Attachment 1.
Geologic Verifications of Cell Excavation

Phase 2 Dump Ramp Removal
Buyoff Survey
Assessment
Cell Floor Verification by Visual Inspection

Phase 3a
Buyoff Survey
Cell Floor Inspection

Attachment 1. Geologic Verifications of Cell Excavation
Phase 2 Dump Ramp Removal Buyoff Survey

Cell Floor and Perimeter Embankment design verification

Area ID: UCFY24 and UE1B32 **Total ft²:** 217,954

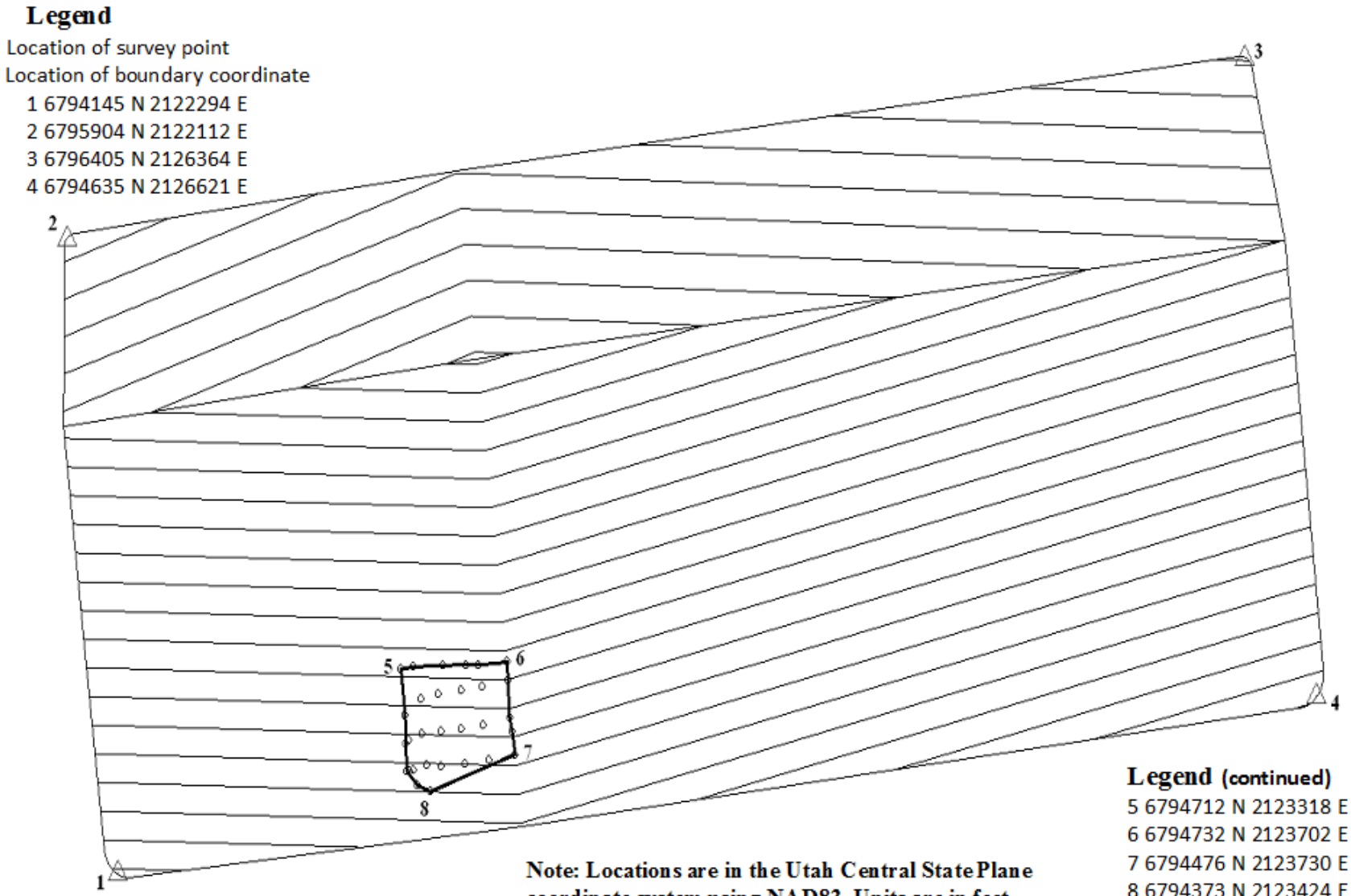
Point #	Code	Northing	Easting	Surveyed Elevation	Design Elevation	Difference in feet	Difference in inches
1002	Floor	6794351	2123493	4926.3	4926.2	0.1	0.9
1003	Floor	6794355	2123541	4926.2	4926.2	0.0	0.3
1004	Floor	6794368	2123632	4926.2	4926.1	0.1	0.7
1005	Floor	6794381	2123745	4926.1	4926.0	0.1	0.7
1006	Floor	6794476	2123731	4928.3	4928.2	0.1	1.1
1007	Floor	6794462	2123635	4928.3	4928.2	0.1	1.0
1009	Floor	6794451	2123550	4928.3	4928.3	0.0	0.1
1010	Floor	6794442	2123465	4928.5	4928.4	0.1	0.7
1011	Floor	6794432	2123364	4928.6	4928.5	0.0	0.5
1012	Floor	6794518	2123346	4930.6	4930.5	0.0	0.2
1013	Floor	6794539	2123464	4930.6	4930.6	0.0	0.1
1014	Floor	6794539	2123464	4930.6	4930.6	0.0	0.3
1015	Floor	6794547	2123536	4930.6	4930.5	0.1	1.4
1016	Floor	6794557	2123614	4930.5	4930.5	0.0	0.0
1017	Floor	6794577	2123711	4930.7	4930.6	0.0	0.5
1032	Floor	6794683	2123704	4933.0	4932.9	0.1	1.5
1033	Floor	6794665	2123614	4933.0	4932.9	0.0	0.6
1034	Floor	6794655	2123535	4933.0	4932.9	0.1	0.9
1035	Floor	6794642	2123453	4933.0	4932.9	0.0	0.5
1036	Floor	6794629	2123392	4932.9	4932.9	0.1	0.6
1037	Floor	6794535	2123396	4930.8	4930.7	0.1	1.2
1038	Floor	6794448	2123410	4928.7	4928.7	0.0	0.5
1039	Embank	6794294	2123800	4967.6	4967.5	0.1	0.6
1040	Embank	6794290	2123729	4967.7	4967.6	0.1	0.7
1041	Embank	6794284	2123669	4967.2	4967.2	0.0	0.1
1042	Embank	6794277	2123604	4967.2	4967.1	0.1	1.1
1043	Embank	6794268	2123512	4966.9	4966.8	0.1	1.0
1044	Embank	6794262	2123458	4966.7	4966.7	0.0	0.2
1045	Embank	6794220	2123461	4966.9	4966.9	0.1	1.1
1046	Embank	6794227	2123550	4967.1	4967.1	0.0	0.0
1047	Embank	6794235	2123629	4967.5	4967.4	0.1	1.2
1048	Embank	6794242	2123695	4967.6	4967.6	0.0	0.3
1049	Embank	6794127	2123701	4944.9	4944.8	0.1	1.2
1050	Embank	6794120	2123615	4944.9	4944.9	0.0	0.5
1051	Embank	6794112	2123517	4944.9	4944.9	0.0	0.1
1052	Embank	6794102	2123383	4945.1	4945.1	0.0	0.3
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0
						0.0	0.0

Comments: QC verified that the finish surface was a smooth and compacted surface to the lines of design grades.

Construction Manager Approval: [signature] **Date:** 11/19/2015

Approved by: Mitch Hogan / [signature] **Date:** 11.19.2015 **Reviewed by:** [signature] 11/19/15

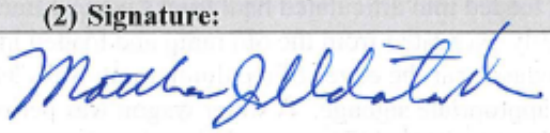
Attachment 1. Geologic Verifications of Cell Excavation
Phase 2 Dump Ramp Removal Buyoff Survey (*continued*)



Attachment 1. Geologic Verifications of Cell Excavation
Phase 2 Dump Ramp Removal Assessment

ASSESSMENT / MANAGEMENT ASSESSMENT, AND OVERSIGHT REPORT

XASSESSMENT/MANAGEMENT ASSESSMENT
☐OVERSIGHT

(1) Name:	(2) Signature:
Matthew Udovitsch, TAC QA Coordinator	

(3) Title:	(4) Date(s):
Crescent Junction Disposal Cell – Old Dump Ramp Removal, Perimeter Berm Placement, and Cell Floor Inspection	September 9th, 23rd, and October 14th, 2015

(5) Location:

Crescent Junction Disposal Cell

(6) Activity(s) Observed:

This surveillance was performed to augment DOE oversight and fulfill the Technical Assistance Contractor's (TAC's) Quality Assurance (QA) Program commitments relative to assessment of Crescent Junction Disposal Cell construction, as identified on the FY2015 Project Integrated Assessment Schedule. This surveillance evaluated dump ramp removal and associated perimeter berm placement activities, performed by the Remedial Action Contractor's subcontractor (Nielson Construction), to verify compliance to the Final Remedial Action Plan and Site Design for Stabilization of Moab Title I Uranium Mill Tailings at the Crescent Junction, Utah, Disposal Site (DOE-EM/GJ1547), Addendum B, Final Design Specifications and Addendum E, Remedial Action Inspection Plan.

