UMTRA-DOE/AL-150224.0006
Revised July, 1985

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

ALBUQUERQUE, NEW MEXICO 87108

UMTRA PROJECT

ENVIRONMENTAL, HEALTH, AND SAFETY PLAN

Approved

Director, Environment, Safety,
and Health Division

UMTRA Project Manager

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1.0 INTRODUCTION

1.1 POLICY

The Department of Energy (DOE) and its contractors shall take all reasonable precautions in the performance of the work to protect the health and safety of employees and the public and protect the environment. The DOE and its contractors shall comply with all applicable Federal, state, tribal, and local health and safety regulations and requirements including, but not limited to, those established pursuant to the Occupational Safety and Health Act (OSHA).

1.2 SCOPE

This UMTRA Project Environmental, Health, and Safety Plan specifies the basic Federal health and safety standards and special DOE requirements applicable to this program. In addition, responsibilities in carrying out this plan are delineated. Some guidance on program requirements and radiation control and monitoring is also included.

An Environmental, Health, and Safety Plan shall be developed as part of the Remedial Action Plan for each mill site and associated disposal site to provide additional detail on site-specific health and safety requirements. **Special conditions at the site which may present potential health hazards will be described, and special areas that should be addressed by the RAC in their site-specific EH&S Plan will be indicated. Site-specific EH&S Plans prepared by the RAC will be available for review by the DOE and state and tribal agencies before the initiation of remedial action.**

Specific requirements set forth in this Environmental, Health, and Safety Plan are intended to provide uniformity to the UMTRA Project's health and safety programs **for processing sites, disposal sites, and vicinity properties** and, in all cases, be consistent with known standards and regulations.

2.0 ORGANIZATION AND RESPONSIBILITIES

2.1 ORGANIZATION AND STRUCTURE

Lines of authority for health and safety management must be independent of those for operational management to assure that UMTRA Project health and safety functions are not overridden by operational concerns. Organizational charts shall be provided in EH&S documents prepared by the TAC and the RAC to indicate the lines of authority for appropriate personnel.

Responsibilities for the Project Office, the RAC, and the TAC are provided in the following sections.

2.2 UMTRA PROJECT OFFICE

The UMTRA Project Office, with the assistance of appropriate divisions of Albuquerque Operations Office (AL), shall:

(a) Identify which contractors are to be covered by this plan, and include the requirement for plan compliance in applicable contracts.

(b) Issue an Environmental, Health, and Safety Plan (EHSP) for each mill site and associated disposal site.

(c) Conduct periodic health and safety audits of contractors, and issue Health and Safety Audit Reports (HSARs). Audits of contracting organizations shall be conducted initially, repeated at least annually and more frequently when warranted.

(d) Act on employee complaints in accordance with procedures outlined in this plan.

(e) Consider, in contract renewal or in reviews of UMTRA Project contractor performance, violations of all prescribed health and safety standards, and the timing and manner of correction. Willful violation or refusal or failure to abate violations of environmental, health, and safety standards or regulations may be justification for contract termination.

(f) Evaluate each project to identify other local, state, tribal, or Federal agencies with health and safety responsibility and assure that contractors comply with all requirements.

(g) Participate in the development of new environmental, health, and safety standards and implementation procedures or modification to existing standards to be issued by the DOE's Assistant Secretary for Policy, Safety, and Environment.

2.3 REMEDIAL ACTION CONTRACTORS AND SUBCONTRACTORS

All Remedial Action Contractors shall:

(a) Develop implementation procedures for the requirements set forth in this plan and/or the site-specific Environmental, Health, and Safety Plans, if available.

(b) Execute programs and policies in a manner that shall ensure compliance with the requirements set forth in this plan.

(c) Assure that required information is recorded and reported as required by DOE and AL Orders 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements.

(d) Submit requests for variance from the requirements of this plan to the UMTRA Project Manager.

(e) Identify subcontractors that are covered by this plan, and include the requirement for compliance with the plan in applicable subcontracts.

(f) Comply with the UMTRA Project Environmental, Health, and Safety Plan and any other regulatory requirements, and ensure that all of its subcontractors comply, as specified in the contract.

2.4 TECHNICAL ASSISTANCE CONTRACTOR

The Technical Assistance Contractor shall:

(a) Maintain and revise the UMTRA Project Environmental, Health, and Safety Plan, as necessary.

