recorded on a daily basis at the access control point. All visitors shall be limited to 0.5 rem per year (see HPMP Section 3).

3.1.3 Bioassay Requirements

Prior to commencement of work in controlled areas, radiation workers will be required to furnish specimens for urinalysis. Samples will be analyzed by a vendor for Ra 226 and Th 230 concentrations. Additional urinalysis will be required for potentially exposed radiation workers workers if weekly average radionuclide air concentrations exceed any radionuclide MPC_a. In addition, every reasonable effort will be made to acquire urinalysis data upon worker termination. The need for additional bioassay will be determined by the Site Health Physics Manager upon consultation with the RAC Radiological Programs Manager. Permanent record of bioassay results shall be maintained. Samples and records shall be marked with unique identifications as per the Canonsburg Systematic Sample Numbering memo (Meyer to Farnes, 2/22/84, Ref. 6). As work progresses at the site, a continuous set of negative urinalysis readings may be interpreted as indicating reduced need for urinalysis, with proper approvals.

3.2.6 Decontamination

Skin contamination will be removed by washing with lukewarm water and soap or mild detergent. If contamination is still evident, additional washings will be used.

Contaminated equipment will be decontaminated by scraping, brushing, wiping, or use of water spray. See RAC-016 for specific procedures on decontamination of personnel and equipment.

3.3 SURVEILLANCE

3.3.1 Gamma Surveys

Gamma surveys at the Canonsburg (CAN) tailings site will be performed monthly during major activity to establish worker exposure rate estimates for health physics purposes. Surveys shall be performed using suitably calibrated hand held scintillator/ratemeter units. Performance of handheld units shall be regularly checked on site using a calibrated pressurized ion chamber.

3.3.2 Air Samples

Portable high volume air samples will be used to grab sample breathing zone air in contamination areas. Ten minute samples will be taken during periods of major activity at least daily or more often as directed by the site Health Physics Manager. The samples will be analyzed for gross alpha and compared to the Th-230 MPC_a limits. Samples and records shall be marked with unique identifications as per the Canonsburg Systematic Sample Numbering Memo (Meyer to Farnes, 2/22/84, Ref. 6).

Any air filters exhibiting gross alpha count rates in excess of worker MPC_a shall be immediately sent to an offsite laboratory to be analyzed for the Th-230 air concentrations. The RAC Radiological Programs Manager or his designate in Albuquerque shall immediately be notified when gross alpha analyses exceed applicable MPC_a values.

3.3.3 Contamination Surveys

Surveys for loose surface contamination will be made by taking smears at least monthly from 100 cm^2 floor areas of trailers, access control trailer, crew trailer, and restroom. Smears will be counted for alpha and/or beta-gamma contamination. Contamination exceeding 200 dpm/100 cm^2 alpha or 1000 dpm/100 cm^2 beta-gamma will require decontamination of the area. If such decontamination is necessary, the Health Physics Manager will determine steps to be taken to prevent future contamination.

3.3.4 Working Level Measurements

Working levels will be measured by analyzing a particulate air sample for radon daughters (or by using a portable automatic sampler such as the WLM-1 Eberline sampler). The particulate [illegible] sample will be taken with a low-volume air sampler. Filters will be counted using a modified Kuznetz method as described in procedure RAC-014. Working level measurements are required prior to first entry into onsite buildings scheduled for remedial action. If a potential hazard is detected, daily or more frequent measurements are required when buildings are to be occupied for working purposes. Working level measurements will be compared to 10CFR20 limits as specified in Section 3.1 of the HPMP.

Working level measurements outdoors will be performed when, in the judgment of the site Health Physics Manager, a significant potential hazard exists (e.g., within pits during periods of excavation into highly contaminated pits, such as in area C).

Samples and records shall be marked with unique identifications as per the Canonsburg Systematic Sample Numbering Memo (Meyer to Farnes, 2/22/84, Ref. 6).

For vicinity properties with no known potential for working level concentrations approaching 10CFR20 restricted area limits (as defined in Section 3.1 of the HPMP), WL measurements will be taken when convenient, as part of required RAC interior survey work. RAC Procedure 019 defines such survey requirements.

3.4 ENVIRONMENTAL MONITORING

3.4.1 Airborne Particulate Monitoring

Site boundary and off-site monitoring for airborne particulate radionuclides shall be required during periods of major activity on-site. Sampling shall be continuous during periods of major activity, with filters analyzed at least weekly and results recorded permanently and compared to unrestricted MPCa values (10 CFR 20). Samples and records shall be marked with unique identification as per the Canonsburg Systematic Sample Numbering memo (Meyer to Farnes, 2/22/84, Ref. 6). Twenty-four hour decay prior to counting shall be employed to exclude radon daughters when gross alpha analysis is performed. Samples exceeding applicable gross alpha activity after decay shall be sent to an offsite vendor for Th-230, Ra-226 isotopic analysis. Samplers shall be located as follows:

3 along the site boundary to the east, ENE and ESE,
1 near the site boundary to the west,
1 at a nearby habitable structure to the east,
1 at a nearby school, or church
1 at a distant, background location.

The RAC EAV Manager or his designee shall be immediately notified when offsite or site boundary gross alpha analyses exceed applicable MPC_a values.

On a monthly basis, the set of air filters from each location shall be sent to an offsite vendor, for compositing and analysis for Th-230 and Ra-226 monthly average air concentrations at each sampler location.

3.4.2 Radon Monitoring

Offsite monitoring for radon is required. Modification of remedial activities to reduce Rn levels is required if results near the site boundary exceed average projections of 6 pCi/l quarterly or 3 pCi/l annually. Monitoring shall be continuous, with measurements integrated over periods of one week. Continuous environmental radon monitors shall be located as per independent DOE contract with a supplier of passive environmental radon monitors.

In addition, real-time radon monitors should be located at a nearby church or public building, at a residence near the east site boundary location, and at the North Strabane Municipal Building. Average values from real-time monitors shall be reported as per current instructions from the RAC EAV Manager.

3.4.3 Water Sampling

Surface water: potentially contaminated water produced during site operations (showers, wash down, etc.) will be analyzed for compliance with NPDES permit values prior to release off-site. Water samples from Chartiers Creek upstream and downstream of the Canonsburg site will be analyzed for gross alpha, Th-230, U-Nat Pb-210, Po-210 and Ra-226 preoperationaly. On a quarterly basis during operations, and if potential contamination has occurred, Th-230 and Ra-226 analyses will be performed at the same locations.

Ground water: preoperational samples from up- and down-gradient locations will be analyzed for Th-230, Ra-226, U-Nat, Pb-210, Po-210 and gross alpha. Additional sampling shall occur on a quarterly basis for Th-230 and Ra-226. Preoperational wells sampled are to be as follows: (See Figure D.2-2, P.D. 2-12, DOE/EIS-0096-F, July 1983): 401, 404-407, GP-7, 410.

