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INSPECTION PROGRAM FOR LOW-LEVEL WASTE DISPOSAL FACILITIES IN COLORADO

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CONTENTS

INSPECTION PROGRAM
FOR LOW-LEVEL WASTE DISPOSAL FACILITIES

1.0 INTRODUCTION

This report sets forth the general requirements for the establishment and execution of an inspection program for a low-level waste disposal facility in Colorado. The purpose of the inspection program, conducted by the State of Colorado, is to assure that the disposal facility is sited, designed, constructed, operated, and closed properly so that the impact to health and the environment is negligible. This inspection program must verify that all activities are conducted properly and documented accurately from initial site characterization through final closure.

The inspection program involves five basic activities necessary for successful low-level waste disposal: 1) site characterization, 2) design, 3) construction, 4) operation, and 5) closure. All of these activities are interrelated and some will occur at the same time. It is necessary to have an overall inspection program in place at the inception of a project so all activities can be adequately evaluated as the project proceeds. This inspection program should evaluate all activities that are important to safe, successful disposal.

The inspection program will involve the review and evaluation of the work of various consultants, contractors, operators, and laboratories. As such, details regarding the inspection of specific tasks are not included in this report. Requirements established in this report are designed to provide the basic framework for a successful inspection program. Detailed inspection procedures must be developed after a specific site has been identified. Appendix A presents model guidelines for operational activities. Similar guidelines should be developed for other site development activities.

The inspection program should be tied directly to the quality assurance and quality control program established by the operating company. These programs must be reviewed when license application is made to the Colorado Department of Health and a detailed State inspection program developed in concert with the company program. Basic requirements for this program are outlined in Section 2.0. It is not intended that the inspection program replace or enlarge the company program; rather, the inspection program is designed as an external inspection and auditing system to ensure that the quality assurance and quality control programs are working properly. This is in direct support of the regulatory activities of the Colorado Department of Health.

Regulatory and enforcement activities for low-level radioactive waste disposal are the responsibility of the Radiation Control Division of the Colorado Department of Health. The Radiation Control Division is responsible for implementing the inspection program, identifying which specific tasks are to be inspected, and specifying the frequency of inspection. At their discretion, the Radiation Control Division can appoint appropriate staff or independent third parties to conduct the inspection program.

2.0 BASIC PROGRAM REQUIREMENTS

The State's inspection program should have a definite organizational structure, proper inspection, testing and audit procedures, authority for changes and corrective actions, and oversight of document control. These factors are paramount in the efficient and effective inspection and control of various project activities. The requirements that follow were developed using the assumption that the site operator will have approved quality assurance and quality control programs for all project activities. The inspection program of the State should ensure that these programs of the operator are being conducted properly. As such, the inspection program of the State will be dependent upon site specific factors and the quality assurance program of the operator. Specific requirements for the inspection program will need to be developed for each site. General requirements for this program will be common to all sites and are discussed in the following sections.

2.1 ORGANIZATION

The organizational structure, functional responsibilities, levels of authority, and lines of communication for the State oversight of activities should be documented in the inspection program. Divisions and persons responsible for assuring that an appropriate quality assurance program is established by the operator and for verifying that this program is conducted properly should be described in the inspection program.

In Colorado, the Colorado Department of Health, Radiation Control Division, will be responsible for the inspection program. They will direct appropriate staff or an independent third party in the conduct of the inspection program. These inspection personnel should report directly to the Radiation Control Division's management level such that required authority and organizational freedom are provided, including sufficient independence from cost and schedule considerations of the operator. Persons involved in the inspection program should have sufficient authority, access to work areas, and organizational freedom to 1) identify quality problems, 2) initiate, recommend, or provide solutions to quality problems through designated channels, 3) verify implementation of solutions, and 4) assure that further processing, delivery, installation, or disposal is controlled until the problems have been corrected.

2.2 INSPECTION, TESTING, AND AUDITING

Inspections and tests required to verify conformance of an item or activity to specified requirements should be discussed in the inspection program. Additionally, the characteristics to be inspected and tested and methods to be employed should be specified. All results should be documented and their conformance with accepted criteria should be evaluated.

Planned and scheduled audits should be performed to verify compliance with all aspects of the operator's quality assurance program and to determine its effectiveness. Audits should be performed in accordance with the guidelines developed for the project and by personnel designated by the Radiation Control Division. Audit reports should be thoroughly documented and reviewed with the operator's managerial staff. In Colorado, inspection, testing and auditing procedures, developed by the Colorado Department of Health, should include details regarding the specific disposal site being evaluated.

2.3 CHANGES AND CORRECTIVE ACTIONS

The inspection program should include a plan for changes and corrective actions. If nonconforming items or actions are identified, the adverse conditions should be identified, documented, and corrected. The program should identify the responsible persons who have authority to reject work or material and to require changes. Additionally, the program should specify and require appropriate actions if it is determined that personnel, instructions, controls, tests or records are inadequate.

2.4 DOCUMENTATION

Documentation should include all inspections, tests, or audits conducted by the State on the low-level waste facilities. The inspection program should identify persons responsible for document preparation, describe a specific record-keeping procedure, and include a method for permanent storage of the documentation.

3.0 INSPECTION PROGRAM ACTIVITIES

The inspection program will address the major project activities associated with shallow land disposal of low level wastes. These activities will include site characterization, design, construction, operation, and closure. The basic inspection program should include those requirements previously discussed in Section 2.0. Additionally, the program must include detailed inspection guidelines for each project activity. To aid in the preparation of the inspection guidelines the following discussion of project activities will set the major objectives of each activity, and present key inspection items. The list of inspection items should not be considered an all-inclusive summary. Additional sources (references) and the company quality assurance/quality control program must be used to prepare the inspection guidelines for specific activities. This guideline will contain detailed written procedures for each phase and activity of the project and will be provided to responsible parties.

3.1 SITE CHARACTERIZATION

Basic data is collected and analyzed during the site characterization phase of a project. This usually includes both the evaluation of alternative sites and the detailed study of one or more preferred sites. Such study and evaluation incorporates many different disciplines including geology, hydrology, meteorology, ecology, and radiology.

Objectives for the inspection program for site characterization activities are:

1) Verify the accuracy of the basic data collected;

2) Determine the applicability of the method of analyses or calculations; and

3) Ensure that proper procedures have been followed in the review of the site and alternatives.

To meet the above objectives, tasks that are critical to the success of the project should be inspected. This will include field investigations,

measurements, and laboratory analyses for the various disciplines used in the site characterization study. Specific items to be inspected will vary from site to site and from discipline to discipline; however, the general inspections for the tasks can be summerized as follows.

Field Investigations and Measurements: Field investigations for characterization and monitoring of low level waste sites are generally conducted for three specific purposes:

1) Direct field evaluation of the characterizing parameters;

2) Installation of equipment and collection of data for evaluation of parameters; and

3) Collection of samples for examination and testing in the laboratory.

Accordingly, the inspection program must be designed to confirm the accuracy and validity of the field investigations and measurements. Specific field investigations that may be undertaken and may be critical in assessing basic site suitability and determining appropriate design parameters are listed in Table I. It must be cautioned that this table is only a list of possible items to be evaluated in the inspection program. Items can be added or deleted from this list as is necessary in the development of the inspection program. It is felt that the inspection program should select and monitor the items that are critical to the safe disposal of the waste. Other items may be spot checked for their accuracy.