(b) Develop an Environmental, Health, and Safety Plan (EHSP) **as part of the RAP** for each mill site and associated disposal site, based upon requirements of this plan and requirements of other local, state, tribal, and Federal agencies. **Site conditions representing potential health hazards will be described.**

(c) Assure that required information is recorded and reported **for the TAC and its subcontractors** as required by DOE and AL Orders 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements.

(d) Submit requests for variance from the requirements of this plan to the UMTRA Project Manager.

(e) Identify subcontractors that are covered by this plan, and include the requirement for compliance with the plan in applicable subcontracts.

(f) Comply with the UMTRA Project Environmental, Health, and Safety Plan, and ensure that all of its subcontractors comply with the plan, as specified in the contract.

(g) Prepare Health and Safety **Audit** Reports (HSARs) based on the findings of health and safety **audits** of Remedial Action Contractor programs. **RAC programs will be compared to requirements in this document, and to site specific procedures and plans developed by the RAC.**

HEALTH AND SAFETY STANDARDS

3.1 APPLICABLE REGULATIONS

The contractor shall comply with all applicable Federal, state, tribal, and local health and safety regulations and requirements including but not limited to those established pursuant to the Occupational Safety and Health Act (OSHA). Special attention should be given to the following OSHA and other Federal regulations.

29 CFR Part 1910,	"Occupational Safety and Health Standards."
29 CFR Part 1926,	"Safety and Health Regulations for Construction."
49 CFR 172-174,	"DOT Transportation of Hazardous Materials."
10 CFR Part 20,	"Standards for Protection Against Radiation" (as cited in this plan).
DOE Order 5480.1A,	Environmental Protection, Safety, and Health Protection Program for DOE Operations (as cited in this plan).
DOE Order 5484.1,	Environmental Protection, Safety, and Health Protection Information Reporting Requirements **(as cited in this plan).**

3.2 RADIATION EXPOSURE STANDARDS

The contractor shall comply with the radiation exposure standards listed in Tables 3.1 and 3.2 unless state and/or local regulations take precedence. In all cases, exposures to workers and members of the public shall be as low as reasonably achievable.

Table 3.1 Exposure of individuals and population groups in uncontrolled areas**

Type of exposure	Annual dose equivalent or dose commitment (rem)*	
	Based on dose to individuals at points of maximum probable exposure (rem)	Based on average dose to a suitable sample of the exposed population (rem)
Whole body, gonads, or bone marrow	0.5	0.17
Other organs	1.5	0.5

*In keeping with Department of Energy policy on lowest practicable exposures, exposure to the public shall be limited to as small a fraction of the respective annual dose limits as is reasonably achievable. Dose commitment is defined as the dose equivalent (rem) received by specific organs during a period of one calendar year, that was the result of uptakes of radionuclides by a person exposed.

**From DOE Order 5480.1.

Table 3.2 Occupational radiation exposure standards***

Type of exposure	Exposure period	Dose equivalent (dose or dose commitment* rem)
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

*To meet the above dose commitment standards, operations must be conducted in such a manner that it would be unlikely that an individual would assimilate in a critical organ, by inhalation, ingestion, or absorption, a quantity of radionuclide or mixture of radionuclides that would commit the individual to an organ dose that exceeds the limits specified in the above table. Dose commitment is defined as the dose equivalent (rem) received by specific organs during a period of one calendar year, that was the result of uptakes of radionuclides by a person occupationally exposed.

**A beta exposure below a maximum energy of 700 KeV will not penetrate to the lens of the eye; therefore, the applicable limit for these energies would be that for the skin (15 rem/year).

***From DOE Order 5480.1.

4.0 PROGRAM REQUIREMENTS

4.1 ORGANIZATION AND STAFFING

The contractor having health and safety responsibilities at a site or associated vicinity properties shall have a qualified individual responsible for health and safety of the workers and public. This individual must be provided properly trained staff and adequate equipment to assure that the work is done safely. The equipment, number of staff, and staff qualifications should be commensurate with the potential hazard and job size.

4.2 OPERATING PROCEDURES

Operating procedures shall be developed and documented for all activities where there is a significant health or safety risk and for activities necessary for quantitatively assessing radiological or industrial hygiene hazards. Examples are dosimetry issuance and control, air sampling and analysis, and control of personnel access.