This assessment was performed over the course of three visits to the site. The first two visits were used to observe dump ramp removal and perimeter berm placement activities. The third was performed to inspect the cell floor following removal of the dump ramp. Site visits included interviews with QA/QC Representatives monitoring the work activities.

(7) Interfaces/Interviews:

Beachem Bosh-RAC QA/QC Representative
Mitch Hogan- RAC QA/QC Representative
Kirk Briscoe-RAC CJ Site Operations Manager
Tim Colglazier-RAC CJ RadCon Supervisor

(8) Documents Reviewed:

Final Remedial Action Plan and Site Design for Stabilization of Moab Title I Uranium Mill Tailings at the Crescent Junction, Utah, Disposal Site (DOE-EM/GJ1547), Addendum B, Final Design Specifications and Addendum E, Remedial Action Inspection Plan

QC Daily Reports 09-09, 09-10, 2015
Lift Approval Form 09-09-2015

ASSESSMENT / MANAGEMENT ASSESSMENT, AND OVERSIGHT REPORT

(9) Results:

During the first two visits, the assessor observed Nielson Construction utilize a motor grader to loosen the compacted dump ramp material and spread it into windrows. The windrows were then loaded into articulated haul trucks using a trackhoe. In some instances, the material was directly excavated from the old ramp and loaded into the haul trucks. The contamination area boundary near the edges of the dump ramp was clearly marked with yellow and magenta rope and appropriate signage. A water wagon was periodically observed moisture conditioning the windrows prior to load out to aid in achieving compaction during placement and assist in controlling dust. The removed material was then transported to the cell's southern perimeter berm where it was placed, spread, periodically moisture conditioned, and compacted using the sheepsfoot compactor. Prior to placement of material on the perimeter berm the placement area was scarified, moisture conditioned, compacted, and retested as necessary (nuclear density/moisture) by RAC Quality Control Representatives. Portions of the material removed from the dump ramp were hauled to an area southwest of the new radiological buffer area/dump ramp and stockpiled for future use due to the significant concentration of aggregate (base course). RAC staff determined that the material contained too much aggregate and if placed in the berm it may produce localized channeling of water through the berm. Additionally, this aggregate/base course material did not originate from excavation of the cell.

On the third visit, the assessor was accompanied by the TAC Ground Water Program Manager. The assessor and Manager inspected the finished cell floor in areas where the dump ramp had been removed to confirm that the cell floor is in the Mancos Shale formation. Based on the field observations conducted, it was concluded that this subject cell floor area meets the requirement of the Remedial Action Inspection Plan (RAIP) which states "The cell floor shall be visually inspected to confirm that it is in the Mancos Shale formation." It should be noted that the entire dump ramp was not removed as portions near the CA boundary still had material that remains above the cell floor (note: these were relatively small areas in comparison to the overall dump ramp footprint). This area should be inspected and confirmed to be Mancos Shale once the material is removed and the floor is at final design grade.

(10) Issue(s) Identified:

No issues were identified.

Photo 1 Excavation, Load Out, and Moisture Conditioning of the Old Dump Ramp

Photo 2 Compaction of Perimeter Berm Material

Photo 3 Mancos Shale Observed During Cell Floor Inspection

Photo 4 Cell Floor Following Dump Ramp Removal (note: edges of the ramp remain)

Attachment 1. Geologic Verifications of Cell Excavation
Phase 2 Dump Ramp Removal Cell Floor Verification by Visual Inspection

S&K Moab TAC Team

TO: FY2015 Assessment File (MOA 021225)

FROM: Matt Udovitsch, TAC Quality Assurance Manager

SUBJECT: Dump Ramp Removal Cell Floor Inspection

DATE: 11-29-16

This memorandum was prepared to document the results of a follow-up cell floor inspection performed at the Crescent Junction site following removal of the dump ramp, located at the southern end of the Phase 2 cell excavation, which occurred in September and October 2015.

On October 14th, 2015, an inspection of the Crescent Junction disposal cell floor, in the area of the former dump ramp, was conducted and documented in TAC assessment DOE-15-A-031. The assessment report included the following statement: "It should be noted that the entire dump ramp was not removed as portions near the CA boundary still had material that remains above the cell floor (note: these were relatively small areas in comparison to the overall dump ramp footprint). This area should be inspected and confirmed to be Mancos Shale once the material is removed and the floor is at final design grade."

In late October 2015, once the subject remaining dump ramp boundary material was removed and the floor was at final design grade, the assessor performed a follow-up inspection of the cell floor as recommended in the assessment. Based on field observations, it was concluded that the cell floor area met the requirements of the Remedial Action Inspection Plan (RAIP) which states: "the cell floor shall be visually inspected to confirm that it is in the Mancos Shale Formation."

Moab TAC Team
200 Grand Avenue, Suite 500, Grand Junction, Colorado 81501
Phone: (970) 257-2100 * Fax: (970) 257-2174 * www.gjem.energy.gov

Attachment 1. Geologic Verifications of Cell Excavation
Phase 3a Cell Floor Buyoff Survey

CRJ 001389

Cell Floor Buyoff Survey

Lift Area Buyoff ID:			Phase 3A		Date:	5/17/2016
Point #	Northing	Easting	Surveyed Elevation	Design Elevation	Difference in feet	Difference in inches
1016_stk	6795878	2124721	4956.795	4956.785	0.0	0.1
1017_stk	6795779	2124736	4954.381	4954.342	0.0	0.5
1053_stk	6795026	2124448	4938.338	4938.225	0.1	1.4
1052_stk	6795042	2124547	4938.313	4938.226	0.1	1.0
1051_stk	6795057	2124646	4938.221	4938.221	0.0	0.0
1050_stk	6795072	2124745	4938.347	4938.229	0.1	1.4
1049_stk	6795171	2124729	4940.667	4940.529	0.1	1.7
1048_stk	6795156	2124631	4940.636	4940.528	0.1	1.3
1047_stk	6795140	2124532	4940.648	4940.527	0.1	1.5
1046_stk	6795125	2124433	4940.661	4940.527	0.1	1.6
1045_stk	6795224	2124418	4942.966	4942.829	0.1	1.6
1044_stk	6795239	2124516	4942.973	4942.829	0.1	1.7
1043_stk	6795255	2124615	4942.963	4942.829	0.1	1.6
1042_stk	6795270	2124714	4942.975	4942.83	0.1	1.7
1040_stk	6795369	2124699	4945.275	4945.132	0.1	1.7
1039_stk	6795354	2124600	4945.265	4945.131	0.1	1.6
1038_stk	6795338	2124501	4945.214	4945.131	0.1	1.0
1037_stk	6795323	2124402	4945.248	4945.131	0.1	1.4
1036_stk	6795421	2124387	4947.59	4947.433	0.2	1.9
1035_stk	6795437	2124486	4947.57	4947.433	0.1	1.6
1034_stk	6795452	2124585	4947.565	4947.433	0.1	1.6
1033_stk	6795468	2124683	4947.569	4947.434	0.1	1.6
1030_stk	6795566	2124668	4949.845	4949.736	0.1	1.3
1029_stk	6795551	2124569	4949.87	4949.735	0.1	1.6
1028_stk	6795536	2124470	4949.886	4949.735	0.2	1.8
1027_stk	6795520	2124372	4949.873	4949.735	0.1	1.7
1022_stk	6795619	2124356	4952.195	4952.037	0.2	1.9
1023_stk	6795634	2124455	4952.143	4952.037	0.1	1.3
1024_stk	6795650	2124554	4952.194	4952.037	0.2	1.9
1025_stk	6795665	2124653	4952.164	4952.038	0.1	1.5
1018_stk	6795764	2124637	4954.477	4954.34	0.1	1.6
1019_stk	6795749	2124539	4954.482	4954.34	0.1	1.7
1020_stk	6795733	2124440	4954.426	4954.339	0.1	1.0
1021_stk	6795718	2124341	4954.444	4954.339	0.1	1.3
1012_stk	6795817	2124326	4956.754	4956.641	0.1	1.4
1013_stk	6795832	2124424	4956.754	4956.641	0.1	1.4
1014_stk	6795847	2124523	4956.69	4956.642	0.0	0.6
1015_stk	6795863	2124622	4956.687	4956.642	0.0	0.5
1011_stk	6795962	2124607	4959.011	4958.944	0.1	0.8
1010_stk	6795946	2124508	4959.074	4958.944	0.1	1.6
1009_stk	6795931	2124409	4959.029	4958.943	0.1	1.0
1008_stk	6795916	2124310	4959.079	4958.943	0.1	1.6
1004_stk	6796014	2124295	4961.339	4961.245	0.1	1.1
1005_stk	6796030	2124394	4961.334	4961.245	0.1	1.1
1006_stk	6796045	2124492	4961.296	4961.246	0.1	0.6
1007_stk	6796061	2124591	4961.349	4961.246	0.1	1.2
1002_stk	6796144	2124477	4963.613	4963.565	0.0	0.6
1001_stk	6796129	2124378	4963.743	4963.714	0.0	0.3
1000_stk	6796113	2124279	4963.728	4963.63	0.1	1.2
1003_stk	6796159	2124576	4963.714	4963.558	0.2	1.9
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0
					0.0	0.0