Laboratory Analyses: Numerous laboratory tests and analyses are commonly conducted during site characterization activities. This laboratory work may include several different laboratories and involve many different testing procedures. Commonly, laboratory tests and analyses are conducted to develop baseline information regarding the quality of air, water, soils and plants, the engineering and geochemical properties of construction materials, and the hydrologic properties of foundation materials and ground water aquifers. Possible laboratory tests are included in Table 1.

The inspection program, at a minimum, should include verification of laboratory analyses of items critical to the design of the disposal facilities. Verification can be accomplished most easily by the review of the laboratory's quality control program and a check of the analytical accuracy of the results.

3.2 SITE DESIGN

Design activities for a low level waste disposal facility commonly consist of technical and management processes which commence with the identification of design input parameters and lead to the issuance of project designs and specifications. Design input parameters include design criteria, performance requirements, regulatory requirements, codes, standards and parameters developed during site characterization. Objectives of the inspection program are:

1) Verify that proper design parameters have been selected to meet regulatory needs; and

2) Ensure that the design parameters have been used in the preparation of project designs and specifications.

In meeting these objectives, the inspection program should specify the general design parameters, inspect the basic design process, and verify the designs and specifications. Inspection of the basic design process should be dependent on the specific process and quality assurance and quality control program of the engineering contractor. As such, this part of the inspection program can only be developed after the initiation of a specific project.

Design verification is the most critical aspect of the inspection program. Verification can be accomplished through design reviews, alternate calculations, and performance testing. This review should include the evaluation of design parameters, design assumptions, and design methods in order to determine if design parameters were properly incorporated into the design, and whether the design is reasonable. Appropriate documentation is necessary for such verification.

The inspection of facility design should consider both site configuration and disposal unit design. Site configuration inspection should emphasize design parameters related to efficient land use, maximum waste volume allocation, and long-term stability and isolation. Disposal unit design should be inspected for factors critical to both the short-term and long-term control of the waste materials and should assess liner and drain design, drainage and erosion control, trench sidewall stability, and cover design. Specific design parameters include many of those listed in Table I.

3.3 SITE CONSTRUCTION

Site construction generally involves two aspects: 1) disposal cell construction and 2) ancillary facilities construction. Disposal cell construction will likely occur over most of the life of the disposal operations; whereas, ancillary facilities construction will occur in a short period as the site is initially developed.

The objectives of the inspection program for these construction activities are:

1) Verify that the geological and hydrological conditions anticipated in the design and characterization phases are correct;

2) Verify that all construction work meets the designs and specifications approved for the project; and

3) Ensure that all field tests are conducted according to established procedures.

These objectives relate mainly to the geotechnical aspects of disposal facility construction. As such, the inspection program should be tied directly to the operators quality control program. General program considerations and specific geotechnical parameters and tests of those parameters are discussed by Johnson and others (1983) in "Geotechnical Quality Control: Low-level Radioactive Waste and Uranium Mill Tailings Disposal Facilities". This document should be used in the development of the contractor's quality control program as well as in the development of the State's inspection program.

Table I lists many of the geotechnical tests conducted during construction. The inspection program should verify that appropriate tests are being conducted during construction and that proper procedures are being used for these tests. In addition to the geotechnical tests, the inspection program should include procedures for examining specifications and field control work. This includes the placement and compaction of liners and drain systems.

Geological and hydrological conditions that were defined in the site characterization phase should also be verified. At a minimum, new exposures of earth materials in the cell walls, road cuts or foundation excavations should be checked. If additional borings are drilled, both geologic and hydrologic conditions should be documented.

3.4 SITE OPERATIONS

Site operations include manifesting, disposal and monitoring functions. Close coordination of these functions must be maintained between management processes and the technical operations so worker exposure is minimized, and long-term control of the materials can be achieved.

The major goals of the inspection program are:

1) Ensure that all disposal materials are properly manifested so that the waste is properly segregated and so that the records reflect the type and amount of materials within the disposal cells;

2) Verify that waste materials are disposed according to methods and procedures developed during the site design stage so that effective control is maintained during operations and in the future;

3) Verify that monitoring activities for both workers and the environment are functioning as designed, and are meeting worker dose and environmental standards; and

4) Determine if the disposal facility is functioning as planned and designed. To accomplish these goals, the inspection program must include both office review and field inspections. The company's quality assurance, and quality control program and operations manual must be carefully considered and incorporated into the inspection program.

Office Review: Periodic review of reports and data submitted by the disposal operator should be conducted to determine their completeness and accuracy. The inspection program should determine if any changes or corrective actions are necessary to ensure proper disposal of the radioactive materials. Reports reviewed in the office will include various subject matter. The subjects covered in the reports should include discussions on worker exposure, manifesting, cell functioning, disposal activities, and monitoring. The review of these reports as a part of the inspection program should assure compliance with the radioactive materials license and disposal regulations.

Field Inspections: A general field inspection guide for disposal operations at a low level waste facility is included in Appendix A. This

guide describes specific items that may be included as part of the inspection program. It is intended that this guide be used in the development of a site-specific inspection program for operational activities. Items should be added or deleted from this guide as necessary.

3.5 SITE CLOSURE

Site closure is defined as the time an individual disposal cell is reclaimed or the facilities are decommissioned. It is likely that closure of individual cells will occur during operation; however, final closure can only be conducted upon termination of all waste burial. The objectives for inspection activities related to closure include:

1) Verify that the individual cells are covered and reclaimed properly and appropriate monitoring of the cells is emplaced;

2) Verify that the decomissioning and reclamation plan is closely followed; and

3) Inspect the disposal area after closure for a specified period and conduct necessary monitoring programs.

To accomplish these objectives, the inspection program must include 1) the evaluation of geotechnical parameters similar to those presented in 3.3 and 2) details pertaining to the long-term monitoring of the disposal area. The long-term monitoring program should be used to determine the effectiveness of the facility design and operation and to verify the containment of the radioactive materials.

Table I

Recommended Testing and Documentation to Characterize Low-Level Waste Disposal Sites

Test or Document by Type of Method

Parameter	Standard Method	Formalized Guidance	Existing Data
Air Pressure[1]	ASTM D3631-77	--	--
	GS	Barometer Observations	--
	--	--	Weather records
Air Temperature[2]	GE	Thermometer Observations	--
	--	--	Weather records
Anisotropy	--	Experienced professional judgment or horizontal and vertical permeability measurements	Geological criteria
Apparent velocity (see seepage velocity)	--	Tracer studies (several procedures)	--
Atterberg limits	ASTM D423-66	--	--
	ASTM D424-59	--	--
	CE 1110-2-1906	--	--
Burial unit boundaries (see monument and point positions)	--	Plane surveying	--

1. Data from the National Weather Service may be sufficient for most purposes.
2. Ibid.

NOTE: ASTM = American Society of Testing and Materials; CE = U.S. Army Corps of Engineers; APHA = American Public Health Association; EPA = Environmental Protection Agency; GS = U.S. Geological Survey; BR = U.S. Bureau of Reclamation; DE = U.S. Department of Energy; and NOAA = National Oceanic and Atmospheric Administration.

*Modified after Lutton, R.J., Butler, D.K., Meade, R.B., Patrick, D.M., Strong, A.B., and Taylor, H.M., Jr., 1982: Test for evaluating sites for disposal of low-level radioactive waste. Nuclear Reglatory Commission NUREG/CR-3038, 36 p., appendix.