4.3 WORKER TRAINING

A formal training program shall be provided to all workers. The training should be commensurate with the anticipated work hazard. The program should include discussions of the UMTRA Project, industrial and radiological safety procedures, and emergency procedures. Practical demonstrations should be given, when appropriate. Each worker shall pass a written or oral examination with the results documented. The instructor shall discuss and provide workers with literature on the biological effects of radiation, when requested. The instructor shall also provide each worker with a copy of USNRC Regulatory Guide 8.13, "Instructions Concerning Prenatal Radiation Exposure." Training sessions shall be scheduled at a frequency that assures health and safety protection of the workers.

4.4 RECORDS AND REPORTING REQUIREMENTS

Each contractor shall notify the UMTRA Project Manager, and cognizant DOE Operations Office Environment, Safety, and Health Division (ESHD), of any fatality or serious accident as required in DOE and AL Orders 5484.1. Fatal accidents shall be investigated by the tribal, state, Federal, or local office having environmental, health, and safety jurisdiction.

Prior to initiating work, a work-related radiation exposure history shall be acquired and maintained for each employee working in a controlled area. Results of termination bioassays shall be obtained from the last employer where exposure to radiation occurred. If not available, consideration should be given to providing appropriate bioassays prior to permitting the employee to do radiation-related work.

The contractor shall be responsible for posting the OSHA applicability and employee reporting instructions, DOE Form F-5480.2. The contractor shall also be responsible for recording and reporting recordable illnesses and injuries in accordance with OSHA requirements. Copies of these reports shall be forwarded to the UMTRA Project Manager or cognizant DOE Operations Office.* Recordable occupational accidents and illnesses are those defined in the Occupational Safety and Health Act of 1970, and set forth by the Occupational Safety and Health Administration in 29 CFR 1904.12(c), (d), (e), (f), and applicable part of 1904.12(g).

When worker exposure monitoring is required per Section 5.6 of this plan, all contractors shall be responsible for maintaining records of employees' exposures to radioactive or toxic materials or other harmful physical agents. Form 5484.8, "Termination Occupational Exposure Report," shall be forwarded to the UMTRA Project Office, or cognizant DOE Operations Office within 30 days of termination of employment, or within 30 days of the determination of exposure in accordance with Annex A of DOE Order 5484.1. Forms 5484.6, "Annual Summary of Whole Body Exposures to Ionizing Radiation," and 5484.7, "Summary of Exposure Resulting in the Internal Body Depositions of Radioactive Materials for CY__," shall be forwarded to the UMTRA Project Office, or cognizant DOE Operations Office by March 15 for the preceding year, in accordance with Annex A of DOE Order AL-5484.1. In addition, all radiation exposure records or a copy of all radiation exposure records shall be transferred to the cognizant DOE Operations Office upon employee termination or completion of the contract.

Each contractor is required **by DOE Order 5000.3** to notify the UMTRA Project Manager and cognizant DOE Operations Office of any unusual occurrence. An "unusual occurrence" is any unusual or unplanned event having programmatic significance such that it adversely affects or potentially affects the integrity of the site or the performance, reliability, or safety of the UMTRA Project. **N**otification of occurrences similar to the following **is required**:

(a) Any substantial degradation of a barrier designed to contain radioactive or toxic material or any substantial release of radioactive or toxic material past this barrier (e.g. overflow of a water treatment pond, tailings release into a stream or river, tailings released beyond the site boundary).

(b) Loss of control of radioactive material (e.g., a spill associated with a truck or train accident).

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*The term UMTRA Project Manager or cognizant DOE Operations Office is used in the plan for notification and reporting related to environmental, health, and safety activities. Reporting and notification to cognizant DOE Operations Office(s) are only intended for use where organizations conducting UMTRA Project work are contracted through DOE Operations Offices other than Albuquerque.

(c) Accidents involving the transport of radioactive or toxic materials.

(d) Any fire or explosion which affects the integrity of the site or project.

(e) Any condition resulting from natural events or man-made activities which substantially affects or threatens performance, reliability, or safe operation (e.g., site flooding, wind damage, soil stability problems, personnel operation errors which create hazardous conditions).

(f) Any incidence of breach of access control by unauthorized personnel.

(g) Any acts of vandalism or major theft occurring at a site.

(h) Any release of contamination outside the controlled area; including personnel, equipment, and roadways.