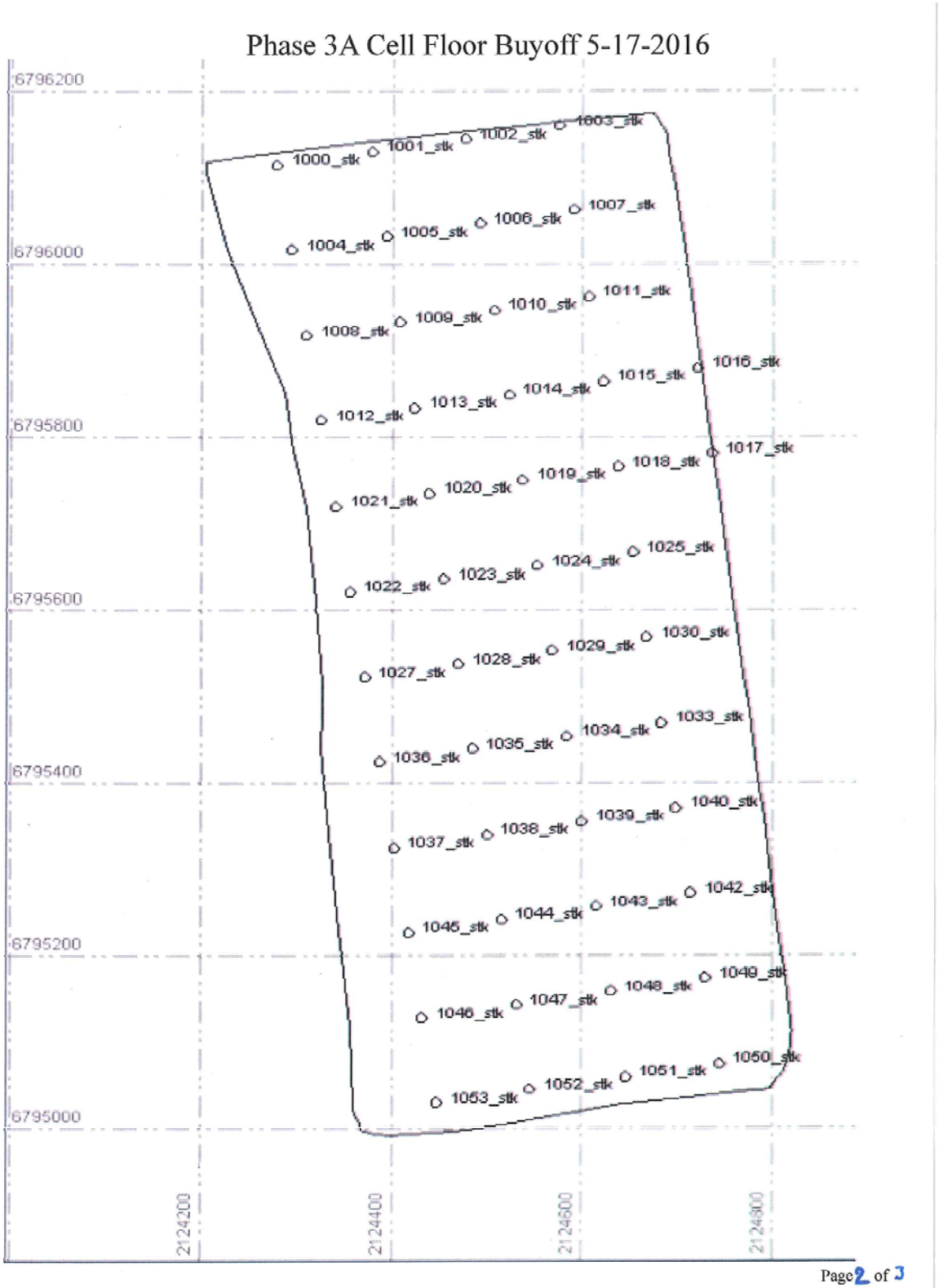
Comments:	QC performed a visual inspection of the final surface with satisfactory results. Visual inspection notes: The area was free of humping, thickened edges and defects. The layer uniform thickness was satisfactory see above survey results for layer thickness.
Approval Date: 5/18/2016	Total Square Feet: 515,634
Northwest Corner: 6796116 N. 2124203 E.	
QC Signature:Mitch Hogan/	Reviewed By:Beachem Bosh/

RECORD COPY

6-15-16 cs

43.8.3.1

Attachment 1. Geologic Verifications of Cell Excavation
Phase 3a Cell Floor Buyoff Survey (*continued*)



Attachment 1. Geologic Verifications of Cell Excavation
Phase 3a Cell Floor Buyoff Survey (*continued*)

Phase 3A Floor 5-17-2016

Attachment 1. Geologic Verifications of Cell Excavation
Phase 3a Cell Floor Inspection

DOE-16-A-029

ASSESSMENT / MANAGEMENT ASSESSMENT, AND OVERSIGHT REPORT

X ASSESSMENT/MANAGEMENT ASSESSMENT
(reviews, evaluations, inspections, tests, checks, surveillances)

☐ **OVERSIGHT**
(operational awareness activities, onsite reviews, assessments, self-assessments, performance evaluations, and other activities)

Name:	**Signature:**
Matthew Udovitsch-QA Manager Liz Moran-Hydrogeologist	
Title:	**Date(s):**
Crescent Junction Disposal Cell Floor Inspection DOE-16-A-029	July 13, 2016 11-29-16
Location:	
Moab UMTRA Project-Crescent Junction Disposal Cell	
Activity(s) Observed:	
This inspection was performed to augment DOE oversight and fulfill the Technical Assistance Contractor's (TAC's) Quality Assurance (QA) Program commitments relative to assessment of Crescent Junction Disposal Cell construction, as identified on the FY2016 Project Integrated Assessment Schedule and meet the requirement of the Remedial Action Inspection Plan (RAIP) which states "The cell floor shall be visually inspected to confirm that it is in the Mancos Shale formation." This inspection evaluated the recently excavated disposal cell floor (phase 3a) to verify compliance to the Final Remedial Action Plan and Site Design for Stabilization of Moab Title I Uranium Mill Tailings at the Crescent Junction, Utah, Disposal Site (DOE-EM/GJ1547), which states: "The disposal cell floor elevation was determined will be excavated a minimum of two feet into the weathered and fractured Mancos Shale." .	
Interfaces/Interviews:	
Craig Niemeyer-RAC Site Operations Manager Beachem Bosh-RAC Quality Assurance Representative	
Documents Reviewed:	
Final Remedial Action Plan and Site Design for Stabilization of Moab Title I Uranium Mill Tailings at the Crescent Junction, Utah, Disposal Site (DOE-EM/GJ1547), Addendum B, Final Design Specifications and Addendum E, Remedial Action Inspection Plan	
Results:	
Through inspection, the subject cell floor has been verified to meet the requirements of DOE-EM/GJ1547 which states: "The disposal cell floor elevation was determined will be excavated a minimum of two feet into the weathered and fractured Mancos Shale." See the attached report documenting the inspection conducted.	
Issue(s) Identified:	
No issues were identified.	