Parameter	Test or Document by Type of Method Standard Method	Formalized Guidance	Existing Data
Collapse susceptibility	CE --	-- --	-- Geological criteria Grain-size data
Compaction relation	ASTM D698-78 ASTM D1557-78	--	--
Consolidation relation	CE 1110-2-1906	--	--
Dispersion	--	Breakthrough curves or laboratory column test	
Density - see material densities			
Electrical resistivity	-- -- -- --	Total salinity of soil Surface resistivity survey Borehole resistivity survey --	 Specific conductance
Erodability	CE 1110-2-1906	--	Local soil conservation agencies should be be consulted
Evapo-transpiration [1]	-- --	Evaporimeter or lysimeter observations --	-- Weather records
Extended site boundary	(see groundwater system & boundaries and surface water system and boundaries)		Technical review

1. Data from the National Weather Service may be adequate.

Parameter	Test or Document by Type of Method: Standard Method	Formalized Guidance	Existing Data
Flow Direction	--	Tracer Studies	--
	--	--	Well data
Frost heaving	--	Estimate from Corps of Engineers method	Geological criteria
	--	--	Grain-size data
Gaseous constituents	APHA 511	--	--
	ASTM D3442-75	--	--
Geomorphology	--	Detailed description by geomorphologist	Geological criteria
Grain-size distribution	CE 1110-2-1906	--	--
	ASTM D422-63	--	--
Ground water chemistry	APHA	Inorganics; quality	--
	EPA 600/4-79-020	Inorganics	--
	ASTM D3086-79	Organics	--
	ASTM D3478-79	Unstable constituents, field determination, radiological constituents	--
	GS	Gas chromatography (organics)	--
Ground water system and boundaries	--	Identify: unconfined & confined aquifers -Ground water flow direction -Piezometric heads	Geological criteria
Hydraulic[1] conductivities	ASTM D2434-68	--	--
	CE	--	--
	BR	--	--
	--	Pump tests	
	--	--	Geological criteria
	--	--	Grain-size data

1. For soils with coefficient of permeability of 10^{-7} cm/sec or less, falling head permeameter or consolidometer should be the method of determination.

Parameter	Test or Document by Type of Method		
	Standard Method	Formalized Guidance	Existing Data
Hydraulic[1] potentials and pressures	--	Wells	--
	--	Piezometers	--
Immediate site boundary	--	Technical review	--
	--	--	--
Infiltration capacity	ASTM D3385-75	--	--
	--	--	Curve number estimation
Ion exchange capacity	--	Saturation method	--
	--	Mehlich method	--
Lithology and soils	--	--	Geological criteria
Material color[2]	ASTM D1535-80	Color chart	--
	ASTM D2488	Visual description	--
Material densities	ASTM D1556-64	--	--
	ASTM D2167-66	--	--
	ASTM D2937-71	Gamma-gamma logging	--
	ASTM D2922-81	--	--
	CE	--	--
Material radioactivity	--	Borehole gamma survey	--
	--	Gamma spectral logging	--
	ASTM D3649-78	--	--
	DE	--	--
Material temperature	--	Thermistor	--
	--	--	Water temperature

1. In the vadose zone, the hydraulic potential is called suction potential.
2. The "Rock Color Chart", available from the Geological Society of America, is an alternative method.

Test or Document by Type of Method

Parameter	Standard Method	Formalized Guidance	Existing Data
Material variability parameter	--	Standard deviation Range	--
Material Zone boundaries	--	Detailed logging, sampling, analysis, and professional judgment	--
Mineralogy and clay mineralogy	ASTM C294-69 ASTM C295-79 --	-- X-ray diffraction Petrography	-- -- --
Monument and point positions	NOAA -- --	-- Plane surveying --	-- -- Control surveys and grids
Oxidation-reduction potential	EPA/CE-81-1 --	Platinum/hydrogen electrode --	-- Geological criteria
Penetration parameter	ASTM D1586-67 ASTM D3441-79	--	--
Permeability function	--	Instantaneous profile	--
Pore water age	-- -- -- --	Radioisotopic ratios or water typing Stable isotopes Conductivity Ground water chemistry	-- -- -- --
Porosities and void ratio	-- -- --	Geophysical techniques Acoustic logging Nuclear logging	-- --

Parameter	Test or Document by Type of Method Standard Method	Formalized Guidance	Existing Data
Precipitation[1]	--	--	Weather records
	--	Rain gauge	--
Recharge and discharge areas	--	Observations & technical literature	Geological criteria
Rock classification	ASTM C294-69	Visual and petrographic methods	--
	ASTM C295-79	Durability test	--
	--	--	Seismic velocity
	--	--	Core logging indices
Runoff[2]	--	Stream gauging	--
	--	--	Curve number estimation
	ASTM D1941-67	--	--
	ASTM D2034-68	--	--
Seepage velocity	--	Darcy's Law calculations and Tracer studies	--
Seismic velocity	--	Surface survey	--
	--	Borehole survey	--
Shrinking-swelling parameter	--	--	Geological criteria
Soil classification	ASTM D2487-69	--	--
Soil organics	--	Loss on ignition	--
Soil pH and acidity	ASTM G51-77	--	--
	--	Titration	--

1. National Weather Service data is adequate.
2. The method developed by the U.S. Soil Conservation Service is well suited to low-level waste sites.

Parameter	Test or Document by Type of Method Standard Method	Formalized Guidance	Existing Data
Soil solubles	EPA-600/4-79-020	--	--
	APHA 406C	--	--
Specific gravity	ASTM D854-58	--	--
	11 C127-77	--	--
	CE 1110-2-1906		
Storativity	--	Pump test	--
	--	Neutron logging	--
Stratigraphy	--	Experienced geologist	Geological criteria
Strength of materials	CE 1110-2-1906	--	--
Structural geology	--	Structural contour maps	Geological criteria
Suction pressure function	ASTM D2325-68 ASTM D3152-72	--	--
Suction pressures	--	Tensiometer	--
	--	Psychrometer	--
	--	Porous element	--
Surface water system and boundaries	--	--	Geological criteria
Transmissivity	--	Pump test	--
Visual description	ASTM D2488-69	--	--
Water content	ASTM D2216-80	--	--
	ASTM D3017-78	--	--
	ASTM	D1558	--
	AASHTD T217	--	--

Parameter	Test or Document by Type of Method: Standard Method	Formalized Guidance	Existing Data
Water zone boundaries	--	Borehole logging	--
	--	Water table measurements	--
	--	--	Water contents
Wind speeds and[1] directions	--	--	Weather records
	--	Anemometer and vane	--

1. National Weather Service data is sufficient.

APPENDIX

GENERAL SITE INSPECTION GUIDE FOR DISPOSAL OPERATIONS AT A LOW-LEVEL WASTE DISPOSAL FACILITY

CONTENTS

PREFACE

This inspection guide is to be used by the State of Colorado as a basis for an inspection program of low-level radioactive waste disposal facilities. In developing this guide, the authors have reviewed information from the U.S. Nuclear Regulatory Commission and Department of Energy as well as information from states which have low-level waste disposal facilities. The guide also draws from the extensive experience gained by Colorado in inspecting its licensed uranium mills.

This document has been developed to be a "generic guide" or checklist which will form the basis for inspections at any low-level waste disposal facility. However, it is recognized that because of site-specific conditions, certain items may have to be added or deleted on a case-by-case basis. A generic guide such as this cannot provide all of the detail needed for the actual inspection of a specific facility. Case-specific procedures will be necessary to cover a particular site or highly technical aspects of a particular situation. Also, the inspection history at a specific facility will influence subsequent inspections.