Quarterly sampling may be from the same set of wells, or from an alternate set designated by DOE. As remedial action activities may inactivate certain existing wells, it may be necessary to drill and sample new down-gradient wells to replace those disturbed as the project progresses.

Treated effluent from the CAN site water treatment plant shall be routinely analyzed for Ra226 and U238 and other materials as per the requirement of the applicable State of Pennsylvania NPDES Permit.

Samples and records shall be marked with unique identifications as per the Canonsburg Systematic Sample Numbering memo (Meyer to Farnes, 2/22/84, Ref. 6).

4.0 RADIOLOGICAL SUPPORT/INSTRUMENTATION

4.1 INITIAL SURVEYS

4.1.1 Gamma Scan Haul Road

Prior to construction of the haul road connecting Main and George Streets and entering area "A" near building "T", a survey of the proposed road employing calibrated portable gamma detection instruments will be conducted by site Health Physics personnel. NaI gamma-scan probes with portable ratemeters will be employed. Data will be mapped indicating any gamma exposure levels significantly in excess of background. This data will be used to guide initial soil and material removal during haul road construction.

During haul road construction, Health Physics personnel will use calibrated NaI detectors or other means to indicate areas of contamination to be removed. Because the haul road area will not be radiologically access controlled, sufficient material will be removed to reduce potential surface contamination levels to less than 200 pCi/g and dose rates to less than 60 ur/hr.

After completion of the haul road, and periodically during site operations, gamma surveys will be conducted to ensure that no significant additional contamination of the road has occurred.

4.1.2 Other Preliminary Scans

Prior to commencement of significant activities in a particular area onsite, a gamma survey of the area will be conducted by Health Physics personnel. Portable NaI instruments will be employed, and a map indicating areas significantly in excess of background gamma levels will be prepared, to be used in guiding initial soil removal.

During initial construction activities in such areas, Health Physics personnel may use NaI detectors, cone-shielded if necessary, or other means such as the CNSI soil analysis system to indicate areas of contamination to be removed.

After completion of initial activities in such areas, and periodically thereafter, exposure rate surveys using field-calibrated instruments will be conducted to re-establish the location of contaminated areas for purposes of Health Physics exposure control.

4.2 EXCAVATION CONTROL, AND VERIFICATION OF COMPLIANCE WITH US EPA STANDARDS

4.2.1 Gamma Scanning

During major construction and excavation activities at Canonsburg, Health Physics personnel will employ (NaI) portable detector instruments to locate residual tailings materials by gamma emissions. Where radiation levels due to interfering tailings materials are excessive, shielded detectors or other procedures such as the CNSAS (below) shall be employed to guide excavation. Protocols, calibrations and record-keeping programs shall be developed as necessary, through coordination with the Project Office (RAC) as specified in the RAC Health Physics Monitoring Plan, and shall be implemented by the Site HP Manager.

4.2.2 Excavation Control and Verification Soil Sampling and Analysis

During construction and excavation activities at Canonsburg, soil sampling to establish concentrations of residual tailings material shall be employed where interference from nearby tailings material is excessive, or when verification of compliance with US EPA 5 and 15 pCi/g soil standards is necessary. To ensure adequate representation of the average soil Ra 226 concentration in a particular excavation, 15 cm deep soil samples shall be taken from approximately 20 grid intersects uniformly distributed within each 100 m^2 or smaller area. A 15 cm "Cookie Cutter", or a sampling shovel with 15 cm blade, or a similar sampling method, shall be used to take uniform mass soil samples at the approximately 20 grid intersects. A homogenized composite of these samples shall be counted using the CNSAS method described by Schiager and Smith (1982), as discussed in RAC procedures 008 and 015. Other approved soil analysis methods may be employed. Ten percent of composite EPA compliance verification samples shall be independently analyzed offsite. Five percent of composites used to establish the location of the less than 100 pCi/g material to remain unencapsulated shall be independently analyzed offsite. Samples and records shall be marked with unique identifications as per the Canonsburg Systematic Sample Numbering

memo (Meyer to Farnes, 2/22/84, Ref. 6). Intercomparison of data derived from the above analyses will be performed for quality assurance, andto provide a basis for eventual reduction of the need for soil sample analysis by off-site laboratories. In addition, offsite analysis results will be used to continuously review the soil analysis system calibration curve, or to develop area-specific calibration curves as necessary. (See RAC Procedures 008 and 015.)

REFERENCES

1. Schiager, Keith J. and W. John Smith II, "Simple Field Method for Determining Compliance with EPA Land Cleanup Standards," Symp. on Uranium Mill Tailings Management, Fort Collins, Colo. Dec. 9-10, 1982.

2. "UMTRA Project Health and Safety Plan," June 1983, UMTRA-DOE/AL-6 US DOE.

3. 10CFR20 (Code of Federal Regulations).

4. Remedial Actions at the former Vitro Rare Metals Plant Site," July 1983, DOE/EIS - 0096-F, US DOE.

5. RAC Health Physics Monitoring Plan, M-K/UMTRA-3, December 2, 1983.

6. Memo, Bob Meyer to Larry Farnes, "Systematic Sample Numbering at Canonsburg/Technical Memo," February 22, 1984.

UNITED STATES
DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE

APPENDIX C
OF THE
HEALTH PHYSICS MONITORING PLAN
UMTRA PROJECT

SALT LAKE CITY, UTAH VICINITY PROPERTIES

HEALTH PHYSICS MONITORING PLAN

November 1984

Prepared by:

Chem-Nuclear Systems, Inc.

For

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Remedial Action Contractor

Remedial Action Contractor - Health Physics Monitoring Plan

APPENDIX C. SALT LAKE CITY HEALTH PHYSICS PLAN

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SALT LAKE CITY HEALTH PHYSICS PLAN
Appendix to RAC Health Physics Monitoring Plan

1.0 INTRODUCTION

This Health Physics Monitoring Plan (HPMP rev. October, 1984) comprises the Salt Lake City (SLC), Utah Site Specific Health Physics Plan. It outlines requirements for health physics operational and environmental control at vicinity properties located at SLC. Specific implementing methods and procedures are found in the RAC Procedures Manual.

Implementing Health Physics procedures will be maintained by the Site Health Physics Manager and will be available at the Salt Lake City site for audit.

2.0 TRAINING

2.1 Radiation Worker

All individuals who regularly enter a controlled area (see Section 3.2.1 for definition) to perform work will receive radiation worker training as described in the RAC Health Physics Monitoring Plan. This training will be given at the site by the Health Physics staff. The SLC Health Physics Manager will maintain the specific training procedures as well as the individual training records (RAC-003). These records will be available for audit.

2.2 Industrial Safety

All workers will attend a safety indoctrination session. This training will be presented by the RAC Construction Safety and Health Manager or his designee. The RAC SLC Manager will maintain documentation of these training sessions.