ASSESSMENT / MANAGEMENT ASSESSMENT, AND OVERSIGHT REPORT

Attachment 1

Field Inspection Notes

The bottom of the Phase 3a Crescent Junction cell excavation was inspected by TAC personnel on July 13, 2016. It was confirmed that the cell floor is within the weathered Mancos shale. The personnel walked the entire portion of the cell and recorded the following observations of the exposed Mancos shale.

Northern Portion of the Cell Floor:

Bedding planes within the weathered Mancos shale are visible at the surface. The color is gray (10YR 5/1) and the strike was E/W and the dip was 10 degrees to the north. The rock is described as moderately weathered, platy, silty shale (plates up to 2" thick), with precipitate present on bedding planes. The shale breaks into angular to sub-angular fragments (Photo 1).

Photo 1: The weathered Mancos shale in the northern portion of the cell.

Central Portion of the Cell Floor:

The central portion of the cell floor contains a few isolated areas of shale with a few portions of sandy shale with visible oxidation stains (Photo 2). The moderately weathered sandy shale is not as friable and has flaggy bedding with precipitate along the bedding planes (Photo 3). The strike of this bedding plane is E/W, with a dip of 5-8 degrees to the north. The color is yellowish brown (10YR 5/4).

Attachment 1. Geologic Verifications of Cell Excavation
Phase 3a Cell Floor Inspection (*continued*)

Photo 2: The central portion of the cell contains a few areas of sandy shale with visible surface oxidation.

Attachment 1. Geologic Verifications of Cell Excavation
Phase 3a Cell Floor Inspection (*continued*)

Photo 3: Precipitate on a bedding plane of the weathered Mancos shale.

Southern Portion of the Cell Floor:

The southern portion of the cell floor consists of moderate to highly weathered Mancos shale. This shale is finer grained, more fissile, and the color is very dark gray (10 YR 3/1). The shale weathers into rounded masses that crumble into millimeter thick sub-angular plates when disturbed.

Attachment 1. Geologic Verifications of Cell Excavation
Phase 3a Cell Floor Inspection (*continued*)

Photo 4: Very fissile, weathered Mancos shale.

Summary:

The entire Phase 3a Crescent Junction cell floor is within the weathered Mancos shale. Bedding planes are visible in the northern portion of the cell and the shale has a more weathered appearance and is more fissile toward the southern portion of the cell. The cell floor bottom is within more than 2 feet of weathered Mancos shale.

Attachment 2.
Debris Processing and Disposal Procedure

Office of Environmental Management – Grand Junction

UMTRA Project

Moab UMTRA Project
Debris Processing and Disposal Procedure

Revision 0

November 2015

U.S. Department of Energy

Office of Environmental Management

Prepared by the Remedial Action Contractor under contract number DE-DT0002936
for the U.S. Department of Energy Office of Environmental Management, Grand Junction, Colorado.

Moab UMTRA Project
Debris Processing and Disposal Procedure

Revision 0

November 2015

Prepared by the Remedial Action Contractor under contract number DE–DT0002936 for the U.S. Department of Energy Office of Environmental Management, Grand Junction, Colorado.

Moab UMTRA Project
Debris Processing and Disposal Procedure

Revision 0

Review and Approval

J.C.B. for K.B. 11-30-2015

J. Kirk Briscoe — Date
RAC Crescent Junction Operations/Site Manager

30 Nov 15

Craig Niemeyer — Date
RAC Moab Operations/Site Manager

11-30-15

Michael P. McDonald — Date
RAC Environmental, Safety, Health, and Quality Manager

J.C.B. for R.S. 11-30-15

Ray Schwaller — Date
RAC Engineering/Design Manager

11-30-2015

Jeffrey C. Biagini — Date
RAC Project Manager

Reviewed by:

11-30-15

Donald R. Metzler — Date
DOE Moab Federal Project Director

Attachment 2. Debris Processing and Disposal Procedure *(continued)*

Revision History

Revision Number	Date	Reason for Revision
0	November 2015	Initial issue.

Contents

1.0 Purpose

The purpose of this document is to describe the debris processing, inspection, handling, shipment, and placement process.

2.0 Background

Approximately half of the demolition debris area of the pile was excavated, sorted, and stockpiled from the mill tailings pile. During the excavation process, the excavated debris was sorted into three categories:

- Concrete Requiring Size Reduction
- Mixed Debris – a mixture of debris and tailings. The majority of the debris in this mixture meets the sizing requirements.
- Steel Requiring Size Reduction

3.0 Responsibilities

3.1 Moab Debris Sorting/Loading Operator

The Moab Debris Sorting/Loading Operator is responsible for:

- Understanding the specifications for debris sizing and loading.
- Performing visual inspection of debris to separate by sizing requirements.
- Loading waste containers according to requirements.

3.2 Tailings Pile Supervisor

The Tailings Pile Supervisor is responsible for:

- Understanding the debris sizing and loading specifications and inspection requirements.
- Coordinating debris processing and loading.

3.3 Moab Quality Control Representative

The Quality Control (QC) Representative at the Moab site is responsible for:

- Understanding the debris sizing and loading specifications and inspection requirements.
- Inspecting the sorted debris at the Moab site, at least once per day during loading, and recording observed activities on the Moab Debris Size Observation Form (QC-F-012) (see Attachment 1).
- Observing the size of debris and comparing it to the sizing requirements and watching for debris that has large internal voids (6 inches or greater).
- Verifying debris not meeting the sizing requirements (too large) and items having large internal voids are sorted out and not loaded into the containers.
- Observing the loading of the residual radioactive material (RRM) layer before loading concrete or other debris to 1 foot below the container top.

3.4 Engineering/Design Manager

The Engineering/Design Manager is responsible for:
- Understanding the debris sizing and loading specifications and inspection requirements.
- Reviewing debris records at both Moab and Crescent Junction on a weekly basis.
- Providing oversight by visibly watching the active placement of debris at the disposal site on a weekly basis to ensure proper judgment by the operator is being used during the placement process to minimize voids to the extent practical.

3.5 Quality Assurance Manager

The Quality Assurance (QA) Manager is responsible for:
- Understanding the debris sizing, loading, and placement specifications.
- Assisting with inspections and with process improvements.

3.6 Crescent Junction Debris Placement Operator

The Crescent Junction Debris Placement Operator is responsible for:
- Understanding the debris sizing and loading specifications and inspection requirements.
- Retaining separation of concrete and other debris from RRM to facilitate single lift placement.
- Observing the unloading of debris and reporting issues that restrict dumping or damage equipment to supervisor.
- Working with caution when handling debris to avoid damage to tires and equipment.

3.7 Landfill Operations Supervisor

The Landfill Operations Supervisor is responsible for:
- Understanding the debris sizing and placement specifications and inspection requirements.
- Observing the unloading of debris to verify conformance with container inventory and compliance with size requirements before placement.

3.8 Crescent Junction QC Representative

The QC Representative at the Crescent Junction site is responsible for:
- Understanding the debris sizing and placement specifications and inspection requirements.
- Inspecting, photographing, and documenting debris after it is spread out into a lift on the Lift Approval Form (QC-F-001) (see Attachment 2).

3.9 Crescent Junction Operations/Site Manager

The Crescent Junction Operations/Site Manager is responsible for:
- Understanding the debris sizing and placement specifications and inspection requirements.
- Scheduling debris shipment, placement, and inspections.
- Assisting with process improvement.

4.0 Requirements and Supplemental Guidelines

4.1 Specification for Placement and Sizing of Debris

The applicable section of the *Moab UMTRA Project Remedial Action Plan* (DOE-EM/GJ1547), Addendum B, Section 31 00 20, Item 3.2.5, lists the requirements for sizing and placement of debris and is quoted below.

> *3.2.5 Placement of Demolition Debris*
> *Demolition debris will be placed in the waste cell along with RRM material. Demolition debris will be sized by others, off site before being placed in containers and hauled to the Crescent Junction disposal cell. Demolition debris is to be sized as follows:*
> - *Wood, Concrete, Masonry: Cut or break up to a maximum 3-foot size measured in any dimension.*
> - *Structural Steel Member, Pipes, Ducts, Other Long Items: Cut into maximum 10-foot lengths.*
> - *Concrete, Clay Tile, and Other Pipes: Crush concrete and clay tile pipes. Crush other pipes and ducts that are 6 inches or greater in diameter or, if crushing is impractical, cut pipes and ducts in half longitudinally. Do not crush asbestos-cement pipe.*
> - *Rubber Tires Excavated at the Site: Cut into two halves around the circumference.*
> - *Geomembranes and Other Sheet Material: Cut into strips a maximum of 4 feet wide by 4 feet long.*
> - *Tree limbs 4 inches in Diameter and Larger: Cut into lengths of 8 feet or less.*
>
> *The contractor is not required to verify or perform additional size reduction.*
> *The above information is provided to inform the contractor of material sizes to be delivered for disposal. The contractor is responsible for placement of demolition debris in the waste disposal cell and compaction of RRM around the placed debris. Each container of demolition debris shall be spread in a single layer, not stacked, and placed in a manner that results in a minimum of voids around the debris.*

The applicable section of the *Remedial Action Plan*, Addendum E, "Remedial Action Inspection Plan," Section 6.4.4, lists the requirements for inspection of the sizing and placement of debris and is quoted below.