To use this guide, the inspector should respond to all items in the inspection outline which should be filled in, some of which are in parenthesis. Any specific items required by license conditions should be added. During the inspection, columns in the middle of the form should be checked. These columns have been designed to indicate if a particular item was reviewed, whether it is adequate or inadequate, and the method of inspection. Specifics as to the adequacy and method of inspection should be described in the remarks column on the right side of the form.

Unique numbers have been assigned for each item on the form. These numbers provide a basis for input of the items into a computer. Once a specific site is to be inspected and an inspection form developed for that site, a computer program could be written to manipulate the data as necessary.

Inspection personnel should be aware of site-specific conditions in order to properly assess a particular facility. All relevant documents should be reviewed prior to the inspection, particularly applicable regulations and license conditions. The compliance history of the facility should be reviewed and discussed with previous inspectors.

During an inspection, it should be determined whether the records or work activities indicate any general problems, inadequacies or other weaknesses that could impact the acceptability of remedial action. For each procedure, license condition, or regulation violated, the applicable text should be cited and a statement made about the condition that violated the requirement. For each item of concern, the issue and recommendations for improvement should both be clearly stated.

In the present format of the inspection form, the amount of space available for comments and explanation is often insufficient. The format can be adjusted in future updates of this guide, or when the guide is adapted to a computer system, in order to accommodate the anticipated volume of comments by inspectors. Also, the inspection form has been reduced from 11 by 17 inches to 8 1/2 by 11 inches. The form could be expanded to a more convenient size for use during inspections.

Inspector _____
Date _____

LOW-LEVEL WASTE INSPECTION FORM

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
1.0	SUMMARY							
1.1	Licensee Information							
1.1.1	Name and address: (For a partnership: principal location where partnership does business. For a corporation or unincorporated association: the state where incorporated or organized, principal location of business, and name and address of its principal officers.)							
1.1.2	Contact person and title:							
1.1.3	Telephone number:							
1.1.4	Location of facility inspected:							
1.2	Inspection Information							
1.2.1	Date of inspection:							
1.2.2	Type of inspection: (Note all that apply: initial, routine, comprehensive, follow-up, announced, unannounced, special and termination.)							
1.2.3	Names of persons contacted							
1.2.3.1	Management representatives:							
1.2.3.2	Radiation safety staff:							
1.2.3.3	Employee representatives:							
1.2.3.4	Other:							
1.2.4	Major items reviewed and discussed:							
1.2.5	Major items not reviewed and discussed:							
1.2.6	Opening conference							
1.2.6.1	Date and time:							
1.2.6.2	Location:							
1.2.6.3	Attendees:							
1.2.7	Closing conference							
1.2.7.1	Date and time:							
1.2.7.2	Location:							
1.2.7.3	Attendees:							
1.2.8	Name of inspector(s):							
1.3	License Information							
1.3.1	License number(s):							
1.3.2	Amendment number(s):							
1.3.3	Expiration date(s) for each license/amendment:							

Inspector_____
Date_____

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
1.3.4	Scope of license (summation of the scope of the license as to amounts, uses, and users of radioactive materials):							
1.3.5	Compliance history (summation of all items of non-compliance determined in previous investigations):							
1.3.6	Surety and long-term care plans (summation of financial arrangements including the reclamation surety):							
1.4	Inspection Results							
1.4.1	Previous Findings (summation of all items of non-compliance or concern cited during the preceding inspection and description of all items that have been satisfactorily resolved or remain unresolved):							
1.4.2	Inspection Findings (summation of all items of non-compliance or concern cited during the inspection and a description of corrective measures necessary to resolve these items):							
1.5	Internal Review The inspection report (IR) and compliance letter notifying the licensee were reviewed and approved by (name_____; date_____ for each reviewer):							

Inspector _____
Date _____

LOW-LEVEL WASTE INSPECTION FORM

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
2.0	MANAGEMENT CONTROL							
2.1	The chain of command is compatible with the current license conditions and regulations.							
2.2	A recent organizational chart is included in the radiation safety manual (RSM).							
2.2.1	Key management individuals are the following (list name and title of each individual):							
2.2.2	Employees working at the facility are the following (list name, address, phone number, job description of each individual, names of supervisors, and any special operating schedules):							
2.3	The radiation safety officer (RSO) agrees with the current license conditions.							
2.4	The radiation safety office is staffed as follows (list name and job title, for each staff member):							
2.5	The number and type of personnel on staff are consistent with the license and uses, and appear capable of performing the duties and responsibilities assigned.							
2.6	The Radiation Safety Committee is structured as required by current license conditions and the regulations.							
2.6.1	The RSC is composed of the following (list name and position of each member):							
2.6.2	The RSC has approved all proposed use of radioactive material prior to actual possession or use.							
2.6.3	The RSC has met at intervals not exceeding those specified by license condition or regulation.							
2.6.4	The RSC has performed all required duties at required intervals.							
2.6.5	The RSC has met on the following dates (Month/Year):							