2.3 Health Physics Staff

The Health Physics staff will meet the standards of the RAC Health Physics Monitoring Plan. If not previously qualified, individuals will be trained and qualified by the SLC Health Physics Manager, assisted by previously qualified RAC staff. The Health Physics Manager will maintain training procedures and documentation regarding site Health Physics Staff. These records will be available for audit.

3.0 OPERATIONAL AND ENVIRONMENTAL HEALTH PHYSICS

3.1 DOSIMETRY AND BIOASSAY PROGRAMS

3.1.1 Thermoluminescent Dosimetry

Personnel requiring access to controlled areas (see Section 3.2.1) for more than 40 hours in any three consecutive months, (i.e. radiation workers) shall be issued thermoluminescent dosimeter (TLD) badges. Such personnel shall receive health physics indoctrination training as described in the RAC HPMP. Appropriate records (see Procedures RAC-003 and 004) of past and current exposure shall be maintained for such personnel by the SLC Health Physics Manager.

The site HP manager is responsible for review and action on TLD dosimetry data, upon receipt. The ALB HS&E manager should be informed via a brief memo whenever related action is taken.

TLD's shall be exchanged quarterly and read by the issuing vendor. A unique TLD number shall be assigned to each individual. Control TLD's shall also be read quarterly. No individual shall be allowed to exceed 90% of the annual limits specified in the HPMP, Section 3.

3.1.2 Self Reading Dosimeters

Individuals entering controlled areas who are not required to wear TLD's (i.e. visitors) shall be issued self-reading dosimeters (SRD's) at the direction of the SLC HP Manager prior to entry. Dosimetry for a group of visitors remaining together while within controlled areas may be provided by one SRD carried by a member of the group, providing exposure potential is low. Visitors should be escorted by Health Physics trained staff while in controlled areas. SRD's, when used, will be read and doses recorded on a daily basis. All visitors shall be limited to 0.5 rem per year (see HPMP Section 3).

3.1.3 Bioassay Requirements

Prior to commencement of work in controlled areas, radiation workers will be required to furnish specimens for urinalysis. Each specimen should be 2 liters, consisting of total voiding over at least 24 hours. Samples will be analyzed by a vendor for Ra-226, Th-230, and U-nat concentrations. Additional urinalyses will be required for potentially exposed radiation workers if weekly average

radionuclide air concentrations exceed any radionuclide MPC . In addition, a determined effort will be made to acquire urinalysis data upon worker termination. The need for additional bioassay will be determined by the SLC Health Physics Manager upon consultation with the RAC Radiological Programs Manager. In general, additional urinalysis will be required as per the following guideline:

- Th-230:
  - resample - 0.05 pCi/l
  - investigate work conditions - 0.1 pCi/l
  - prohibit employee from working in restricted areas - 0.2 pCi/l

- Ra-226
  - resample - 0.5 pCi/l
  - investigate work conditions - 0.7 pCi/l
  - prohibit employee from working in restricted areas - 1.0 pCi/l

The site HP manager is responsible for review and action regarding urinalysis data, upon receipt. The ALB HS&E manager should be informed via a brief memo whenever such action is taken.

A permanent record of bioassay results shall be maintained in a dosimetry and urinalysis log. Samples and records shall be marked with unique identifications as per the RAC Systematic Sample Numbering memo (Skinner to Purvis, 4/10/84, HS-014-04-84 Ref. 6). Copies of all SLC staff and subcontractor quarterly urinalysis records shall be forwarded to the CNSI/ALB EAV Manager each quarter. As work progresses at the site, a continuous set of negative urinalysis readings may be interpreted as indicating reduced need for urinalysis with approval of the RAC HS&E Manager.

3.2 ACCESS CONTROL

3.2.1 Boundary Establishment and Posting

Controlled areas shall be established for certain vicinity properties to protect the workers and the general public from unnecessary radiation exposure, and to prevent the spread of radioactive contamination. Controlled areas include, but are not limited to, any work areas which meet the following conditions:

o. Significant portions of potentially exposed surface contamination exceed 200 pCi/g of Ra-226.

- o. The estimated external gamma dose to any individual in that work area may exceed 500 millirem/year (240 micro R/hr, 40 hours per week).

- o. Airborne concentrations of radionuclides may exceed quantities provided in DOE Order 5480.1A, Attachment II.

- o. Transferable surface contamination is likely to exceed 200 dpm cm^2 alpha, or 1000 dpm/100 cm^2 beta-gamma.

Access to these areas shall be controlled for people, vehicles, and equipment by fencing the area or using other methods to prevent inadvertent exposure to contaminated material.

Smoking, drinking, and eating are prohibited in controlled areas.

Controlled areas defined as above must be conspicuously marked at points of potential access with a sign or signs bearing the radiation caution symbol and the words:

CAUTION
RADIOACTIVE MATERIAL

All other applicable posting and labeling requirements set forth in 10 CFR 20 must be followed.

3.2.2 Protective Clothing

Coveralls may be required for workers expected to contact significant quantities of contaminated material or contaminated dust generated by excavation. Rubber boots and/or gloves may be required depending on weather and/or work conditions. Protective clothing requirements will be as directed by the site HP Manager.

3.2.3 Respiratory Protection

Respiratory protection will be required for any individual working in airborne contamination whose projected monthly average inhalation exposure exceeds 40 MPC hours. Hi-vol or other air sampling will be used to establish projected exposures. For individuals using respiratory protection, a qualitative fit test, and an evaluation of physical ability to wear a respirator (coordinate with the ALB RAC Manager of Construction, Safety & Health) are required as well as respirator training. Respiratory protection will be required only if other dust control measures fail. See RAC-012 for specific details.

3.2.4 Personnel Monitoring

All potentially contaminated individuals exiting from a controlled area will monitor or be monitored for alpha contamination. The monitoring will routinely be done with an alpha scintillation probe on an alarming rate meter. Measurable contamination will be removed (see section 3.2.5).

3.2.5 Equipment Surveys

All potentially contaminated equipment or tools, used in controlled areas containing in excess of 200 dpm/100 cm^2 loose alpha, will be surveyed prior to release from the area.

The survey will consist of monitoring with a portable survey instrument, and, if necessary, a smear survey for loose contamination. The equipment will be held for decontamination and re-survey for levels exceeding 200 dpm/100 cm^2 loose or 300 dpm/100 cm^2 fixed alpha.

Section 3.2.4 and 3.2.5, Monitoring and Survey Requirements, may be related upon written direction from the US DOE for specific locations.

3.2.6 Decontamination

Skin contamination will be removed by washing with lukewarm water and soap or mild detergent. If contamination is still evident, additional washing will be necessary.

Contaminated equipment will be decontaminated by scraping, brushing, wiping, or use of water spray. See RAC procedures for specific details on decontamination of personnel and equipment.