Reports of "unusual occurrence" shall be made according to the format in **Implementation Guidelines for Unusual Occurrence Reporting, May 19, 1985.**

Each contractor shall submit a DOE Form 5484.3, "Supplementary Record of Occupational Injury/Illness," Form 5484.5, "Report of Property Damage or Loss" or SF-91-A, "Investigation Report of A Motor Vehicle Accident," to the UMTRA Project Manager or cognizant DOE Operations Office, who in turn will forward copies to the DOE, Environment, Safety, and Health Division, for each property damage incident involving more than $1000 government loss and for each motor vehicle accident involving more than $250 government loss.

A central file of all enforcement inspections and reports along with violations and abatement actions shall be maintained by contractors for inspection by DOE.

A central file shall be maintained, by the cognizant DOE Operations Office, of formal employee health and safety complaints and their disposition. Upon request, these shall be made available for inspection by affected employees or their authorized representative.

4.5 COMPLAINTS

Employees are encouraged to report to the contractor, either directly or through their authorized employee representative, any conditions or practices which they consider detrimental to their health or safety or which they believe are in violation of applicable health and safety standards. Such complaints may be made orally or in writing.

Any employee, or representative of employees, who believes that a condition or practice that threatens physical harm, or a violation of a health or safety standard exists, may request an inspection by filing a complaint directly with the local agency having health and safety responsibility.

Any employee or authorized representative of employees, who believes that an imminent danger exists that threatens death or serious physical harm, is encouraged to bring this matter to the immediate attention of the appropriate contractor, supervisor, or designated official for resolution. In the event of inadequate corrective action, the employee and/or authorized representative may also contact the local agency having jurisdiction, the DOE UMTRA Project Office, or the cognizant DOE Operations Office by telephone and set forth with reasonable particularity the basis for their request for an immediate inspection.

DOE, upon receipt of a complaint of inaction concerning alleged imminent danger or upon receipt of notice of alleged imminent danger, shall immediately ascertain whether there is a reasonable basis for the allegation. If it appears to have merit, DOE shall dispatch an inspector to the workplace involved. When an immediate inspection cannot be made, DOE shall contact the contractor immediately, gather the pertinent details concerning the situation, and if necessary, have affected employees removed from the danger area. DOE shall ascertain what steps, if any, the contractor intends to initiate in order to eliminate the danger. DOE shall conduct appropriate follow-up activities.

4.6 POSTING

Each contractor shall post DOE Form F-5480.2, "Occupational Safety and Health Protection," a poster outlining contractor responsibilities to provide safety and health protection. Each contractor shall also have available in the workplace DOE Form F-5480.4, "Occupational Safety and Health Complaint," a form to be used in reporting violations.

The forms required by this part shall be posted in a sufficient number of places to permit employees working in or frequenting any portion of the workplace to observe a copy on the way to or from their place of employment.

4.7 INTERNAL AUDIT PROGRAM

An internal audit committee made up of the Remedial Action Contractor's health and safety manager, and other managers as appropriate, shall be established to periodically review the health and safety operations and related procedures. A report of this review, recommendations, and follow up shall be maintained and available for review by DOE.

4.8 RESTRICTIONS

A worker under age 18 shall neither be employed in, nor allowed to enter, controlled areas in such a manner that they will receive doses of radiation in amounts exceeding one-tenth the standards in Table 3.2.

All women working in jobs involving possible radiation exposure shall be advised of NCRP Report 39 recommendations, indicating that the intent of the recommendations is to minimize exposure to embryos and fetuses.

All such women workers shall be advised of the biological risks to embryos and fetuses exposed to the various expected levels of ionizing radiation; and shall be made aware that specific efforts and attention should be taken to keep radiation exposure of an embryo or fetus to the very lowest practicable level during the gestation period.

Administrative limits shall be used to assure that workers do not exceed the quarterly or annual limits specified in Table 3.2. Workers who have exceeded the administrative limits or standards shall be placed on work restrictions until the end of the period of time of concern.

5.0 RADIATION CONTROL AND MONITORING

5.1 CONTROLLED AREAS

Controlled areas shall be established at processing sites, disposal sites, and 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:

- **10 mCi of Ra-226 or more as tailings exist in the area, based on data from the initial radiological assessment.**
- The estimated external gamma dose to any individual in that work area exceeds 500 millirem/year.
- Airborne concentrations of radionuclides exceed quantities provided in DOE Order 5480.1A, Attachment 11.
- Transferable surface contamination exceeds **600** dpm/100 cm^2.

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.

Access may also be restricted at construction areas which do not meet the controlled area criteria if it is necessary to protect the public from potential construction hazards.