> *6.4.4. Demolition Debris*
> *Demolition debris will be placed in the waste cell along with RRM. Each container of demolition debris shall be spread in a single layer, not stacked, and placed in a manner that results in a minimum of voids around the debris. The following materials will be placed in the waste cell:*
> - *Wood, Concrete, Masonry: Cut or break up to a maximum 3-foot size measured in any dimension.*
> - *Structural Steel Member, Pipes, Ducts, Other Long Items: Cut into maximum 10-foot lengths.*
> - *Concrete, Clay Tile, and Other Pipes: Crush concrete and clay tile pipes. Crush other pipes and ducts that are 6 inches or greater in diameter or, if crushing is impractical, cut pipes and ducts in half longitudinally. Do not crush asbestos-cement pipe.*
> - *Rubber Tires Excavated at the Site: Cut into two halves around the circumference.*
> - *Geomembranes and other Sheet Material: Cut into strips a maximum of 4 feet wide by 4 feet long.*
> - *Tree limbs 4 inches in Diameter and Larger: Cut into lengths of 8 feet or less.*

4.2 Supplemental Guidelines for Sizing of Debris

The guidelines below are in addition to the size requirements listed in Section 4.1. The goal of these supplemental guidelines is to incorporate debris directly into the 12-inch-thick lift requirement at Crescent Junction. Overall, debris shipped to the disposal cell should not exceed 10 inches when laid flat. Further, the supplemental guidelines should ensure material dumps freely from the containers without getting hung up. The supplemental guidelines are listed below.

- Wood, concrete, and masonry: Size-reduce the material to a maximum 10.0 inches in thickness when laid flat.
- Structural steel members, pipes, ducts, tree limbs, and other long items: Cut into maximum 7-foot lengths.
- Rubber tires: Size-reduce rubber tires so they fit into a standard 12.0-inch lift and do not contain void spaces. The requirement in Section 4.1 of this procedure states that they will be cut around the circumference. They can also be cut into small pieces such that voids will not be created when disposed of in a standard 12.0-inch lift.
- Geomembranes and other sheet material: Cut into strips measuring a maximum of 4.0 feet wide by 3.0 feet long.
- Cable, chains, and wire: Cut into lengths of 4.0 feet or less.
- Hoses: Cut into lengths of 4.0 feet or less.
- Fencing, matting: Cut into strips measuring a maximum of 4.0 feet wide by 4.0 feet long.

5.0 Moab Debris Operations

5.1 Processing Concrete Requiring Size Reduction

The concrete will be size-reduced using a hydraulic hammer or processor mounted on an excavator. Rebar protruding from concrete will be removed as practical and/or folded over to prevent damage to shipping containers during the loading and unloading process.

Final Sorting
Before loading, the concrete debris will be visually inspected and physically separated by the operator, using the excavator to remove any oversized or non-compliant material, leaving only material/debris that meets the disposal specification. The debris removed will be stockpiled for further processing before loading and shipment.

5.2 Processing Mixed Debris

A substantial amount (>100,000 cubic yards) of mixed debris was generated during excavation. Mixed debris is a mixture of approximately 30 percent debris and 70 percent mill tailings. The mixed debris requires further sorting to ensure debris material is acceptable per the specification and supplemental guidelines.

Final Sorting
Before loading, the mixed debris is visually inspected and physically separated by the operator, using the excavator to remove any oversized or off-specification material, leaving only material/debris that meets the size requirements. The debris that is removed will be stockpiled for further processing before loading and shipment.

5.3 Processing Metal Requiring Size Reduction

The metal will be size-reduced using a shear mounted on an excavator. Thick metal may be size-reduced using flame-cutting equipment.

Final Sorting
Before loading, the metal debris will be visually inspected and physically separated by the operator, using the excavator to remove any oversized or non-compliant material, leaving only material/debris that meets the disposal specification. The debris removed will be stockpiled for further processing before loading and shipment.

5.4 Processing Other Debris

Other debris, such as structural steel members, pipes, tires, geo-membranes, tree limbs, cable, chains, fencing, hoses, and matting, that cannot practically be processed to meet the mixed debris size of 10 inches will be sized to the supplemental guidelines in Section 4.2. This debris will be processed using shears mounted on an excavator, chainsaw, or other cutting process. Thick metal may be size-reduced using flame-cutting equipment.

Final Sorting
Before loading, other debris will be visually inspected and physically separated by the operator, using the excavator to remove any oversized or non-compliant material, leaving only material/debris that meets the disposal specification. The debris removed will be stockpiled for further processing before loading and shipment.

5.5 Loading Debris

All debris types will be loaded into plywood-lined, short containers marked with corner castings painted white. After the sorting process, acceptable mixed debris and tailings will be loaded directly into the container and shipped. To protect the bottom of the container and facilitate the unloading process at the landfill, a layer of tailings 4 to 12 inches thick will be evenly distributed in the bottom of the container before loading debris. Debris shall not be tangled when placed in the container or it prevents easy separation and handling at the disposal cell. When loading containers with debris, a minimum of 1 foot of clearance from the top of the container is to be allowed.

5.6 Moab QC Activities (Inspection)

The QC Technician shall, at least once per day during loading, inspect the sorted debris at the Moab site, recording activities on the Moab Debris Size Observation Form.

For sorting and loading, the Technician shall observe the size of debris and compare it to the sizing requirements. Further, the Technician will watch for debris that has large internal voids (6 inches or greater).

For mixed debris loading, the Technician shall verify debris not meeting the sizing requirements (too large) and items having large internal voids are sorted out and not loaded into the containers.

For concrete and other debris, the Technician shall observe the loading of the RRM layer and loading of debris up to 1 foot below the container top.

5.7 Weight Tracking and Other Information

Each container that is loaded with debris material will be individually weighed and the weight recorded. No effort will be made to track the percentage of debris in each container.

Additionally, a general description of the types of debris (e.g., concrete, mixed, metal) will be recorded for each loaded debris container. This information (container number and type of debris) will be forwarded to the Crescent Junction site. The Tailings Pile Supervisor is responsible for ensuring this information is obtained and forwarded to the Landfill Operations Supervisor.

5.8 Placement of Debris Containers on the Train

Debris containers will be placed on the southern end of the railcars on the mainline track. At Crescent Junction, the train is generally unloaded from south to north. The purpose of the debris containers being placed at the southern end of the train is so the debris can be off-loaded and dumped during the earlier portion of the day, ensuring there is adequate tailings available to facilitate the disposal of the debris.

6.0 Crescent Junction Operation

6.1 Unloading Debris Containers

The debris containers will be unloaded at the dump ramp. After the unloading process, the debris will be loaded into articulated trucks using a wheel loader or excavator and then transported to the active lift placement area. The wheel loader/excavator operator and articulated dump truck driver should use caution not to run over debris that could damage heavy equipment tires.

6.2 Debris Placement - General

The highest level goal is to minimize voids in and around debris during the placement process at the disposal cell.

Efforts shall be employed to reduce voids when placing debris in the landfill. Potential differential settlement from compression can be eliminated by preventing the inclusion of cavities during the waste placement process.

Debris and loads containing debris shall be spread into layers not greater than 12 inches thick.

Debris shall be spread in a uniform single layer to prevent nesting of debris.

If voids are visually present between debris items in the lift after the spreading process, debris can either be rearranged, or tailings material shall be added to the lift and allowed to sift between the debris.

Debris lifts shall not be placed directly on top of debris lifts. There shall be at least one lift of tailings (void of debris) covering debris before a subsequent debris lift can be placed.

Debris shall be disposed of at least 10 feet below the bottom of the interim cover layer and more than 25 feet from a stand pipe.

6.3 Debris Placement – Large Single Item

Single debris items (e.g., concrete, wood, masonry objects) thicker than 12 inches are allowed. The objects must not exceed 3 feet in any dimension. The objects must be spread out 1.5 times the width of the compaction equipment to ensure the achievement of required compaction in the area between the objects. The Project currently uses a Caterpillar 825 Compactor (12 feet in width); therefore, the minimum required distance between objects is 18 feet. A maximum of 12-inch thick lifts of tailings shall be built up around the objects.