3.3 VICINITY PROPERTY CHARACTERIZATION SURVEYS

Vicinity property characterization surveys are performed to define the limits of contamination on properties identified by the inclusion survey as potentially contaminated. Characterization surveys may range from simple supplements to previous surveys, to thorough and complete resurveys of properties. The Site Health Physics Manager shall determine the extent of this survey, with the advice and concurrence of the RAC Vicinity Properties Manager, the RAC Radiological Programs Manager, and the Site Manager.

3.3.1 Gamma Surveys

Gamma surveys at SLC vicinity properties shall be conducted in compliance with Procedure RAC-019. The background for the Salt Lake City area has been found to average about 750 c/0.1m on the 2220/4410 instrument package. Surface soil sample data in the Salt Lake City area indicate that a surface count rate of 1500 c/0.1m (three times background) corresponds to an average concentration of 4.98 pCi/g, including background. To provide a degree of conservatism the count rate to be used as the gamma boundary at SLC properties is 2000 c/0.1m.

3.3.2 Delta Surveys

When "shine" from nearby tailings materials interferes with the proposed performance of the outdoor gamma survey, a delta survey may substitute for the usual gamma survey. Delta surveys will be performed according to Procedure RAC-015A, except that soil sampling will not be routinely required.

3.3.3 Borehole Surveys

Borehole surveys at SLC vicinity properties shall be conducted in compliance with Procedure RAC-018. The average borehole background count in Salt Lake City has been determined to be 1700 c/0.1m for all depths except at the surface. As shown in Section 3.3.1, a count rate of three times background might correspond to the soil concentrations limit of 15 pCi/g below 6 inches depth. However, because of the uncertainty introduced by the geometry of the boreholes, and the variances in emanating fractions of various soils, a cutoff of 2.5 times background (4250 c/0.1m) provides a suitable degree of conservatism. For convenience, this is rounded down to a final cutoff value of 4000 c/0.1m.

3.3.4 Surface Contamination Survey

Surface contamination surveys, when needed, will be conducted in compliance with Procedure RAC-011. Permissible limits of surface contamination are described in the procedure.

3.3.5 Surface Soil Samples

Surface soil samples may be collected as needed, at the direction of the Health Physics Manager. Soil samples are appropriate when a gamma survey indicates the presence of contamination, but borehole surveys indicate no contamination at depth. Samples may be counted on the SLC OCS system, when available, or by off-site laboratory analysis.

3.3.6 Working Level Measurements

Working level measurements, when needed, will be made in compliance with Procedure RAC-014. If an inclusion survey, performed in accordance with the June 1984 VPMIM, page A-7, has reported radon daughter concentrations (RDC) less than 0.01 WL, additional measurements, in general, will not be necessary.

3.4 INITIAL SURVEYS AND SURVEILLANCE FOR REMEDIAL ACTION

3.4.1 Gamma Surveys

Gamma surveys at SLC vicinity properties shall be performed initially to establish worker exposure rate estimates for health physics purposes. Surveys shall be performed using suitably field calibrated hand held scintillator/ratemeter units, and recorded on prepared maps. Performance of hand held units shall be routinely checked using a calibrated pressurized ion chamber. VP's with significant potential for worker exposure shall be resurveyed as necessary for health physics purposes.

Hauling routes to be used for each vicinity property contamination transfer to the Vitro site will be spot-surveyed initially and then routinely using a field calibrated scintillator/ratemeter.

3.4.2 Air Samples

Portable high volume air samples will be used to collect grab sample breathing zone air particles in controlled areas. Samples will be taken during periods of major activity or as directed by the SLC Health Physics Manager. The samples will be analyzed for gross alpha and compared to the Th-230 MPC_a column I limits. Samples and records shall be marked with unique identifications as per the RAC Systematic Sample Numbering Memo (Skinner to Purvis, Ref. 6).

Any air filters exhibiting gross alpha count rates in excess of one worker MPC_a shall be immediately sent to an offsite laboratory to be analyzed for the Th-230 air concentrations. The RAC Radiological Programs Manager or his designate in Albuquerque shall immediately be notified when gross alpha analyses exceed applicable MPC_a values. The actual isotopic concentration of Th-230 may be utilized to help interpret future worker exposure as indicated by onsite gross alpha analyses.

3.4.3 Contamination Surveys

Surveys for loose surface contamination will be made by taking smears at least monthly from selected 100 cm^2 floor areas of the SLC field office, the access control points, crew trailers, and restrooms. Smears will be counted for alpha and/or beta-gamma contamination. Contamination exceeding 200 dpm/100 cm^2 alpha or 1000 dpm/100 cm^2 beta-gamma will require decontamination of the area. If such decontamination is necessary, the Health Physics Manager will determine steps to be taken to prevent future contamination. Records of smear surveys and action taken will be maintained by the HP Manager.

3.4.4 Working Level Measurements

Working levels will be measured by the method described in Procedure RAC-014 for grab samples, or by using a calibrated portable automatic sampler such as the WLM-1 Eberline sampler or the WLM-300 EDA monitor). A WL air sample may be taken with a calibrated low-volume air sampler. Filters will be alpha counted using a modified Kusnetz method as described in RAC Procedure-014. Working level measurements are required prior to work entry into buildings scheduled for remedial action. If a potential hazard is detected, daily or more frequent measurements are required when buildings are to be occupied for working purposes. Working level measurements will be compared to 10CFR20 limits as specified in Section 3.1 of the HPMP.

Working level measurements outdoors will be performed when, in the judgment of the SLC Health Physics Manager, a significant potential hazard exists (e.g., within contaminated pits).

Samples and records shall be marked with unique identifications as per the RAC Systematic Sample Numbering Memo (Skinner to Purvis, Ref. 6).

For vicinity properties with no known potential for working level concentrations approaching 10CFR20 restricted area limits (as defined in Section 3.1 of the HPMP), routine WL measurements will be taken when convenient, as part of required RAC interior survey work. Records of all WL measurements and actions taken will be maintained by the SLC HP Manager.

3.5 ENVIRONMENTAL MONITORING

3.5.1 Airborne Particulate Monitoring

VP boundary monitoring for airborne particulate radionuclides shall be required during periods of major activity for vicinity property sites where large volumes of contaminated soils averaging 200 pCi/g exist and the potential exists for measurable increases in airborne activity. For such properties, sampling shall be continuous during periods of major activity. Filters shall be analyzed at least weekly and results recorded permanently and compared to unrestricted MPCa (Th-230) values (10 CFR 20). For vicinity property sites with soils averaging less than 200 pCi/g, initial site boundary "grab" air sampling performed during the first exposure to large quantities of contaminated material, to determine whether environmental releases in excess of MDA are likely, may be performed at the discretion of the site HP Manager. The HP Manager shall consider such factors as anticipated quantities of material to be removed, proximity of neighboring populations, etc, in making this decision. Depending upon the outcome of such sampling, additional short-term air sampling at the site boundary may be performed, at a frequency determined by the HP Manager. Samples and records shall be marked with unique identification as per the RAC Systematic Sample Numbering memo (Skinner to Purvis, Ref. 6). Twenty-four hour decay prior to counting shall be employed to exclude radon daughters when gross alpha analysis is performed. Samples exceeding applicable gross alpha activity after decay shall be sent to an offsite vendor for Th-230, Ra-226 isotopic analysis. Site boundary samplers shall be located both upwind and downwind of the site where possible.