5.2 POSTING

Controlled areas **at processing sites and disposal sites** 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

Controlled areas at vicinity properties may instead utilize other signs which indicate that radioactive materials exist in the area, and that access is restricted for the general public.

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

5.3 PERSONNEL AND EQUIPMENT MONITORING

All personnel leaving controlled areas that potentially have been in contact with contaminated materials shall be monitored with an appropriate instrument. Contamination on personnel, as indicated by a statistically significant increase above natural background levels, will be removed

prior to leaving the site. A personnel contamination log shall be maintained where levels and decontamination measures and levels are noted. The monitoring instrument must be able to reliably detect less than 500 dpm 100 sq cm. Appropriately trained personnel may monitor themselves.

All tools and equipment potentially contaminated with mill tailings that are to be released from a controlled area for unconditional use shall be monitored and decontaminated, if necessary, to levels of 600 and 3300 dpm/100 sq cm for removable and total activity, respectively, as specified in ANSI N13.12 Table 1, footnote 1. In all cases, an extensive effort shall be made to reduce contamination levels to levels as low as reasonably achievable.

Contamination limits for equipment and personnel are based on total decay rate including decay by alpha, beta, or electron capture.

All vehicles shall be cleaned to remove all visible soil prior to leaving a contaminated site. The following criteria shall then be applied to a representative fraction (not less than 10 percent) of the vehicles:

(a) For vehicles potentially in contact with material having elevated Ra-226 concentrations, the tires (and cab interior, if potentially contaminated) shall be monitored and decontaminated to meet the limits described above. Appropriate spot checks shall be made of other potentially contaminated truck surfaces.

If contamination in excess of the limits is found, a more extensive monitoring program shall be implemented.

5.4 PROTECTIVE CLOTHING AND CHANGE FACILITIES

A change facility including lockers and a shower shall be provided when construction activities begin at a processing site, to serve workers wearing protective clothing or requiring decontamination. In the case of vicinity properties, a central facility shall be provided to serve many properties in a general area.

Protective clothing shall be recommended for all workers at sites having significant quantities of soils contaminated above 200 pCi/g Ra-226. Protective clothing shall also be made available to workers in lesser contaminated areas at the discretion of health physics personnel.

Appropriate precautions shall be applied by health physics personnel on a case-by-case basis for visitors and management personnel.

5.5 DOSIMETRY AND BIOASSAY

DOE Order 5480.1 (Chapter 11) specifies that each individual who enters a controlled area, such that he may receive a whole body dose commitment in any calendar quarter greater than 300 millirem, shall be included

in a dosimetry program. **Employee exposure on UMTRA Project sites and vicinity properties, as recorded by prior dosimetry programs, have been significantly lower than that level. Thus, only personnel expected to spend more than 120 hours in a controlled area, in any three consecutive months, shall be required to wear thermoluminescent or film dosimeters.**

A urine analysis or other appropriate bioassay program for workers shall be developed based on worker history and commensurate with the hazard as indicated by air sampling data and the potential for inhalation and ingestion of measurable quantities of radioactive material. Bioassay action levels shall be specified and follow-up procedures developed.

All workers included in the urine analysis bioassay program who showed positive results shall be resampled at the time the positive results are discovered, and considered for additional bioassay upon termination of employment.

5.6 RESPIRATORY PROTECTION/AIR SAMPLING

Dust suppression techniques, such as vehicle speed control and/or water spray, shall be used to minimize airborne particulates. **Respiratory protection devices will only be employed when all reasonable efforts to minimize airborne particulates fail to maintain airborne concentrations at acceptable levels.**

Representative air-particulate sampling for radionuclides in work areas shall be required when significant quantities of soils averaging 50 pCi/g Ra-226 or greater are exposed during the work shift. **Additional guidance for work area monitoring is provided in Appendix A.**

Representative radon daughter concentration (RDC) measurements shall be made in the work environment when work is performed in poorly ventilated conditions.

If respirators are used, radiological protection factors other than 1.0 are acceptable only for respiratory protection programs in full compliance with USNRC Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," and "Protection for Respiratory Protection," ANSI Z88.2-1980 (ANSI). **Employee exposures to airborne radionuclides may be averaged over a quarter-year in determining compliance with standards.**

5.7 TRANSPORT OF CONTAMINATED MATERIAL

The DOE and all contractors shall comply with the applicable state or Federal regulations regarding the transportation of contaminated material. Site-specific determination of the levels of radioactivity associated with tailings and tailings contaminated material shall be made. If levels do not exceed 2000 pCi/g, the material does not meet the Department of Transportation's definition of "Radioactive Material," and trucks **and railroad cars** are not required to be placarded.