Alternatively, narrower compactors and hand compaction methods can be used to accomplish compaction around the objects.

6.4 Debris Placement – Concrete

Concrete debris will be mixed with tailings and incorporated directly into the 12-inch loose lift. Once sorted, tailings are first mixed with the debris as part of the loading process. Once dumped at Crescent Junction debris and tailings will be mixed together when loaded into the articulated dump truck. When the mixture is dumped in the placement area of the landfill, it will be further mixed by the bulldozer placing the lift.

If necessary, more tailings will be added to the concrete debris to ensure void space is minimized. The bulldozer shall work the tailings into the debris. Once the bulldozer operator has minimized void spaces, the Caterpillar 825 will compact the lift. The bulldozer may be used as an alternative method for compaction.

6.5 Debris Placement – Mixed

Mixed debris will be incorporated directly into the 12-inch loose lift. This mixed debris is already approximately 70 percent tailings. If necessary, more tailings will be added to the mixed debris to ensure void space is minimized. The bulldozer shall work the tailings into the debris. Once the bulldozer operator has minimized void spaces, the Caterpillar 825 will compact the lift. The bulldozer may be used as an alternative method for compaction.

6.6 Debris Placement – Metal

The wheeled loader or excavator will place the metal debris in the articulated dump truck. This metal debris will be dumped in the placement area of the landfill, and the bulldozer or excavator will uniformly spread the debris.

Metal debris shall be uniformly spread in a single layer into the 12-inch loose lift, not stacked, and placed in a manner that results in a minimum of voids around the debris.

Tailings will be placed over the metal debris and allowed to sift between the debris to ensure void space is minimized. The bulldozer shall work the tailings into the debris. Once the bulldozer operator has minimized void spaces, the Caterpillar 825 will compact the lift. The bulldozer may be used as an alternative method for compaction.

6.7 Crescent Junction Verification Activities (Inspection)

The verification of debris placement requirements relies heavily on observation during actual placement by the equipment operators and oversight by QC personnel.

The QC Representative shall inspect concrete debris, metal debris, and mixed debris after it is spread across the lift. Photos shall be taken of the debris lift. The debris shall be visually inspected to ensure it is spread out uniformly across the lift in a manner that minimizes voids. The debris inspection shall be documented on the Lift Approval Form (Attachment 2).

The Computer Aided Earthmoving System (CAES) will be used to document lift thickness and compaction of the lift. The QC Technician shall monitor both lift thickness and compaction by visually inspecting the process and reviewing the computer records for each lift that is placed. The CAES results will be verified by the QC Representative.

7.0 Communication

Frequent communication between the disposal facility and generating facility is the key to successful debris handling.

A group of workers who process and handle debris (operators, QC technicians, and supervisors from both Moab and Crescent Junction) will form a Work Planning and Improvement Team to focus on the communication and debris-handling challenges. During debris-processing activities, the team will hold a meeting approximately every 2 weeks. The team will be led by the Crescent Junction Landfill Operations Supervisor.

The Crescent Junction Landfill Operations/Site Manager will communicate the schedule for shipment volumes to manage placement requirements and lift sequences to the Moab Site Manager. Additionally, the 3:00 pm Plan of the Day meeting will be used to facilitate daily communication on planning, debris-handling challenges, and successes. The Crescent Junction Landfill Operations/Site Manager must be in agreement before debris being loaded or shipped to the landfill.

8.0 Engineering/QA Review

The Engineering/Design Manager (or designee) or the QA Manager shall review the debris records at both Moab and Crescent Junction on a weekly basis.

Further, the Engineering/Design Manager (or designee) will provide oversight by observing the active placement of debris at the disposal site on a weekly basis to ensure proper judgment by the operator is being used during the placement process to minimize voids to the extent practical.

Once the Engineering/Design Manager documents that the operators are using proper and consistent judgment during the placement of debris, the frequency of oversight can be reduced to once per month.

9.0 Records

All documentation created as a result of compliance with this procedure is considered a Project record and will be managed in accordance with the *Moab UMTRA Project Records Management Manual* (DOE-EM/GJ1545), which follows DOE orders, policies, and regulations for retention and maintenance of records.

10.0 References

DOE (U.S. Department of Energy) *Moab UMTRA Project Records Management Manual* (DOE-EM/GJ1545).

DOE (U.S. Department of Energy) *Moab UMTRA Project Remedial Action Plan* (DOE-EM/GJ1547).

Attachment 1.
Moab Debris Size Observation Form QC-F-012

Attachment 1. Moab Debris Size Observation Form QC-F-012

UMTRA Project

Moab Debris Size Observation Form

Date: _____

Start Time: _____ End Time: _____

Type(s) of debris observed:

_____

_____

_____

_____

Debris observed appeared to be in compliance:

☐ Yes ☐ No

Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Observer: _____ Date: _____

NOTE: See back for debris specifications.

Attachment 1. Moab Debris Size Observation Form QC-F-012 (*continued*)

Debris Specifications

Moab UMTRA Project Remedial Action Plan **(DOE-EM/GJ1547), Addendum B, Section 31 00 20, Item 3.2.5:**

Demolition debris will be placed in the waste cell along with RRM material. Demolition debris will be sized by others off site before being placed in containers and hauled to the Crescent Junction disposal cell. Demolition debris is to be sized as follows:

- Wood, Concrete, Masonry: Cut or break up to a maximum 3-foot size measured in any dimension.
- Structural Steel Member, Pipes, Ducts, Other Long Items: Cut into maximum 10-foot lengths.
- Concrete, Clay Tile, and Other Pipes: Crush concrete and clay tile pipes. Crush other pipes and ducts that are 6 inches or greater in diameter or, if crushing is impractical, cut pipes and ducts in half longitudinally. Do not crush asbestos cement pipe.
- Rubber Tires Excavated: Cut into two halves around the circumference.
- Geomembranes and Other Sheet Material: Cut into strips a maximum of 4 feet wide by 4 feet long.
- Tree limbs 4 inches in Diameter and Larger: Cut into lengths of 8 feet or less.

The contractor is not required to verify or perform additional size reduction. The above information is provided to inform the contractor of material sizes to be delivered for disposal. The contractor is responsible for placement of demolition debris in the waste disposal cell and compaction of RRM around the placed debris. Each container of demolition debris shall be spread in a single layer, not stacked, and placed in a manner that results in a minimum of voids around the debris.

Remedial Action Plan**, Addendum E, "Remedial Action Inspection Plan," Section 6.4.4**

Demolition debris will be placed in the waste cell along with RRM. Each container of demolition debris shall be spread in a single layer, not stacked, and placed in a manner that results in a minimum of voids around the debris. The following materials will be placed in the waste cell:

- Wood, Concrete, Masonry: Cut or break up to a maximum 3-foot size measured in any dimension.
- Structural Steel Member, Pipes, Ducts, Other Long Items: Cut into maximum 10-foot lengths.
- Concrete, Clay Tile, and Other Pipes: Crush concrete and clay tile pipes. Crush other pipes and ducts that are 6 inches or greater in diameter or, if crushing is impractical, cut pipes and ducts in half longitudinally. Do not crush asbestos-cement pipe.
- Rubber Tires Excavated at the Site: Cut into two halves around the circumference.
- Geomembranes and other Sheet Material: Cut into strips a maximum of 4 feet wide by 4 feet long.
- Tree limbs 4 inches in Diameter and Larger: Cut into lengths of 8 feet or less.

Moab UMTRA Project Debris Processing and Disposal Procedure **(DOE-EM/2178 Section 4.2**

The supplemental requirements are listed below.

- Wood, concrete, and masonry: Size-reduce the material to a maximum 10.0 inches in thickness when laid flat.
- Structural steel members, pipes, ducts, and other long items: Cut into maximum 7.0-foot lengths.
- Rubber tires: Size reduce rubber tires such that they fit into a standard 12.0-inch lift.
- Geomembranes and other sheet material: Cut into strips a maximum of 4.0 feet wide by 3.0 feet long.
- Tree limbs: Cut into lengths of 7.0 feet or less.
- Cable, chains, and wire: Cut into lengths 4.0 feet or less.
- Chunks of concrete with rebar extending out: Fold over rebar to prevent damage to shipping containers.
- Hoses: Cut into lengths 4.0 feet or less.
- Fencing, matting: Cut into maximum of 4.0 feet wide by 4.0 feet long strips.
- Debris shall not be tangled together when placed in the container such that it prevents easy separation and handling at the landfill.
- When loading containers with debris, allow 1 foot clearance from the top of the container.