The RAC EAV Manager or his designee shall be immediately notified when offsite or site boundary gross alpha analyses exceed applicable MPC_a column II values. Air sampling and counting equipment shall be operated at an MDA (minimum detectable activity) averaging no higher than 25% of the most restrictive MPC_a column II (Th-230), unless specific approval to operate temporarily at a higher MDA is received from the RAC Radiological Programs Manager.

On a monthly basis, the set of air filters from each continuous monitor location shall be sent to an offsite vendor, for compositing and analysis for Th-230 and Ra-226 monthly average air concentrations (each sampler location).

3.5.2 Radon Monitoring

Offsite monitoring for radon shall be performed at the boundary of vicinity property sites where large volumes of 200 pCi/g (average) soils are present, and the potential exists for significant offsite increases in radon air concentrations. Modification of remedial activities to reduce Rn levels is indicated if results near the boundary exceed an average of 3 pCi/l weekly. For properties meeting or exceeding the above criteria, an initial, downwind grab sample for radon should be taken following initial exposure of large quantities of contaminated material. If no significant Rn activity above background is found, radon concentrations downwind should be routinely measured by grab sampling on a weekly basis. If significant Rn activity is determined to exist as a result of remedial action, more frequent monitoring will be necessary, at a frequency to be determined by the SLC HP manager in consultation with the ALB Rad. Programs manager.

3.5.3 Water Sampling

Prior to release from the property, water potentially contaminated during remedial action will be sampled and analyzed. Releases are permitted if concentrations do not exceed limits provided in 10 CFR 20, or in state or local regulations, whichever is most restrictive. Decisions concerning handling of contaminated water will be made by the M-K Site Manager in consultation with the HP Manager and the Albuquerque RAC Project Office. Records of data and actions taken shall be maintained by the SLC HP manager.

Samples and records shall be marked with unique identifications as per the RAC Systematic Sample Numbering memo (Skinner to Purvis, Ref. 6).

4.0 RADIOLOGICAL SUPPORT/INSTRUMENTATION

4.1 EXCAVATION CONTROL, AND VERIFICATION OF COMPLIANCE WITH US EPA STANDARDS

4.1.1 Gamma Scanning

During construction and excavation activities, Health Physics personnel will employ (NaI) portable detector instruments to locate residual tailings materials by gamma emissions. Where radiation levels due to interfering tailings materials are excessive, shielded detectors shall be employed to guide excavation. Protocols, calibrations and record-keeping programs shall be developed as necessary, through coordination with the ALB (RAC) as specified in the RAC Health Physics Monitoring Plan, and shall be implemented by the SLC HP Manager.

4.1.2 Excavation Control and Verification Soil Sampling and Analysis

When gamma interference from nearby tailings materials (usually called "shine") is excessive, or during pre-restoration and verification surveys, the SLC delta monitoring system shall be used. The delta system consists of a standard 2220/4410 scintillation instrument with the probe encased in a 1/2" thick lead sheath. A small stand on the sheath places the unshielded face of the probe one inch above the ground surface. A separate lead plate, approximately 12" x 12" x 1/2" in size, is also part of the delta system.

The delta system is used by placing the lead sheath over the desired monitoring point and inserting the probe into the sheath, taking care that the unshielded face of the probe is one inch above the surface. A 30-second (0.5 minute) count is taken and recorded. The lead plate is then placed on the surface under the probe and another 30-second count is made. The second count is subtracted from the first; the difference is called the "delta." A delta of about 2200c/0.5 m corresponds to 5 pCi/g, and a delta of about 3900c/0.5 m corresponds to 15 pCi/g, as shown on Figure 1 of this plan. When excavation is only within the first six inches of soil, the limit is 5 pCi/g (2100c/0.5 m); at deeper excavations, the limit is 15 pCi/g (3900c/0.5 m). Since the EPA standards actually mandate cleanup to 5 and 15 pCi/g above background, the administrative levels of 5 and 15 pCi/g including background provide an acceptable degree of conservatism.

Soil samples will not be required for excavation control; however, soil samples will be collected during the pre-restoration survey. Samples will be collected from the soil at the excavated surface. These samples will be sealed in cans and counted immediately and after a suitable decay and ingrowth time, in the SLC opposed crystal system (OCS). The OCS consists of two NaI scintillation crystals, connected to a multichannel analyzer (MCA) with a space between the crystals for the sample. The system is lead shielded. The computerized OCS calculates the radium concentration in the sample, compared to a known standard.

If the delta system has demonstrated conclusively that contamination above EPA standards has been removed, backfilling can proceed without the confirmatory results from the soil samples.

As a minimum, twenty pre-restoration, evenly distributed delta readings will be taken in each 100 m^2 area of the excavation, and additional readings may be made at the direction of the HP Manager. At the start of the project, a soil sample is to be collected at exactly each delta measurement point. Once a sufficient data base has been established to demonstrate the validity of the delta measuring system, the soil sampling may be reduced to 10% of the delta locations, with RAC ALB and DOE concurrence.

REFERENCES

1. Schiager, Keith J. and W. John Smith II, "Simple Field Method for Determining Compliance with EPA Land Cleanup Standards," Symp. on Uranium Mill Tailings Management, Fort Collins, Colo. Dec. 9-10, 1982.

2. "UMTRA Project Environmental Health and Safety Plan," June 1984, UMTRA-DOE/AL-150224.006 US DOE.

3. 10CFR20 (Code of Federal Regulations).

4. Remedial Actions at the former Vitro Rare Metals Plant Site," July 1983, DOE/EIS - 0096-F, US DOE.

5. RAC Health Physics Monitoring Plan, M-K/UMTRA-3, December 2, 1983.

6. Memo, Dawn Skinner to Jim Purvis, "Systematic Sample Numbering at Salt Lake City/April 10, 1984; HS-019-04-84.

7. "Vicinity Properties Management and Implementation Manual," June 1984, UMTRA-DOE/AL-050601, US DOE.

8. 40CFR192 (Code of Federal Regulations).

UNITED STATES
DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE

APPENDIX D
OF THE
HEALTH PHYSICS MONITORING PLAN
UMTRA PROJECT

SHIPROCK, NEW MEXICO

SITE SPECIFIC HEALTH PHYSICS MONITORING PLAN

April 12, 1985

Prepared by:

Chem-Nuclear Systems, Inc.