Site specific procedures shall be developed for transporting contaminated material to a disposal site. As a minimum, all trucks or train cars hauling contaminated material shall be tarped **or otherwise covered** for transit **to eliminate potential tailings loss.** All visible contaminated material shall be removed from the exterior. The vehicles shall be monitored according to guidance given in Section 5.3.

6.0 INDUSTRIAL HAZARDS CONTROL

6.1 NONRADIOACTIVE AIRBORNE MATERIAL

Monitoring for respirable dust and toxic gases and fumes is required when the average eight-hour loading is expected to reach 50 percent of the Threshold Limit Value (TLV). If limits are exceeded for toxic and hazardous materials, and concentrations of radionuclides do not require respiratory protection, then exposure shall be maintained by wearing respirators approved by the National Institute of Occupational Safety and Health (NIOSH). TLVs adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) shall be used. Respiratory Protection practices shall be in accord with ANSI Z88.2-1980, "Practices for Respiratory Protection."

If it is suspected that asbestos is present in soils or in buildings, then an asbestos monitoring, protection, and record-keeping program shall be initiated **during removal operations** as per regulations cited in 29 CFR 1910.1001. The eight-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed **2.0** fibers, longer than 5 micrometers, per cubic centimeter (or ml) of air as determined by the membrane filter method at 400-450X magnification (4mm objective) with phase contrast illumination.

6.2 NOISE

TLVs for workers shall be limited to those specified by ACGIH, 85 dBA for an 8-hour work day and 80 dBA for a 16-hour work day. Noise suppression devices shall be used where appropriate and the use of hearing protective devices shall be mandatory for levels above the TLV and encouraged for levels below the TLV. All other guidance in "Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment with Intended Changes for 1982," (or the most current edition) ACGIH, related to noise exposure shall be followed.

6.3 PROTECTIVE EQUIPMENT

Personal protective equipment shall be provided based on projected need. Such apparatus may include respirators, safety eye glasses or goggles, coveralls, hardhats, gloves, shoe covers, rubber boots, and safety shoes.

6.4 FIRE SAFETY

Contractors shall maintain a fire prevention and control effort appropriate for the needs at the site. Training shall be provided to employees. Where appropriate, fire extinguishers shall be provided and maintained and employees instructed in their use. Good housekeeping practices and proper storage of flammable and combustible liquids shall be required.

6.5 CONSTRUCTION SAFETY

Management shall assure that all provisions of 29 CFR 1926 are addressed prior to initiating any construction activity. Particular attention shall be paid to Excavations, Trenching, and Shoring (Subpart P), Signs, Signals, and Barricades (Subpart G), Motor Vehicle, Mechanized Equipment, and Marine Operations (Subpart O), and Power Transmission and Distribution (Subpart V). All management shall be familiar with the requirements and direct the workmen accordingly.

6.6 SANITATION

Toilet facilities shall be provided in accordance with 29 CFR 1926.51.

Potable water for drinking and for washing prior to eating shall be provided for all employees.

7.0 ENVIRONMENTAL MONITORING

An environmental monitoring program shall be conducted at all processing sites, **and disposal sites. Additionally, at** large vicinity properties where **10 mCi or more** of **Ra-226 as tailings will** be removed **routine grab sampling will be conducted to determine if a more intensive monitoring program is warranted.** Data collection at the sites **requiring monitoring** shall be done prior to construction in order to characterize the pre-remedial action radiation levels. Monitoring during remedial action shall be performed to ensure that the nearby population does not receive radiation dose equivalents greater than those presented in Table 3.1.

The environmental monitoring program is designed to monitor non-radioactive particulate concentrations in air, radionuclide concentrations in air and in surface water **where applicable,** and ground water **at processing sites and disposal sites.** Monitoring requirements are described in the following sections. Additional requirements may result from the permitting processes outlined in the Remedial Action Plan for processing sites.

7.1 PARTICULATES

When environmental monitoring is required, continuous air particulate sampling **shall be performed** at points around the site **or property** boundary during periods of major activity. Gross activity measurements shall be compared to the DOE Order 5480.1A, Attachment 11, limit for Th-230, 8 X 10^{-14} microCi/ml **if soluble or 3 x 10^{-13} microCi/ml if insoluble,** above background. Continuous air particulate sampling may **also** be **required** under other conditions, such as that specified in air quality permits issued by the respective tribe or state.