Inspector _____
Date _____

LOW-LEVEL WASTE INSPECTION FORM

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
2.6.6	RSC minutes were reviewed for the period (_____) through (_____).							
2.6.7	The annual report about the current status of the Radiation Safety Program was prepared by the RSC.							
2.6.8	Current RSC authorizations adhere to applicable standards and license conditions.							
2.7	Radiation Work Permits (RWP) for all non-routine activities or those for which there are no written procedures in the Radiation Safety Manual are compatible with the license conditions.							
2.7.1	All permits were initiated correctly and reviewed prior to use.							
2.7.2	All prior approvals and reviews by responsible individuals (RSO, shift Supervisor, RS Technician, and Employee) are documented.							
2.7.3	All protective equipment specified was used.							
2.7.4	Proper monitoring and/or protective equipment was used.							
2.7.5	Analytical results were recorded.							
2.7.6	Bioassay (if applicable) was performed and results were recorded.							
2.7.7	Employee was informed of analytical results.							
2.7.8	RWP was closed-out correctly.							
2.8	Management controls such as internal audits and inspections are consistent with the license conditions.							
2.8.1	Frequency of internal audits is consistent with the license.							
2.8.2	Internal audits are conducted by (_____). and reviewed by (_____).							
2.8.3	The subject areas covered by internal audits are consistent with the license.							
2.8.4	The annual corporate audit is complete, sufficiently detailed, and indicates adequate corrective action and follow-up.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
2.8.5	The annual independent audit is complete, sufficiently detailed, and indicates adequate corrective action and follow-up.							
2.8.6	RSO weekly inspections and quarterly, semi-annual and annual audits are complete, sufficiently detailed, and document significant findings and corrective action by a responsible individual.							
2.8.7	Shift supervisor inspections (for each shift) are complete and sufficiently detailed.							
2.9	Management has established administrative controls and provisions relating to organization and management, procedures, recordkeeping, material control and accounting, and management review that are necessary to assure safe operations.							
2.10	The licensee has reported each actual or attempted theft or loss as soon as such theft or loss becomes known to the licensee.							
2.10.1	Copies of investigation reports conducted by the licensee are maintained for inspection and are of sufficient detail.							
2.11	Only authorized users, consistent with the license, have used, or supervised the use of, radioactive materials.							
2.12	Training has been conducted in a manner and at intervals consistent with license conditions and the regulations.							
2.12.1	All individuals who have required training since the prior inspection have received the required training.							
2.12.1.1	Average class duration is (_____) hours.							
2.12.1.2	Average number of individuals per class is (_____).							
2.12.1.3	Average number of classes per year is (_____).							
2.12.1.4	Passing score is (_____)%.							
2.12.1.5	Dates of training:							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
2.12.1.6	Subjects covered in training:							
2.12.2	Respirator training is performed according to specifications of the license. (Note appropriate retraining, testing and medical examinations.)							
2.12.3	Training on protective clothing and devices is performed according to specifications of the license.							
2.13	All individuals working in or frequenting any portion of a restricted area are informed, instructed or advised of risks associated with the exposure to radiation, as detailed below.							
2.13.1	Informed of the storage, transfer, or use of sources or radiation in such portions of the restricted area.							
2.13.2	Instructed in the health protection considerations associated with exposure to radiation or radioactive material, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed.							
2.13.3	Instructed in, and instructed to observe, to the extent within the worker's control, the applicable provisions of the regulations and the license(s) for the protection of personnel from exposure to radiation or radioactive material occuring in such areas.							
2.13.4	Instructed as to their responsibility to report promptly to the licensee any condition which may lead to or cause a violation of the regulations or license conditions, or unnecessary exposure to radiation or radioactive material.							
2.13.5	Instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation or radioactive material.							
2.13.6	Advised as to radiation exposure reports which are furnished pursuant to the license.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
2.13.7	The extent of the above instructions are commensurate with potential radiological health protection considerations in the restricted area.							
2.14	Employee interviews were conducted and are summarized below: Name/Position ____ Comments							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
3.0	WASTE DISPOSAL OPERATIONS							
3.1	Records are maintained relating to the receipt, handling and burial of radiation sources, and other such records as the license requires which permit determination of the extent of occupational and public exposure from such radiation sources.							
3.2	Receipt of radioactive materials is performed in accordance with the license conditions.							
3.2.1	Controls for procurement of radioactive material are consistent with the license and are adequate to safeguard against unauthorized receipt by others and possession of unauthorized quantity and types of radioactive material.							
3.2.2	The licensee does not exceed authorized quantities, kinds, or forms of radioactive material.							
3.2.3	Upon receipt, the external surfaces of the packages and detection systems are surveyed for radioactive contamination caused by leakage of the contents.							
3.2.4	Monitoring was performed no later than 3 hours after receipt if during normal working hours or no later than 18 hours if received afte normal working hours.							
3.2.5	If contamination was found, the licensee immediately notified the final delivery carrier, shipper, and the department.							
3.2.6	Licensee maintains adequate records showing the results of the contamination surveys.							
3.2.7	Techniques and equipment used to repackage damaged items and control (or correct) contaminated surfaces were properly utilized.							
3.3	Quarterly inventories were conducted by the licensee to account for all radioactive materials received and possessed.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
3.3.1	Quantities and kinds of radioactive material are properly recorded, including quantities awaiting disposal and current inventories buried.							
3.3.2	Dates of receipt and disposal are recorded.							
3.3.3	Container integrity checks are performed and container rates recorded (in mR/hr).							
3.4	The temporary storage area is adequate and properly utilized.							
3.5	Construction of trenches is performed according to specifications of the license.							
3.5.1	The integrity of the trenches is adequate, as determined by a physical inspection.							
3.5.2	Soil and permeability testing are done at required frequencies and meet specifications of the license.							
3.5.3	Foundation and subgrade preparation is performed according to specifications of the license.							
3.5.4	A liner and leak collection system has been properly placed in each trench, according to QA records and/or inspection.							
3.5.5	Boundaries and dimensions of trenches are in agreement with specifications and are properly recorded.							
3.6	Placement and burial of wastes into trenches was performed in accordance with specifications of the license.							
3.6.1	Records of disposal of licensed material are maintained by the licensee.							
3.6.2	Spot checks of manifest records indicates proper burial, in a timely manner, of each class and form of waste.							
3.6.3	Wastes are properly segregated by classification.							
3.6.4	Drums are properly marked with identification tags.							
3.6.5	Void spaces between packages are filled with earth materials.							

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Unique Number	Inspection Items	Not Reviewed	Ad quate	Inadequate	Method of Inspection: Obser-vation	Inter-view	Records	Comments/Explanation
3.6.6	Proper methods are used to exclude or reduce liquids and gases.							
3.6.7	Gas containers are properly spaced.							
3.6.8	Heavy equipment user certification is adequate.							
3.7	The erosion protection cover over each trench has been constructed according to specifications.							
3.7.1	Settlement has been adequately accomodated in the cover design and construction.							
3.7.2	The cover provides adequate protection from infiltration and erosion as determined by:							
3.7.2.1	an engineer's inspection,							
3.7.2.2	lab analysis, or							
3.7.2.3	field measurements.							
3.7.3	Protection from surface water runon and heavy precipitation is adequate.							
3.7.4	The cover has been designed and constructed to limit human, animal, and root penetration.							
3.8	Closure of trenches is performed according to specifications.							
3.8.1	Closed units are identified by boundary markers.							
3.8.2	Closed units show no evidence of possible cover subsidence, ponding of water, or other factors that may indicate repository failure.							
3.8.3	Intruder barriers have been constructed over closed units.							
3.8.4	Leak collection systems show no evidence of seepage generation.							
3.9	Wastes generated on-site are handled in accordance with the license.							
3.9.1	Liquids are properly disposed and eliminated.							
3.9.2	On-site contamination is controlled and corrected as specified.							
3.9.3	Toxic chemicals are handled as specified in the license.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
3.9.4	All trash and laundry is handled as specified in the license.							
3.9.5	The licensee, prior to disposal of an empty container which previously held radioactive material, conducted proper surveys for contamination and documented decontamination results.							
3.10	Physical security of the facility is designed to reduce the possibility of inadvertant intrusion and unauthorized dumping.							
3.10.1	The physical security system of the facility appears adequate in meeting its design goals, and has prevented inadvertant intrusion and unauthorized dumping.							
3.10.2	Fencing has been installed and maintained to meet the license conditions.							
3.11	Transportation							
3.11.1	The licensee maintains radioactive materials shipment records that include packaging, marking, labeling, absorbant, security seal, and placarding, in a manner consistent with DOT regulations, Colorado State regulations, and the license.							
3.11.2	Shipping papers include: proper name and class, quantity, isotope, chemical/physical form, transport index, and signed certification.							
3.11.3	The licensee has transferred radioactive material since the last inspection to (list name, license number, nuclide, activity, and date of transfer):							
3.11.3.1	The licensee had appropriate copies of the transferee(s) license(s) on hand prior to transfer.							
3.11.4	The licensee has received radioactive material since the last inspection from (list names and origins):							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
3.11.5	Manifest records include generator name, address, telephone number, contact person, permit number, proper shipping name, hazard class, number of packages, weight and volume. Radionuclide inventory and the activity total for ^{226}Ra, ^{99}Tc, ^{14}C, ^{3}H and ^{129}I, transuranics, chelating and solidifying agents are included. Verification is made of a proper site-use permit.							
3.11.6	Package release reports are complete and include contamination limits.							
3.11.7	Vehicle inspection reports are complete and include weight limits, contamination limits, and vehicle safety inspection documentation.							
3.11.8	Emergency procedures for transportation accidents/spills are adequate and are being conformed to by the licensee.							