For

Morrison-Knudsen Company, Inc.

Remedial Action Contractor

Remedial Action Contractor - Health Physics Monitoring Plan

APPENDIX D. SHIPROCK, HEALTH PHYSICS PLAN

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SHIPROCK HEALTH PHYSICS PLAN
Appendix D to the Health Physics Monitoring Plan

1.0 INTRODUCTION

This Appendix D to the UMTRA Remedial Action Contractor (RAC) Health Physics Monitoring Plan comprises the Shiprock, New Mexico site specific Health Physics Plan. Specific implementing methods and procedures are found in the RAC Procedures manual.

The implementing procedures will be maintained by the Site Health Physics Manager or his designee, and will be available at the Shiprock field office.

2.0 TRAINING

2.1 Radiation Worker

All individuals who regularly enter a controlled area to perform work will receive radiation worker training as described in the RAC Health Physics Monitoring Plan. This training will be given on site by the Health Physics Manager or his designee. The Health Physics Manager will maintain the specific training procedure as delineated in the RAC Training Manual as well as individual training records. These records will be available at the Shiprock field office.

2.2 Industrial Safety

All individuals working on the Shiprock UMTRA Project shall periodically attend industrial safety indoctrination sessions. This training will be presented by the RAC Construction Safety and Health Manager or his designee. The RAC Site Manager will maintain documentation of these training sessions.

2.3 Health Physics Staff

The Health Physics Staff will meet the standards of the RAC Health and Safety Personnel Training Program. If not previously qualified, individuals will be trained and qualified by the site Health Physics Manager. The site Health Physics Manager will maintain training procedures and documentation regarding site Health Physics Staff. These records will be available for audit.

The anticipated organizational chart for Shiprock is included in Figure 1.0.

3.0 ACCESS CONTROL

3.1 Boundary Establishment and Posting

Controlled areas shall be established for the mill site and for certain vicinity properties to protect the workers and the general public from unnecessary radiation exposure, and to prevent the spread of radioactive contamination. Controlled areas include, but are not limited to, any work areas which meet the following conditions:

- o. Significant portions of potentially exposed surface contamination exceed 200 pCi/g of Ra-226.
- o. The estimated external gamma dose to any individual in that work area may exceed 500 millirem/year (240 micro R/hr, 40 hours per week).
- o. Airborne concentrations of radionuclides may approach quantities provided in DOE Order 5480.1A, Attachment II.
- o. Transferable surface contamination is likely to exceed 200 dpm cm^2 alpha, or 1000 dpm/100 cm^2 beta-gamma.

Initially, Figures 1.1 and 2.0 may be utilized by the site Health Physics Manager to establish access control areas as defined above. Periodic area exposure rate surveys are required to verify the information on exposure rates.

Access to these areas shall be controlled for people, vehicles, and equipment by fencing the area or using other methods to prevent inadvertent exposure to contaminated material.

Smoking, drinking, and eating are prohibited in controlled areas.

Controlled areas defined as above must be conspicuously marked at points of potential access with a sign or signs bearing the radiation caution symbol and the words:

CAUTION
RADIOACTIVE MATERIAL

All other applicable posting and labeling requirements set forth in 10 CFR 20 must be followed.

3.2 Protective Clothing

Protective clothing requirements will be established by the site HP Manager on a case by case basis, with requirements posted at controlled area access points.

3.3 Respiratory Protection

Respiratory protection shall be required when airborne contamination projected exposure in an area may exceed 40 MPC hours per week or 160 MPC hours per month. Training, and a determination of physical ability to wear a respirator is required, as defined in Procedure RAC-006. The site HP Manager shall make every effort to reduce personnel exposures to airborne radionuclides to levels as low as are reasonably achievable.

3.4 Personnel Monitoring

All personnel shall thoroughly frisk for alpha contamination at the end of each shift, and each time they exit a controlled area. An alarming alpha rate meter shall be utilized. Personnel shall be trained in self-monitoring by site HP staff during initial Health Physics training.

3.5 Equipment Surveys

All Equipment taken into a controlled area will be surveyed for contamination prior to release from the area. Any equipment having fixed or loose contamination levels exceeding free release limits as stated in Procedure RAC-004 will be held for decontamination and resurvey.

3.6 Decontamination

Skin contamination will be removed by washing with luke warm water and mild soap. Contaminated equipment will be decontaminated by scraping, wire brushing, washing, etc. See Procedure RAC-008 for specific procedures.

4.0 DOSIMETRY AND BIOASSAY PROGRAMS

4.1 Thermoluminescent Dosimetry

Personnel requiring access to controlled areas for more than 40 hours in any three consecutive months shall be issued uniquely numbered thermoluminescent dosimeter badges (TLD's). Such personnel shall receive health physics indoctrination training as described in the RAC Health Physics Monitoring Plan. Note: The Health Physics Manager may waive health physics indoctrination training for personnel with health physics backgrounds. Appropriate records as

per Procedure RAC-002 shall be maintained by the Health Physics Manager. TLD's shall be issued daily and collected by Health Physics at the end of each day. Appropriate control TLD's are required to determine contribution of background to accumulated dose.

TLD's will be exchanged and read quarterly by a properly qualified vendor.

4.2 Self Reading Dosimeters (SRD's)

Visitors shall be issued SRD's prior to entry into radiologically controlled areas. A visitor log shall be maintained stating date, visitors name, social security number, time into controlled area, time out of controlled area, SRD reading in, SRD reading out, and total exposure received.

4.3 Bioassay Requirements

Prior to commencement of work in controlled areas, radiation workers will be required to furnish specimens for urinalysis. Each specimen should be 2 liters, consisting of total voiding over at least 24 hours. Samples will be analyzed by a vendor for Ra-226, Th-230, and U-nat concentrations. Additional urinalyses will be required for potentially exposed radiation workers if weekly average radionuclide air concentrations exceed any radionuclide MPC_a. In addition, a determined effort will be made to acquire urinalysis data upon worker termination. The need for additional bioassay will be determined by the Shiprock Health Physics Manager upon consultation with the RAC HS&E Manager. In general, additional urinalysis will be required as per the following guideline:

- Th-230:
  - resample - 0.05 pCi/l
  - investigate work conditions - 0.1 pCi/l
  - prohibit employee from working in restricted areas - 0.2 pCi/l

- Ra-226
  - resample - 0.5 pCi/l
  - investigate work conditions - 0.7 pCi/l
  - prohibit employee from working in restricted areas - 1.0 pCi/l

The site HP manager is responsible for review and action regarding urinalysis data, upon receipt. The ALB HS&E manager and Environmental Assessment manager should be informed via a brief memo whenever such action is taken.