Attachment 2.
Lift Approval Form QC-F-001

Attachment 2. Lift Approval Form QC-F-001

LIFT APPROVAL FORM

PROJECT: _____ **OTHER** _____

NW CORNER **DATE:** _____

	P_1
	EW: ___ X ___ = ___
	NS: ___ X ___ = ___
	P_2
	EW: ___ X ___ = ___
	NS: ___ X ___ = ___
	P_3
	EW: ___ X ___ = ___
	NS: ___ X ___ = ___
	P_4
	EW: ___ X ___ = ___
	NS: ___ X ___ = ___
	P_5
	EW: ___ X ___ = ___
	NS: ___ X ___ = ___
	Page 2 attached: Y N

IDENTIFY LOTS ABOVE

LIFT ID: _____ - _____ NW CORNER: _____

Uncompacted Thickness: _____ Compacted Thickness: _____ Debris Insp. By: _____ Date: _____ Time: _____

NW CORNER of debris placement: _____ EW Dimension _____ NS Dimension _____

Lift Area (ft^2): _____ Lift Volume (yd^3): _____

Comments:

KEYING IN NOTES: N E S W _____ MOISTURE/ DENSITY TESTS ID # (S): _____

LIFT APPROVED BY: _____ DATE: _____ TIME: _____

_____ _____

QA/QC APPROVAL DATE

Attachment 3.
NRC Correspondence

Attachment 3. NRC Correspondence

U.S. Department of Energy
200 Grand Avenue
Grand Junction, CO 81501
July 25, 2016

Ms. Kimberly Conway
FSME Division of Waste Management and Environmental Protection
U.S. Nuclear Regulatory Commission
Mail Stop T8F5
Washington, DC 20555-0001

Subject: Request to Change Moab UMTRA Project Specification and the RAIP for RRM and Debris Placement in the Crescent Junction Disposal Cell

Dear Ms. Conway:

This letter is to formally request your concurrence with several changes to one of the Crescent Junction disposal cell construction specifications and the associated Remedial Action Inspection Plan (RAIP) for the Moab Uranium Mill Tailings Remedial Action (UMTRA) Project. The requested changes are to allow an increase from 12 inches to 24 inches of loose residual radioactive material (RRM) in each lift in the disposal cell. The intent of this change is to allow for more efficient handling and compaction of RRM and debris in the disposal cell.

Addendum B to the *Final Remedial Action Plan and Site Design for Stabilization of Moab Title I Uranium Mill Tailings at the Crescent Junction, Utah, Disposal Site* (July 2008) (RAP) contains the Final Design Specifications. The relevant portions of specification 31-00-20, "Placement and Compaction of RRM and Interim Cover," are attached showing the proposed changes to Sections 3.2.1 RRM and Interim Cover Soil Placement and 3.2.5 Placement of Demolition Debris.

The change to Section 3.2.1 is to allow the 24-inch loose lift for RRM and RRM/debris. No change is requested for interim cover lifts, which will remain at 12 inches. The phrase "an average of" is added to lifts to be consistent with existing language in the RAIP. The main change to Section 3.2.5 is to specify that a ratio of no more than 50/50 debris to RRM by volume will be allowed. A phrase regarding how debris is placed was removed to facilitate spreading it in 24-inch lifts using a dozer. These changes minimize voids and are based on experience at other sites where debris and soil are co-disposed. The statement on additional size reduction of debris was modified to allow this to be performed at the Crescent Junction site, if necessary.

Corresponding changes are proposed to Addendum E, the RAIP, to make it consistent with the revised specification language for the 24-inch lift. Attached are the proposed changes to Sections 6.4.2 RRM Placement, 6.4.3 Inspection and Testing, 6.4.4 Demolition Debris, and the Cell Construction Material Installation Summary Table. The table also notes that the approximate compacted thickness of the 24-inch lift is 20 inches.

If you concur with these changes, the Specification 31-00-20 and the RAIP will be revised and included in the next Interim Completion report scheduled for submittal at the end of this calendar year.

If you have any questions or concerns with these changes, please do not hesitate to contact me at (970) 257-2115 or Deputy Federal Project Director Justin Peach at (435) 719-2845.

Sincerely,

Donald R. Metzler
Moab Federal Project Director

Enclosures

cc w/enclosures:
Z. Cruz, NRC
K. Armstrong, CBC
K. Grimes, CBC
J. Peach, MOAB
K. Wethington, MOAB
J. Biagini, RAC
D. Dalga, RAC
K. Kisiel, RAC
R, McKinney, RAC
C. Niemeyer, RAC
K. Turvy, RAC
J. Ritchey, TAC
M. Udovitsch, TAC
Project File CRJ 2.12 (C. Smith)

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ADDENDUM B

Final Remediation Action Plan
DOE-EM/GJ1547
August 2011

Final Design Specifications

Number	Title
31-00-00 R4	Earthwork
31-00-20 R4	Placement and Compaction of Tailings and Interim Cover
31-00-30 R7	Placement and Compaction of Final Cap Layers
31-32-11 R1	Surface Water management and Erosion Control
32-11-23 R8	Aggregate and Riprap

3.2.1 RRM and Interim Cover Soil Placement

RRM and Interim Cover soil shall be placed to the lines and grades shown on the drawings. A GPS guided Computer Aided Earthmoving System (CAES) shall be used to direct fill placement such that RRM and interim cover soil are placed in lifts of nearly uniform thickness not to exceed an average of ~~12 inches loose for interim cover lifts and~~ 24 inches loose for RRM and RRM/debris lifts and 12 inches loose for interim cover lifts. In areas where hand operated tampers must be used, the loose lift thickness shall not exceed 4 inches.

3.2.5 Placement of Demolition Debris

Demolition debris will be placed in the waste cell along with RRM material. Demolition ebris will be sized by others, off-site before being placed in containers and hauled to the Crescent Junction disposal cell. Demolition debris is to be sized as follows:

Wood, Concrete, Masonry: Cut or break up to a maximum 3-foot size measured in any dimension.

Structural Steel Member, Pipes, Ducts, Other Long Items: Cut into maximum 10-foot lengths.

Concrete, Clay Tile, and Other Pipes: Crush concrete and clay tile pipes. Crush other pipes and ducts that are 6 inches or greater in diameter or, if crushing is impractical, cut pipes and ducts in half longitudinally. Do not crush asbestos-cement pipe.

Rubber Tires Excavated at the Site: Cut into two halves around the circumference.

Geomembranes and Other Sheet Material: Cut into strips a maximum of 4 feet wide and 4 feet long.

Tree limbs 4 inches in Diameter and Larger: Cut into lengths of 8 feet or less.

The contractor may ~~is not required to verify or~~ perform additional size reduction, as necessary. The above information is provided to inform the contractor of material sizes to be delivered for disposal. The contractor is responsible for placement of demolition debris in the waste disposal cell and compaction of RRM around the placed debris. ~~Each container of d~~Demolition debris shall be ~~spread in a single layer, not stacked, and~~ placed in a manner that results in a minimum of voids around the debris. The ratio of debris to RRM shall not exceed 50/50 by volume in each lift.

Addendum E

Final Remedial Action Plan
DOE-EM/GJ1547
June 2011

Remedial Action Inspection Plan (RAIP)

Number	Title	
Document	Remedial Action Inspection Plan (RAIP)	
Attachment 1	Computer Aided Earthmoving System (CAES) For Landfills	

6.4.2 RRM Placement

Scarify at a minimum the top 1 inch of subsoil or preceding RRM lift using a footed roller or a dozer prior to placement of subsequent RRM layers. Fill materials shall be placed in continuous and planar lifts. The method of dumping and spreading RRM shall result in loose lifts of nearly uniform thickness, average thickness not to exceed 24~~12~~ inches. Compaction equipment shall consist of footed rollers or dozers. Footed rollers shall have a minimum weight of 45,000 pounds and at least one tamping foot shall be provided for each 110 square inches of drum surface. The length of each tamping foot from the outside surface of the drum shall be at least 6 inches. During compaction operations, the spaces between the tamping feet shall be maintained clear of materials that would impair the effectiveness of the tamping foot rollers. Dozers shall have a minimum ground pressure of 1,650 pounds per feet. The CAES may be used to direct fill placement, monitor compaction, and record the location and thickness of each soil layer being placed.