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4.0	FACILITIES, EQUIPMENT AND INSTRUMENTATION							
4.1	The licensee maintains facilities and equipment in a manner consistent with the license.							
4.1.1	Remote handling equipment is adequate.							
4.1.2	Measuring and testing equipment is adequate.							
4.1.3	The appropriate emergency equipment is kept at the facility and is properly maintained and utilized by the licensee.							
4.1.3.1	5 minute escape capsules are functional and checked at appropriate frequencies as described in the procedures manual.							
4.1.3.2	First aid equipment is properly maintained, checked and utilized.							
4.1.4	Personnel protective equipment is properly maintained and utilized by employees of the licensee.							
4.1.4.1	Protective clothing and gloves are worn in accordance with the procedures manual.							
4.1.4.2	Respiratory protection equipment is used properly.							
4.1.4.3	SCBA are checked monthly.							
4.1.4.4	The facility has a free exit from each HIGH RADIATION AREA.							
4.2	Posting at the facility is adequate to meet license conditions.							
4.2.1	Each Radiation Area and all entrances thereto are conspicuously posted with a sign or signs bearing the radiation caution symbol and colors and the words "CAUTION - RADIATION AREA".							
4.2.2	Each High Radiation Area and all entrances thereto are conspicuously posted with a sign or signs bearing the radiation caution symbol and colors and the words "CAUTION - HIGH RADIATION AREA".							
4.2.3	Each Airborne Radioactivity Area is conspicuously posted with a sign or signs bearing the radiation caution symbol and colors and the words "CAUTION - AIRBORNE RADIOACTIVITY AREA".							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
4.2.4	Each area or room in which any radioactive material is used or stored is conspicuously posted with a sign or signs bearing the radiation caution symbol and colors and the words "CAUTION - RADIOACTIVE MATERIAL".							
4.2.5	Each container of radioactive material bears a durable, clearly visible label identifying the radioactive contents. Each label bears the radiation caution symbol and colors and the words "CAUTION - RADIOACTIVE MATERIALS". Labels provide sufficient information to permit individuals handling or using the containers, or working in the vicinity thereof, to take precautions to avoid or minimize exposures.							
4.2.6	The licensee has invoked the following exemptions from posting allowed by License Condition.							
4.3	Fire safety procedures and equipment appear adequate for the facility.							
4.3.1	Fire drills and/or training were performed at appropriate intervals.							
4.3.2	Fire safety equipment is appropriately maintained, checked and utilized.							
4.4	Security for the facility appears to be adequate.							
4.4.1	Licensed materials are physically secured to prevent tampering or unauthorized removal, or are tended under the constant surveillance and immediate control of the licensee.							
4.5	The licensee appropriately posts current copies of documents, including the following:							
4.5.1	The regulations.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
4.5.2	The license and conditions or documents incorporated into the license by reference and amendment thereto.							
4.5.3	The operating procedures applicable to work under the license.							
4.5.4	Any notice of violation involving radiological working conditions, proposed imposition of civil penalty, or an order issued pursuant to the license.							
4.5.5	A notice. In lieu of posting the documents required by 4.5.1 through 4.5.4, the licensee posts a notice which describes the documents and states where they may be examined.							
4.5.6	Radiation Work Permits (RWP's).							
4.5.7	Other (specify):							
4.6	Leak tests are performed as specified in the license.							
4.6.1	Leak test samples are sent to the following approved outside vendor for analysis (list name and address):							
4.6.2	Leak test samples are analyzed in-house using the following equipment (list equipment type and unique number):							
4.6.3	Leak test samples are counted using established written procedures approved by the department.							
4.6.4	Leak test samples are usually obtained by (_____) and usually analyzed by (_____).							
4.6.5	Leak test results are kept in units of microcuries.							
4.6.6	The licensee possesses sealed sources which do not require a periodic leak test, and/or possesses sealed sources which require leak tests at six month intervals, and/or possesses sealed sources which require leak tests at intervals not to exceed three months.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
4.6.7	The licensee utilizes the following reference standards when analyzing leak test samples (list nuclide, activity, manufacturer, assay date, and sealed source):							
4.7	Monitoring equipment and instrumentation is maintained by the licensee in a manner consistent with the license. Frequency of calibration, function checks, and methods for ensuring that instrumentation is reliable are consistent with the license and regulations.							
4.7.1	A list of monitoring equipment is maintained. The list includes the following items:							
4.7.1.1	Number of each							
4.7.1.2	Types of probes							
4.7.1.3	Calibration procedure (radiation, flow rate and electronic)							
4.7.1.4	Instrument (probe) capability and efficiency determined at the time of calibration; comparison to Department equipment							
4.7.1.5	Limitation of calibration (e.g., alpha, beta, gamma, neutron, energies)							
4.7.1.6	Calibration dates.							
4.7.1.7	Calibration is performed by (_____). (Specify in-house or by a contractor, and name individual).							
4.7.2	Radiation Safety Office dose rate instruments are calibrated at appropriate intervals as required, but no less-frequently than the manufacturer's suggested interval.							
4.7.3	Radiation Safety Office contamination survey instruments are calibrated at appropriate intervals as required, but no less frequently than the manufacturer's suggested interval.							
4.7.4	Radiation Safety Office Dose Rate instruments are calibrated on site, by (_____) utilizing a (_____) source of approximately (_____) millicuries, or by an approved vendor.							
4.7.5	Contamination instruments are calibrated with (_____) or by approved vendor.							
4.7.6	Authorized user instruments are calibrated at appropriate intervals as required.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
4.7.7	Authorized user instruments are calibrated by the Radiation Safety Office, the authorized user, or an approved vendor.							
4.7.8	The Radiation Safety Office maintains and uses an inventory of portable meters for alpha detection, beta/gamma contamination, and dose rate.							
4.7.9	The Radiation Safety Office utilizes liquid scintillation counters, multi-channel analyzers, and other counting/detection instruments (_____).							
4.7.10	Functioning and calibrated Radiation Safety Office instruments were physically checked for adequate batteries and proper response to radiation during this inspection and were found to be adequate.							
4.8	Authorized users possess and use calibrated and operable survey instrumentation as required by license and individual authorization conditions.							
4.8.1	All authorized users who possess and use Iodine 125 have, and use, instrumentation appropriate for the detection and/or quantification of Iodine 125.							
4.8.2	All instruments used to detect Iodine 125 are properly calibrated at the appropriate energy.							
4.8.3	Authorized user instruments were physically checked during this inspection for adequate batteries and proper response to the radiation of interest and were found to be adequate.							
4.9	Upper and lower limits of detection are described for all instruments and are adequate							
4.10	Adequate records are kept on calibration and maintenance for all instruments.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
4.11	The Radiation Safety Office uses appropriate instrumentation for performing thryroid bioassay.							
4.11.1	Scaler/counter: make, model and serial number.							
4.11.2	Probe: make, model and serial number.							
4.11.3	Counting standard: make, model, nuclide, activity and serial number.							
4.11.4	Calculated system efficiency is (_____).							
4.11.5	Bioassay counting is normally performed by: (_____).							
4.11.6	The licensee utilizes appropriate written procedures when performing and analyzing bioassay.							
4.11.7	Bioassay procedures are approved by current license condition.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
5.0	HEALTH AND SAFETY							
5.1	The health and safety procedures manual contains sufficient information and procedures to protect individuals and limit exposures in accordance with the "as low as reasonably achievable" (ALARA) principal.							
5.1.1	The licensee has sufficient copies of the manual on site for staff and worker use.							
5.1.2	The health and safety procedures manual contains the following components:							
5.1.2.1	Policy statements and instructions to workers.							
5.1.2.2	Techniques for reducing exposure and an annual review by the RSO.							
5.1.2.3	Training for radiation safety staff and supervised workers.							
5.1.2.4	RSO authority guidelines to suspend operations, protect workers, and modify plant operations or procedures to reduce exposures.							
5.2	The licensee supplies appropriate personnel monitoring equipment, including pocket devices, TLD or film badges, and ring badges to each individual who enters a High Radiation Area or a restricted area designated pursuant to and controlled as provided in the license.							
5.2.1	Personnel monitoring devices have been assigned to one individual per exposure interval.							
5.2.2	Personnel monitoring devices have not been worn by any individual other than that individual to which the device was originally assigned.							
5.2.3	Personnel monitoring devices assigned to an individual that are exposed while not being worn are processed and results recorded as soon as possible and a replacement device assigned to the individual immediately.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
5.2.4	Personnel monitoring devices have been adequately catalogued by the licensee (list name of supplier, date and calibration records).							
5.2.5	The visitor badging and authorization system is adequate.							
5.3	The licensee has not processed, used, received or transferred sources of radiation in such a manner as to cause any individual in a restricted area to receive in any calendar quarter from all sources of radiation a dose in excess of the limits specified in the license.							
5.3.1	The licensee distributes dosimetry devices to the following personnel (list personnel, department, and type of device):							
5.3.2	The licensee generated and distributed warning letters to all individuals whose dosimetry results have exceeded investigation action levels.							
5.3.3	The following individuals had dosimetry results which exceeded pertinent investigation action levels (list individual department, and exceeded level):							
5.3.4	The licensee adhered to the following action levels (list level, period, and required action):							
5.4	The licensee has adhered to the requirements of Reg. Guide 8.20 for Iodine bioassay and/or Reg. Guide 8.99 for Tritium bioassay.							
5.4.1	The licensee has performed the required baseline bioassays.							
5.4.2	The licensee has performed bioassays at the required intervals and has used sufficient blank, spiked or duplicate samples.							
5.4.3	Excessive levels from the bioassays have been appropriately noted, individuals notified and corrective actions taken (list level, individual, and action):							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
5.4.4	The licensee requires that any individual be informed of anticipated occupational doses prior to employment or work in a residential area.							
5.4.5	The licensee records prior occupational doses during the calender quarter for individuals working in a restricted area.							
5.5	Emergency procedures are conducted as specified in the license and the procedures manual.							
5.5.1	Emergency drills are conducted quarterly, as specified in the procedures manual.							
5.5.2	Safety meetings are held quarterly, as specified in the procedures manual.							
5.5.3	Emergency procedures are properly established and followed during drills for:							
5.5.3.1	Severe weather,							
5.5.3.2	Fire fighting,							
5.5.3.3	Medical assistance,							
5.5.3.4	Equipment failure.							
5.5.4	Facility inspections were performed, as necessary, following unusual events such as storms, floods or earthquakes.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
6.0	OPERATOR SURVEYS							
6.1	Contamination surveys conducted by the licensee were conducted properly and according to the license conditions.							
6.1.1	Contamination surveys were performed at the time intervals specified in the license conditions.							
6.1.2	Contamination survey results are adequately documented and properly stored.							
6.1.3	Contamination surveys included the following activities (list type of survey, frequency and location):							
6.1.3.1	The procedure and equipment used in conducting each contamination survey is included in the health and safety procedures manual.							
6.1.3.2	Contamination surveys were performed at the following locations (list type of survey, date, and location):							
6.1.3.3	Results of the contamination surveys conform to applicable regulations and license conditions.							
6.1.3.4	The following surveys indicate noncompliance in (list survey area, date):							
6.1.4	Off-site dose calculation for 50 (or 70) year annual dose commitment was performed by the licensee.							
6.1.4.1	Calculated annual dose commitment is within applicable limits.							
6.1.5	Ventilation efficiency, including control of dust fumes, mist, and gas, meets applicable standards, air permits, and license conditions.							
6.1.5.1	Methods used in ventilation control are (list filter for each item controlled):							
6.1.6	Stack sampling: All vents with potential for radionuclide release were evaluated.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
6.1.6.1	All vents were found to be in compliance with applicable limits, equipped with the appropriate scrubbing equipment, and monitored correctly.							
6.1.6.2	The performance of this equipment is carefully monitored each shift in operation, appropriate sampling methods are used, and results are adequately recorded.							
6.1.7	Breathing zone (lapel) air sampling techniques and analytical procedures were determined to be adequate.							
6.1.7.1	Monitoring frequencies, concentration limits, action levels, and reporting of overexposures to regulatory agency and employee is in compliance with the license.							
6.1.8	Airborne radionuclide concentrations for ^{3}H, ^{129}I, and ^{222}Rn, Rn progeny (if uranium mill tailings or significant amounts of radium-bearing materials are codisposed or disposed in an adjacent trench contiguous with the site) were measured.							
6.1.9	In addition to other applicable requirements, the licensee monitors hands and clothing after each procedure or before leaving a restricted area. Survey documentation includes an area diagram, describes the instrumentation used and is maintained for at least two years.							
6.1.9.1	The licensee maintains records showing the results of surveys required to establish compliance with the regulations.							
6.1.10	Each sealed radioactive source possessed under the provisions of the specific license, other than tritium, with a half-life greater than 30 days and in any form other than gas, was tested for leakage and/or contamination prior to initial use and at six-month intervals or as specified by the license.							