A permanent record of bioassay results shall be maintained. Samples and records shall be marked with unique identifications as per the RAC Systematic Sample Numbering memo (Skinner to Purvis, 4/10/84, HS-014-04-84 Ref. 6). Copies of all Shiprock staff and subcontractor quarterly urinalysis records shall be forwarded to the CNSI/ALB EAV Manager each quarter. As work progresses at the site, a continuous set of negative urinalysis readings may be interpreted as indicating reduced need for urinalysis, with approval of the RAC HS&E Manager and the US DOE.

4.4 Radon Monitoring

Where the potential exists for exposure of workers to significant concentrations of Rn-222, provision shall be made to monitor such exposure. Depending on the anticipated exposure, one of the following monitoring procedures may be employed at the discretion of the site HP Manager: 1) Routine grab sampling for radon in close proximity to exposed workers; 2) Continuous monitoring with an Eberline RGM-2 or equivalent located in the immediate vicinity of exposed workers; 3) Use of Track Etch R radon dosimeters, routinely worn by workers with maximum potential for radon exposure, and read on a monthly basis. Based on initial experience at the Canonsburg UMTRA site, it is not anticipated that worker annual average exposures approaching the limit of 30 pCi/l will be encountered at Shiprock, except in rare cases involving enclosed structures containing high radium concentrations. In such cases, monitoring for radon daughter exposures is also required.

5.0 INITIAL SURVEYS

5.1 Gamma Radiation Surveys (Surface)

Prior to excavation of the mill site or included Vicinity Properties, a survey will be conducted with a gamma detection instrument to locate limits of contamination, and to identify potential health physics problems. VP survey measurements will be performed as per Procedure RAC-013. Correlation to exposure rate is required to determine potential worker exposures. Health Physics procedures shall be utilized to generate and routinely check this correlation.

Portable instruments used for this purpose must be routinely calibrated against a Pressurized Ion Chamber over the gamma exposure rate range of interest. A probe/ratemeter pair thus calibrated shall always be used as a pair for purposes of gamma exposure rate measurements. Separate calibration curves shall be maintained for millsite vs. Vicinity Property use. All such field calibration data shall be maintained both by the Site HP Manager, and via copies sent to the RAC Radiological Programs Manager in ALB.

5.2 Gamma Radiation Surveys (Borehole)

In addition to area surveys, areas with elevated gamma readings will be augered and boreholes will be logged using a gamma detection instrument coupled to a portable rate meter. Gamma measurements will be taken at 15 cm increments to estimate the contamination depth. All measurements will be recorded and borehole locations tied to the established grid system as per RAC HP procedure J09 and 013.

5.3 Gamma Radiation Surveys (Haul Roads)

Routes used for hauling excavated material from vicinity properties to the Uranium Mill Tailings Site will be gamma surveyed initially, and then routinely during transfer of material.

6.0 SURVEILLANCE AND RESPONSE

6.1 Exposure Rates

Portable gamma detection instruments will be used to routinely measure area radiation exposure rates. Initial readings will be taken in the on-site areas occupied by workers to characterize the gamma radiation field to which they are exposed. These readings will be recorded and submitted to the site Health Physics Manager. During excavation, area gamma radiation exposure rate surveys will be conducted on a routine basis specified by the Health Physics Manager. See Section 5.1 for correlation requirements for portable gamma exposure rate instruments.

6.2 Air Samples

Portable high-volume air samples will be taken with calibrated hi-volume air samplers at least twice per shift during excavation of large volumes of contaminated material as prescribed by the Health Physics Manager. Air samples will be counted with an Alpha detection system capable of detecting gross Alpha at 25% MPCa for Th-230. Samples with 24-hour-decayed gross alpha activity in excess of the Th-230 MPCa will be sent to an offsite laboratory specified by the RAC Albuquerque office for analysis for Th-230 and Ra-226. Initially, worker protection against radioactive dusts shall be based on the one-day decayed gross alpha result, assuming 100% of the count to be due to Th-230. After 10 or more hi-vol air samples have been analyzed by EDA laboratory, the Th-230/gross-alpha ratio established by these results may be used to control worker exposure to radioactive particulates. Records of the data and calculations used to establish this ratio shall be maintained by the site HP Manager. Samples shall be uniquely marked as per the RAC system. The ALB Radiological Programs Manager shall be immediately notified when 24 hour decayed air samples determined to be in excess of MPCa (by onsite gross alpha) are found.

Whenever dust is generated within a controlled area, or whenever significant concentrations of airborne particulate or gaseous radionuclides are measured at the mill site or vicinity property, measures must be implemented to reduce such concentrations. RAC Procedure 010 defines such procedures for radon control. For control of particulates, water sprays should routinely be applied to all areas potentially releasing radioactive dusts. In severe cases, including windstorms, advance planning to control release of radioactive dusts must be performed by the Site Manager. Measures such as covering of recently exposed, highly contaminated areas may be necessary to reduce the potential for radioactive dust release.

6.3 Contamination Surveys

Surveys for loose contamination will be made by taking smears from floor areas, desk tops, etc., on a routine basis established by the Health Physics Manager. Loose alpha contamination exceeding 200 dpm/ 100 cm 2 will require decontamination of the area. Smears of loose contamination will be counted with alpha, and/or beta-gamma detection systems capable of detecting gross alpha and beta-gamma below levels for unrestricted release. Routine smears will be taken daily in eating areas and lab areas, weekly in access control and office areas, and monthly on permanent support equipment.

6.4 Working Level Surveys

Working level measurements will be required when significant worker exposure is possible, in the judgment of the HP Manager.

Working levels will be measured by taking air samples and analyzing for radon daughters using a modified Kusnetz method, or by using Eberline WLM-1's or equivalent. Working level measurements will also be taken prior to remedial action in any poorly ventilated building, and, for EPA verification purposes, in all inhabited structures when remedial action is completed in or near those structures (i.e., fill around foundations, utility lines, etc).

7.0 EXCAVATION CONTROL

7.1 Gamma Radiation Scans

During excavation at Shiprock, New Mexico, health physics personnel will employ portable detectors to locate residual tailings material by gamma-ray emissions. Where gamma radiation levels due to interfering tailings material are excessive shielded detectors or other methods, such as OCS soil sampling, shall be employed to guide excavation.

7.2 Soil Sampling

Where analysis of the Ra-226 concentration of soil samples is required to demonstrate compliance with USEPA, USDOE or USNRC standards, either the Opposed Crystal System (OCS) gamma spectrometer (RAC procedure 015A) or independent analysis by an approved vendor, is acceptable.

Soil sampling procedure for both vicinity property and mill site verification shall be as per RAC procedure 015 and 016 based on the "Remedial Action Plan and Site Conceptual Design for Stabilization of the Inactive Uranium Mill Tailings Site at Shiprock, New Mexico," June 1984, pages C6 and C7.

7.3 Post Excavation Gamma Radiation Scans

Hauling routes, entry paths, and access points will be routinely spot-surveyed with a gamma detector to ensure that removal and transfer of contaminated material is being done in a controlled manner. This data will be compared to initial survey readings, at the completion of decontamination.