7.2 RADON

For sites **and vicinity properties** meeting the requirements in paragraph 7.0, monitoring for Rn-222 shall be performed at or near the site boundaries. During the period of remedial action construction, radon monitoring locations shall be located at areas downwind from the site. Additionally, one sampler shall be located at an area not influenced by site operations to determine background radon concentrations.

Guidance for Rn-222 sampling at UMTRA processing sites shall be provided in the "Radon Monitoring Plan for the UMTRA Project Sites," currently under development. **Grab sampling techniques may be used to determine radon concentrations around vicinity properties requiring environmental monitoring.**

7.3 WATER

Surface waters caught in catch basins, shower water in catch tanks, and any other potentially contaminated water shall be sampled and analyzed prior to release from the site. Gross alpha measurements may be used to

assure that the concentrations of radionuclides are below acceptable release criteria providing the gross measurement is less than the most restrictive radionuclide. Parameters as required by the National Pollutant Discharge Elimination System (NPDES) permit shall be monitored prior to release. In the absence of other radiological release limits, releases are permitted if concentrations do not exceed DOE Order 5480.1A, Chapter XI, Table II limits. For former processing sites, preoperational, operational, and post-operational samples of water and sediment from nearby streams and in some cases, monitoring wells, shall be taken and analyzed for radiological constituents and for hazardous chemical constituents as required by applicable permits.

7.4 METEOROLOGICAL DATA

For sites where adequate local meteorological data are not available from another source, the remedial action contractor shall obtain wind speed, wind direction, and stability data for the period of remedial action. The meteorological parameter data shall be stored for potential subsequent evaluation of environmental monitoring data.

8.0 EMERGENCY PROCEDURES

Site-specific Environmental, Health, and Safety Plans (EHSP) will contain a section on emergency procedures. The emergency procedures should indicate a severe weather action plan for those sites where there is a potential for significant dispersal of contaminated material through wind or water erosion. The procedures should include a truck or train accident/spill response section and an emergency medical assistance section. Medical and first-aid supplies should be provided as needed and telephone/radio contact numbers provided.

Procedures should take into account the roles and responsibilities of state/tribal and local emergency response agencies, the UMTRA Project Office, and the DOE/AL Emergency Center. Contact should be made with state health department agencies to coordinate what activities are allowable by the contractor in advance of health department personnel arrival at the scene of an accident. Nearby hospitals and fire departments should be briefed on what might be expected in terms of radioactive or toxic materials during their involvement with remedial action accidents.

Portions of emergency response procedures should be routinely exercised to determine if they are adequate and can provide a timely response.

9.0 SUMMARY

The basic health and safety requirements established in this plan are designed to provide guidelines to be applied at all UMTRA Project sites. Specific restrictions are given where necessary. However, an attempt has been made to provide guidelines which are generic in nature, and will allow for evaluation of site-specific conditions. Health and safety personnel are expected to exercise professional judgment when interpreting these guidelines to ensure the health and safety of project personnel and the general population.

APPENDIX A

GUIDANCE ON AIR PARTICULATE MONITORING AND RESPIRATORY PROTECTION

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A.1 NON-RADIOLOGICAL PARTICULATES IN AIR

Threshold Limit Values (TLVs) refer to airborne concentrations of substances and represent conditions under which most workers can be exposed continuously without adverse affects. Certain workers, however, with respiratory or other ailments may experience discomfort when exposed to concentrations near the TLV.

The TLVs for mineral dusts in air are provided in "Threshold Limit Values for Chemical Substances and Physical Agents in Workroom Air," adopted by American Conference of Governmental Industrial Hygienists. If the respirable fraction is known, the limit is:

$$\frac{10 \text{ mg/cu m}}{\% \text{ respirable quartz} + 2}$$

If only the total dust is known (measured), the TLV is:

$$\frac{30 \text{ mg/cu m}}{\% \text{ quartz} + 3}$$

Modifications of these formulae are provided for mineral dusts containing cristobalite, tridymite, fused silica, and tripoli.

Breathing zone air sampling shall be done during dusty periods. Although respiratory protection is not mandatory for levels below the TLV, respirators shall be available for workers who wish to use them.