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Unique Number	Inspection Items	Not Reviewed	Adequate	Inadequate	Method of Inspection: Observation	Method of Inspection: Interview	Method of Inspection: Records	Comments/Explanation
6.1.10.1	Leak tests for sealed sources designed to be alpha, beta, or gamma emitters have been performed at intervals no greater than three months.							
6.1.10.2	The following sealed sources were noted to have been leaking and were disposed or decontaminated/repaired and returned to service (list instrument, nuclide, activity, assay data, I.D. number, leak test date(s), and leak test results):							
6.2	The environmental monitoring program operates so that the following are achieved: 1) exposure pathways are monitored to determine if annual dose standards to the general public are exceeded; 2) it is determined if all applicable radionuclide and hazardous or toxic materials standards are met for air, water and soil; and 3) early warning is provided for releases of hazardous or toxic materials and radionuclides from the disposal site before they leave the site boundaries.							
6.2.1	Air sampling is properly conducted on a daily basis, with monthly and quarterly averages determined.							
6.2.1.1	Sample locations are properly documented by map and narrative description, and include all trenches, at least four locations at the site boundary and the nearest residence.							
6.2.1.2	Sampling indicates that applicable limits and action levels have not been exceeded (list limits, levels, and sample results):							
6.2.1.3	Trends and anomolies in the air sampling data are adequately explained by the licensee.							
6.2.1.4	Sample calculations have been checked and verified to be accurate.							
6.2.2	Surface water sampling and analysis is properly conducted on a monthly basis.							