6.4.3 Inspection and Testing

QC shall visually inspect the ground preparation and fill placement operations. RRM shall be compacted to meet 90 percent of the laboratory determined maximum dry density as determined by ASTM D698. QC shall verify that the RRM placement is constructed in accordance with design plans and specifications by checking and confirming:

- Assessment tests shall be performed on RRM to ensure compliance with specified requirements and to develop compaction requirements for placement. A minimum of three tests for maximum dry density (ASTM D698) and optimum moisture content (optimum moisture plus or minus 3 percent) (ASTM D2216) shall be performed for each type of RRM soil observed.
- Fill material is properly moisture conditioned; one moisture content quick test will be performed each day material is placed in accordance with ASTM D4643, D4944, or D4959 until a sufficient number have been performed to demonstrate a clear correlation allowing a reduction in testing.
- Fill material is placed in continuous and planar lifts. The method of dumping and spreading RRM shall result in loose lifts of nearly uniform thickness, average thickness of fill area not to exceed 24~~12~~ inches.
- Compaction meets specifications.
- Compaction by CAES – QC shall monitor CAES compaction by visually inspecting the process and reviewing the computer records for each layer of soil placed.
- Verification tests of in-place density shall be performed on the initial layer of RRM and on any layers in which the CAES indicates that problems occurred obtaining compaction. In-place density will be taken every 6 months to verify the performance of the CAES.

NOTE: Companion sand cone and moisture tests must be performed along with nuclear tests until a sufficient number have been performed to demonstrate a clear correlation.

If CAES is not used, the following testing requirements shall be followed.

- Compaction Verification Tests – Perform in-place density and moisture content tests on compacted fill material in accordance with the following requirements.
  - A verification representative sample from each principal type or combination of blended RRM materials shall be tested to establish compaction curves using ASTM D698.

  - A minimum of one set of compaction curves shall be developed per 10,000 cubic yards of RRM material.
  - In-place density and moisture content tests are performed on a soil layer; a minimum of two tests shall be performed per 5,000 cubic yards or 135,000 square feet of fill material placed.
- Compaction and moisture content tests shall be performed in accordance with the following methods.
  - ASTM D1556 – Density and Unit Weight of Soil in Place by the Sand-Cone Method
  - ASTM D2216 – Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (Oven Moisture)
  - ASTM D6938 – In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
  - ASTM D4643 – Determination of Water (Moisture) Content of Soil by the Microwave Oven Heating
- After lift placement, moisture content shall be maintained until the next lift is placed.
- Erosion that occurs in the RRM layers shall be repaired and grades re-established.
- Freezing and desiccation of the RRM soil shall be prevented. If freezing or desiccation occurs, the affected soil shall be reconditioned as directed.
- Areas that have been repaired shall be retested as directed. Repairs to the RRM layers shall be documented including location and volume of soil affected, corrective action taken, and results of retests.

6.4.4 Demolition Debris

Demolition debris will be placed in the waste cell along with RRM. ~~Each container of~~ dDemolition debris shall be ~~spread in a single layer, not stacked, and~~ placed in a manner that results in a minimum of voids around the debris. The ratio of debris to RRM shall not exceed 50/50 by volume in each lift.

The following materials will be placed in the waste cell:

- Wood, Concrete, Masonry: Cut or break up to a maximum 3-foot size measured in any dimension.
- Structural Steel Member, Pipes, Ducts, other Long Items: Cut into maximum 10-foot lengths.
- Concrete, Clay Tile, and other Pipes: Crush concrete and clay tile pipes. Crush other pipes and ducts that are 6 inches or greater in diameter or, if crushing is impractical, cut pipes and ducts in half longitudinally. Do not crush asbestos-cement pipe.
- Rubber Tires Excavated at the Site: Cut into two halves around the circumference.
- Geomembranes and other Sheet Material: Cut into strips a maximum of 4 feet wide by 4 feet long.
- Tree Limbs 4 inches in Diameter and Larger: Cut into lengths of 8 feet or less.

Cell Construction Material Installation Summary Table

Cell Component	Material of Construction	Compaction Requirements	Lift Thickness max/approx loose/compact	Frequency of Verification Tests
Cell Excavation	NA	NA	NA	NA
Perimeter Embankment	Common Fill	95 percent	12 inches/10 inches	Initial layer/Section 6.3.4
RRM Placement	RRM	90 percent	Average thickness 2412 inches/ 2010 inches	Initial layer/Section 6.4.3
Interim Cover	Common Fill	90 percent	Average 12 inches/10 inches	Initial layer/Section 6.5.4
Radon Barrier	Weathered Mancos Shale	95 percent	12 inches/10 inches	Initial layer/Section 6.7.4
Infiltration and Biointrusion Barrier	Stone	NA	NA	NA
Frost Protection	Common Fill	90 percent	Average thickness 12 inches/10 inches	Initial layer/Section 6.9.4
Cap Armoring	Stone	NA	NA	NA

approx = approximate; max = maximum; NA = not applicable

S&K
Moab TAC Team

Control Number T16-01640

July 25, 2016

Mr. Donald R. Metzler
Moab Federal Project Director
U.S. Department of Energy
200 Grand Avenue, Suite 500
Grand Junction, CO 81501

SUBJECT: Contract No. DE-EM0002067, Moab Uranium Mill Tailings Remedial Action (UMTRA) Project Technical Assistance Contract (TAC), Letter to the Nuclear Regulatory Commission (NRC) concerning 2-foot lifts of material place in the disposal cell and addenda B and E of the Remedial Action Plan

Dear Mr. Metzler:

Enclosed is a draft letter to the NRC requesting its concurrence with changes to a specification and the Remedial Action Inspection Plan, both addenda to the Remedial Action Plan, to facilitate going to 2-foot lifts of material placed in the disposal cell. Also attached are the addenda; electronic copies will be emailed to the DOE Executive Assistant.

If you have any questions or require additional information, please contact me at 970-257-2120.

Sincerely,

Joseph D. Ritchey, PE, RG
Senior Program Manager

Encl: 2

cc: w/ enclosures:
Project File MOA 3.2 (C. Smith)

cc: w/o enclosures:
J. Peach, DOE
B. Wethington, DOE
Correspondence Control File (P. Wilson)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 11, 2016

Mr. Donald R. Metzler
Moab Federal Project Director
U.S. Department of Energy
200 Grand Avenue
Grand Junction, CO 81501

SUBJECT: REVIEW OF PROPOSED SPECIFICATION CHANGES TO REMEDIAL ACTION PLAN AND REMEDIAL ACTION INSPECTION PLAN FOR THE CRESCENT JUNCTION DISPOSAL CELL

Dear Mr. Metzler:

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of your letter dated July 25, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16224A248), in which the U.S. Department of Energy (DOE) proposed changes to residual radioactive material (RRM) and debris placement specifications for the Crescent Junction disposal cell. The proposed changes to the Moab Uranium Mill Tailings Remedial Action (UMTRA) Project Remedial Action Plan (RAP) Specification 31-00-20, "Placement and Compaction of RRM and Interim Cover," are as follows:

- Changes to Section 3.2.1 to allow an increase from 12 inches to 24 inches of loose RRM in each lift in the disposal cell. No change was requested for interim cover lifts, which will remain at 12 inches.

- Changes to Section 3.2.5 to specify a ratio of no more than 50/50 debris to RRM by volume.

Corresponding changes to the Remedial Action Inspection Plan (RAIP) were also proposed to make it consistent with the proposed language of the RAP. Specifically, DOE proposed revisions to: Section 6.4.2, RRM Placement; Section 6.4.3, Inspection and Testing; Section 6.4.4, Demolition Debris; and the Cell Construction Material Installation Summary Table. A redline/strikeout version noting the revisions to the RAP and RAIP were included as an enclosure to your July 25, 2016, submittal.

Staff reviewed the proposed changes to Specification 31-00-20 and the RAIP and determined that the changes do not affect the overall approved design (volume and area) of the Crescent Junction disposal cell. The intent of the proposed modifications is to allow for more efficient handling and compaction of the RRM and debris in the disposal cell. Verification test frequency for RRM placement remains the same as described in Section 6.4.3 of the RAIP. Based on its review, NRC staff finds the proposed changes noted in the July 25, 2016, submittal to be acceptable.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 2.390 of the NRC's "Rules of Practice for Domestic Licensing Procedures and Issuance of Orders," a copy of

this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions concerning this letter, please contact me either by telephone at (301) 415-1335 or by e-mail at kimberly.conway@nrc.gov.

Sincerely,
/RA/

Kim Conway, Project Manager
Reactor Decommissioning Branch
Division of Decommissioning, Uranium
Recovery, and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Docket No. WM-110

cc: J. Peach, DOE

ML16216A096

OFFICE	NMSS	NMSS	NMSS	NMSS	NMSS
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DATE	8/4/16	8/4/16	8/4/16	8/4/16	8/4/16

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