A.2 RADIOLOGICAL PARTICULATES IN AIR

The airborne radionuclide-bearing dusts are controlled by a different health protection philosophy than that associated with non-radiological particulates. For the non-radiological particulates, the TLV concentration is a limit below which no health effects are assumed to occur. For radiological particulates, there is no threshold level below which no health effects are expected, especially if a very large number of workers are exposed.

The basic policy of this program is to reduce the exposure to airborne contaminants to levels as low as are reasonably achievable. A definition of air monitoring and respiratory protection practices for the UMTRA Project based on what is "reasonably achievable" follows.

Available data indicate that under normal undisturbed conditions, 30 micrograms of soil are suspended in one cubic meter of air. Somewhat higher values may apply in arid regions and lower values for wet or highly vegetated areas. This is called the average mass loading but this value is not, however, appropriate for construction type activities. Very little data exist for areas subject to mechanical or local resuspension such as heavy equipment or conveyors moving contaminated soils or mill tailings. In one study (Milham et al., 1975) an attempt was made to measure the resuspension rate resulting from local disturbances. The air concentration reached several hundred mg/cu m. Another study of local resuspension (Myers et al., 1975) reported air concentrations of 50-60 mg/cu m.

Dust suppression techniques used in the UMTRA Project should limit resuspension to mass loadings less than those reported values. However, until data are available, it will be assumed that 50 mg/cu m is an appropriate upper limit on the air concentration in the work environment, averaged over an eight-hour day. Resuspension from heavy equipment operations would be expected to cause large particles to become airborne. Large particles are considered less hazardous because they are cleared from the lung more readily than small particles. In order to be conservative, this will be ignored and the air concentrations will be compared to the radionuclide concentration guides (RCG) of DOE Order 5480.1, Attachment XI-1. Furthermore, it will be assumed that the concentrations of Th-230 and Ra-226 are approximately equal. The radionuclide concentration guide for soluble Th-230 is by far the most restrictive, so this concentration of 2 pCi/cu m will be considered the maximum allowable average air concentration for workers.

The soil Ra-226 or Th-230 concentrations required to produce 2 pCi/cu m, assuming a mass loading of 50 mg/cu m, can be calculated by dividing the two numbers. In this case, a soil concentration of 40 pCi/g is obtained.

A.3 RECOMMENDED AIR-PARTICULATE MONITORING

The formulae in Section A.1 indicate that a maximum TLV for tailings material will be 10 mg/cu m. If the levels are kept below the TLV, the mass loading defined in Section A.2 should be reduced from 50 to 10 mg/cu m which corresponds to a soil concentration of 200 pCi/g rather than 40 pCi/g. Normal practice is to require monitoring at levels much below the MPC and TLV. Therefore, the following monitoring practices are recommended:

When the average mass dust loading is expected to reach 50 percent of the TLV, an air monitoring program is required. Respiratory protection should be available and its use encouraged. If the TLV is exceeded when averaged over an eight-hour day, a re-evaluation of the dust suppression measures should be made and appropriate measures taken. A particulate radionuclide air monitoring program must be established for work in areas in which significant quantities of soils averaging 50 pCi/g (Ra-226 or Th-230) or greater are exposed at processing sites, disposal sites, or vicinity properties.

Airborne radionuclide monitoring should involve collecting air particulate samples which are representative of the work environment, and quickly determining the level of radioactivity after a delay to permit the decay of short-lived radionuclides. Samples should be collected daily in work areas which require monitoring, and analytical results compared to the most restrictive RCG for any radionuclide present (typically Th-230). Isotopic analyses should be performed on conposited filters to provide actual concentrations of radionuclides, if gross activity measurements exceed the RCG.

REFERENCES

Milham et al. (R. C. Milham, J. F. Schubert, J. R. Watts, A. L. Boni, and J. C. Corey), 1975. "Measured Plutonium Resuspension and Resulting Dose from Agricultural Operations on an Old Field at the Savannah River Plant in the Southeastern United States," IAEA/USERDA International Symposium on Transuranic Nuclides in the Environment, November 17-21, 1975.

Myers et al. (D. S. Myers, W. J. Silver, D. G. Coles, K. C. Lamson, D. R. McIntyre, and B. Mendoza), 1975. "Evaluation of the Use of Sludge Containing Plutonium as a Soil Conditioner for Food Crops," IAEA/USERDA International Symposium on Transuranic Nuclides in the Environment, November 17-21, 1975.