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6.2.2.1	Sample locations are properly documented by map and narrative description, and include the nearest surface water source and all principal surface water sources within 2 km up and down gradient from the facility.							
6.2.2.2	Samples indicate that applicable limits and action levels have not been exceeded (list limits, levels, and sample results):							
6.2.2.3	Trends and anomolies in the surface water sampling data are adequately explained by the licensee.							
6.2.2.4	Sample calculations have been checked and verified to be accurate.							
6.2.3	Ground water sampling is properly conducted on at least a monthly basis.							
6.2.3.1	Sample locations are properly documented by map and narrative description, and include the nearest aquifer and/or any water bearing zone which may be impacted by the facility.							
6.2.3.2	Samples indicate that applicable limits and action levels have not been exceeded (list limits, levels, and sample results):							
6.2.3.3	Trends and anomolies in the ground water sampling data are adequately explained by the licensee.							
6.2.3.4	Sample calculations have been checked and verified to be accurate.							
6.2.4	Soil sampling is properly conducted on a quarterly basis, for both surface soils and transport route soils.							
6.2.4.1	Sample locations are properly documented by map and narrative description, and include all trenches, at least four locations at the site boundary, and the nearest residence.							
6.2.4.2	Samples indicate that applicable limits and action levels have not been exceeded (list limits, levels, and sample results):							

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6.2.4.3	Trends and anomolies in the soil sampling data are adequately explained by the licensee.							
6.2.5	Sampling of vegetation and animals (flora and fauna) is properly conducted on an annual basis.							
6.2.5.1	Sample locations are properly documented by map and narrative description, with sample type noted.							
6.2.6	Exposure rate sampling is properly conducted on a weekly basis.							
6.2.6.1	Sample locations are properly documented by map and narrative description.							
6.2.6.2	Samples indicate that applicable limits and action levels are not exceeded (list limit, level, and sample results):							
6.2.6.3	Trends and anomolies in the exposure rate sampling data are adequately explained by the licensee.							
6.2.7	Residential monitoring is properly conducted on a quarterly basis.							
6.2.7.1	Samples indicate that applicable limits and action levels are not exceeded (list limits, levels and sample results):							
6.2.7.2	Trends and anomolies in the residential sampling data are adequately explained by the licensee.							
6.2.8	Meteorological data is properly recorded on a daily basis, with monthly and quarterly averages determined.							
6.2.8.1	Precipitation data includes minimum, maximum and average by month, year and event.							
6.2.8.2	Wind data includes direction frequency distribution, stability categories and evaporative index.							

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7.0	INSPECTOR'S INDEPENDENT SURVEYS							
7.1	Independent surveys conducted during the inspection indicate that the licensee is in compliance with applicable regulations and license conditions.							
7.1.1	A walk-through of all facilities was conducted, and cleanliness, evidence of proper storage, eating or smoking in restricted areas, and security and posting were determined to be adequate.							
7.1.2	Contamination control and decontamination procedures were inspected and determined to be adequate.							
7.1.3	Personnel decontamination procedures were inspected and determined to be adequate.							
7.2	Spot checks for contamination were conducted at the following locations (list instrument readings at all locations surveyed, including clean areas, lunch rooms, change rooms, showers, first aid supply area, protective gear and unrestricted areas):							
7.2.1	The following instruments were used for direct contamination surveys (list make/model, code number, and latest calibration):							
7.2.2	Battery and response checks using appropriate referenced sources were conducted for all instruments listed in 7.2.1 and indicate properly functioning instruments.							
7.2.3	Alpha and beta-gamma instruments indicate that contamination is below regulatory limits and license conditions.							
7.2.4	Spot checks out of compliance with regulatory levels and license conditions are (list survey, regulatory level, and measured level):							
7.2.5	Corrective actions for noncompliance items include (describe corrective measures):							
7.3	Wipe samples for contamination were taken at the following locations or of the following items (list location, item, date, method of analysis and results):							

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7.3.1	Wipe samples found to be out of compliance with the regulations and license conditions are (list sample, regulatory level, and measured level):							
7.3.2	Corrective action for noncompliance items include (describe corrective measures):							
7.4	Multiple dose rate surveys were conducted during the inspection and indicate compliance with applicable regulations and license conditions.							
7.4.1	Dose rate surveys were taken at the following locations (list all survey locations and results):							
7.4.2	Dose rate surveys were conducted with the following instruments (list make/model, code number, latest calibration):							
7.4.3	Battery checks and response checks using appropriate reference sources were conducted for all instruments listed in 7.4.2 and indicate properly functioning instruments.							
7.4.4	All dose rates were within normal parameters for the type of posting, security, and sources present, except as noted in 7.4.5.							
7.4.5	Dose rates exceeding regulatory levels and license conditions are (list area/item, meter code number, mR/hr at contact, 6 inches, 1 foot and 3 feet, and regulatory level):							
7.4.6	Corrective action for noncompliance items include (describe corrective measures):							
7.5	Independent air flow tests conducted during the inspection indicate compliance with applicable regulations and license conditions.							
7.5.1	Air flow tests were conducted at the following locations (list location, instrument, and results):							
7.5.2	Air flow tests out of compliance with regulations and license conditions are (list location, regulatory level, and measured level):							
7.5.3	Corrective actions for noncompliance items include (describe corrective actions):							

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7.6	Confirmatory samples from the environmental and construction monitoring program were obtained during the inspection and were found to be in compliance with appropriate regulations and license conditions.							
7.6.1	Confirmatory samples were obtained for the following items (list sample type, location, and collection method for air, surface water, ground water, surface soils, transport route soils, vegetation, animals, and construction activities):							
7.6.2	Analysis of the confirmatory samples is consistent with previous data and information supplied by the licensee (list confirmatory sample analysis and licensee analysis for similar sample locations):							
7.6.3	Confirmatory samples that indicate potential noncompliance with the rules and license conditions are (list specific samples):							
7.6.4	Corrective actions for noncompliance items include (describe corrective actions):							
7.7	Disposal cells were inspected and surveyed, as appropriate, and are in compliance with appropriate regulations and license conditions.							
7.7.1	Cell construction is being conducted according to the final plans and specifications and testing procedures are conducted by the appropriate methods.							
7.7.2	Handling and placement of waste materials in the trenches is being conducted according to the operations manual, especially the minimization of void spaces.							
7.7.3	Closed trenches show no signs of disturbance or failure.							

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8.0	DOCUMENTATION							
8.1	The licensee uses and maintains sufficient copies of appropriate documents to assure safe operations.							
8.1.1	The licensee maintains current copies of Colorado's Rules and Regulations Pertaining to Radiation Control.							
8.1.2	The licensee maintains current copies of the radioactive materials license and amendments.							
8.1.3	The licensee maintains current copies of the radiation safety manual.							
8.1.4	The radiation safety manual contains operating and emergency procedures for radiation and non-radiation events and appears current and consistent with applicable regulations and license conditions.							
8.2	The licensee maintains accurate records of incidents, accidents, unusual exposures, overexposures, and any subsequent corrective action.							
8.2.1	The system for preparing and maintaining records is functioning properly.							
8.2.2	The licensee has notified the department and others as required of unusual incidents, overexposures, theft, leaking containers, excessive radiation levels or concentrations, or other non-routine circumstances.							
8.3	The licensee maintains accurate records concerning the receipt and disposal of all radioactive materials.							
8.3.1	Receipt records are accurately filed in a secure area and contain the required information (list documents reviewed, required information, and period):							
8.3.2	Disposal records are accurately filed in a secure area and contain the required information (list documents reviewed, required information, and period):							
8.3.3	Inventory records are current, filed in a secure area and contain the required information (list documents reviewed, required information, and period):							

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8.4	The licensee maintains adequate records regarding appropriate regulatory requirements and license conditions.							
8.4.1	The following records are properly maintained (list type of record and required information, including construction, waste disposal, instrument calibration, leak tests, training, dosimetry, surveys, monitoring, meetings, and transportation):							
8.4.2	Records of site activities are adequate to demonstrate compliance with the appropriate regulations and license conditions.							
8.4.3	Records document that inspection, testing, and recording procedures were followed during site operations.							
8.4.4	Records found to be out of compliance with the regulations and license conditions are (list record, regulatory requirement, and description of non-compliance item):							
8.4.5	Corrective actions for items of noncompliance include (describe corrective measures):							

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9.0	SITE-SPECIFIC INSPECTION ITEMS This section is to be developed once a license has been approved by the State of Colorado. This section should include site-specific construction, operation, closure, and monitoring items that assure the safe disposal of low-level radioactive wastes.							