8.0 ENVIRONMENTAL MONITORING

8.1 Airborne Particulate Monitoring

Continuous air particulate sampling is required at points around the site boundary during periods of major activity. This requirement applies only to piles being stabilized in place, piles being excavated for relocation, disposal sites, and those vicinity property sites where large volumes of contaminated soils averaging 200 pCi/g of Ra-226 or more are present and the potential exists for measurable increases in airborne radioactivity. Gross activity measurements shall be compared to the DOE Order 5480.1A, Attachment 11, limit for Th-230, (8 X 10 -14 microCi/ml above background). Continuous air particulate sampling may be performed under other conditions, such as that specified in air quality permits issued by the respective tribe or state. Nine Shiprock site particulate sample locations are required; three in the downwind direction, one at the site upwind boundary, one at Shiprock High School, one at the old mill classroom building and one at a background location. Locations as identified on Figures 3.1 shall be utilized as closely as practical. The site HP Manager in conjunction with the M-K Site Manager will make arrangements with local residents and officials to locate the offsite monitors.

Sampling will commence at least 1 month prior to major onsite remedial action construction activities, continue through major remedial action and may be discontinued after winter shut down or completion of remedial action. Prior to any shut down, provision must be made to minimize windblown radioactive dust release.

An onsite meterology station will be located near the counting trailer.

For large vicinity property sites, initial site boundary "grab" air sampling performed during the first exposure to large quantities of material contaminated to 200 pCi/g or greater, to determine whether environmental releases in excess of MPC's are likely, may be performed at the discretion of the site HP Manager. The HP Manager shall consider such factors as anticipated quantities of material to be removed, proximity of neighboring populations, etc, in making this decision. Depending upon the outcome of such sampling, additional short-term air sampling at the vicinity property may be performed, at a frequency determined by the HP Manager. Samples and records shall be marked with unique identification as per the RAC Systematic Sample Numbering memo (Skinner to Purvis, Ref. 6). One-day decay prior to counting shall be employed to exclude radon daughters when gross alpha analysis is performed. Samples exceeding applicable gross alpha activity after decay shall be sent to an offsite vendor for Th-230, Ra-226 isotopic analysis.

The RAC EAV Manager or his designee shall be immediately notified when offsite or site boundary gross alpha analyses exceed applicable MPC a 10CFR20 Table I column II values. Air sampling and counting equipment shall be operated at an MDA (minimum detectable activity) averaging no higher than 25% of the most restrictive MPCa (Th-230), unless specific approval to operate temporarily at a higher MDA is received from the RAC Radiological Programs Manager.

On a monthly basis, the set of air filters from each continuous monitor location shall be sent to an offsite vendor, for compositing and analysis for Th-230 and Ra-226 monthly average air concentrations for each sampler location.

8.2 Radon Monitoring

Mill site boundary radon monitoring is required. Real time (RGM or equivalent type) radon monitors will be placed as specified on Figure 3.1. Monitoring shall be continuous, with measurements integrated over one week periods. Modification of remedial activities shall be required if boundary results exceed average projections of 3 pCi/l, annual average above background radon concentrations. Locations shall be chosen to coincide with designated Radon RGM locations as indicated on Figure 3.1. The locations of the PERM's or Track etch cups maintained by Mound Laboratory are also indicated on Figure 4.0. These data will also provide radon concentration data (with a longer turn around time) in addition to the RGM realtime monitors.

Monitoring for radon shall be performed at the boundary of large vicinity property sites where the potential exists for significant offsite increases in radon air concentrations. Modification of remedial activities to reduce Rn levels is indicated if results near the boundary exceed an average of 3 pCi/l weekly. For properties meeting or exceeding the above criteria, an initial, downwind grab sample for radon should be taken following initial exposure of large quantities of contaminated material. If no significant Rn activity above background is found, radon concentrations downwind should be routinely measured by grab sampling. If significant Rn activity is determined to exist as a result of remedial action, more frequent monitoring will be necessary, at a frequency to be determined by the Shiprock HP Manager in consultation with the ALB Radiological Programs Manager.

8.3 Water Monitoring

If significant dewatering is required at the site or at a large vicinity property, potentially contaminated water produced as a result of remedial activities will be analyzed for Th-230 and Ra-226 as necessary, prior to release off-site. On a quarterly basis during operations, gross alpha, Ra-226, Th-230, and U-nat analyses shall be required on any natural drainages associated with the mill site.

Ground water: where wells exist upgradient and downgradient from the mill site, water samples will be collected according to RAC procedures, and analyzed by an approved vendor for U-238, Th-230, Ra-226, and gross alpha. Preoperational samples are to be taken from wells 1, 1H, 4H, 5, 7, 8GT, 11, 6GT, 9GT, and 3A as indicated in Figure 5.0. Additional sampling will be done on a quarterly basis and at the completion of remedial action on permanent wells numbered 1, 4H, 5, 7, 6GT and 9GT. An additional well designated MW-1 north east of the pile will be constructed and sampled quarterly.

Surface water: two upstream and two downstream surface water samples will be collected from the San Juan River in the approximate locations indicated on Figure 6.0. Preoperational samples will be collected and analyzed for Ra-226, Th-230, U-nat and gross alpha. Quarterly, samples will be analyzed for Ra-226 and Th-230.

Other parameters (not specified herein) may be added if agreed to by the US DOE and the appropriate Tribal Officials.

REFERENCES

1. Letter from Masud Uz Saman, Director Department Water Management, Navajo Nation to Russ Hopkins, February 85.

2. "UMTRA Project Environmental Health and Safety Plan," June 1984, UMTRA-DOE/AL-150224.006 US DOE.

3. 10 CFR 20 (Code of Federal Regulations).

4. Remedial Action Plan and Site Conceptual Design for Stabilization of the Inactive Uranium Mill Tailings site at Shiprock, New Mexico, June 1984

5. RAC Health Physics Monitoring Plan, M-K/UMTRA-3, December 2, 1983.

6. Memo, Dawn Skinner to Jim Purvis, "Systematic Sample Numbering at Shiprock/April 10, 1984; HS-019-04-84.

7. "Vicinity Properties Management and Implementation Manual, "June 1984, UMTRA-DOE/AL-050601, US DOE.

8. 40 CFR 192 (Code of Federal Regulations).

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HEALTH PHYSICS MONITORING PLAN

UMTRA Project
Prime Contract No. DE-AC04-83AL18796

Rev. No. 7

Date
November 25, 1987

Designated Contact
H.R. Meyer

UNITED STATES
DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE

HEALTH PHYSICS MONITORING PLAN
URANIUM MILL TAILINGS
REMEDIAL ACTION (UMTRA) PROJECT

Prepared by:

CHEM-NUCLEAR SYSTEMS, INC.
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