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Dear Mr. Lohaus:

This transmittal constitutes the Uranium Mill Tailings Remedial Action Project Office's response to your letter dated June 22, 1989 which provided comments to Revision C of the Green River, Utah Remedial Action Inspection Plan (RAIP). Enclosed are the U.S. Nuclear Regulatory Commission's (NRC's) comments followed by the U.S. Department of Energy's (DOE's) responses. With your concurrence to this submittal, Revision D to the Green River RAIP will be issued.

Should you have any questions, please contact Milt Scoutaris of my staff at FTS 846-1200.

Sincerely,

Mark L. Matthews
Acting Project Manager
Uranium Mill Tailings Project Office

Enclosure

cc w/enclosure:
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WM-68
NL041

NRC Comment 1. Statement of Policy

As per paragraph 3, this RAIP is a means by which MK-Ferguson Company will assure that EPA requirements and NRC guidelines for Testing and Inspection Plans During Construction of DOE's Remedial Actions at Inactive Uranium Mill Sites (Reference 3) are satisfied. The last paragraph states that should a conflict exist between this RAIP and the approved Design Specifications and/or Drawings, the specified requirements in the Design Documents shall take precedence. This statement should be revised to include another restriction that any deviation from the NRC guidelines (Reference 3) shall be identified and such deviation shall be adequately justified. The NRC guidance on RAIPs (Reference 3) was revised recently after evaluating the past few years experience with UMTRA projects, and DOE was consulted in the revision process before finalizing. Therefore, any deviation from this guidance, particularly in terms of materials to be tested, types of tests, test methods, and frequency of tests should be identified and adequately justified.

DOE Response 1

The last paragraph in the Statement of Policy will be removed from Revision D. Each UMTRA site is unique, while the NRC Staff Technical Position (STP) is generic for all sites. The unique RAIPs are written only after the design documents are reviewed by the NRC. The unique RAIPs are published after they have first received multiple reviews at all levels and comply with the design documents and the applicable sections of the STP.

NRC Comment 2. Section 6.1.2 Field Density Control

The statement, "In any event, any test results which would be outside of the Design Specification tolerances shall be retested, where possible", needs an explanation about how DOE intends to address situations where they decide not to retest a measurement that is outside design specification tolerances. Besides, there are statements in the design specifications (see Section 3.5.D.7 page 02200-24 RAP Vol. III, Design Specifications, January 1989) that require fill materials placed outside the specifications ranges to be reworked to meet the specifications or removed and replaced with acceptable materials to meet the specifications. The intent of the phrase "where possible" needs further explanation.

In addition Section 6.1.2 distinguishes between "test results" and "record test results," which implies that DOE does not consider some of the density and moisture content results as official records of the remedial action. Such a distinction appears inappropriate because DOE uses the test results either to verify compliance with design specifications for the remedial action or to assess the accuracy and reliability of other results used to verify compliance. Therefore, the RAIP should be revised to consider all test results as official records of the remedial action.

DOE Response 2

By reference the RAIP statement of policy includes the Quality Assurance Program Plan (QAPP) as part of the RAIP. QAPP Number 8, Revision 4 defines a non-conformance condition and further defines the actions taken when tests fail. "Information Only" Quality Control Tests are designated as such since these tests are not required by the Design Documents and therefore have no accept/reject criteria. Information tests are permanent records which are included with the QA records. Information tests provide a complete history of the performance standards obtained when working with procedural specifications (number of roller passes), or when working with preliminary performance specifications. (See responses 3, 8, and 9)

NRC Comment 3. Section 6.1.4 Field Density Control

There is no mention of any in-place field density tests on tailings and other contaminated materials. The omission seems to be intentional, as this item was included in Rev. A. and Rev. B (References 1 and 2 respectively) versions of this RAIP document. This item was included in all the previous RAIPs for other UMTRA project sites. The NRC guidance on RAIPs (Reference 3), which was concurred in by the DOE, also requires this item. The field density test requirements should be revised to include (1) testing of the tailings and other contaminated materials at a frequency of one test per 1,000 cubic yards and (2) a minimum of one test per each lift of material placed.

DOE Response 3

In-place field density tests are not specified in the Green River design specification for contaminated materials, and therefore, are not required in the RAIP. The specifications stated the equipment to be used and the number of passes to be made (procedural specifications). There is no requirement for density testing in accordance with NRC Guidelines as per the staff technical position section 3.2.3, which states: "Inspection should also verify that the compaction equipment (or equivalent), as per specifications, is being used for compacting the material and the number of roller passes meets the specification requirements." MK-Ferguson's inspection records indicate that monitoring and inspection of equipment and verification of the required number of roller passes met the requirements of the RAIP and Design Documents. In addition "Information Only" density tests were taken which proved the acceptability of the procedural specification. These "Information Only" tests are filed as permanent records.

NRC Comment 4. Section 6.1.4.1 Field Density Control

The frequency of in-place moisture content tests is one per 2,000 cyd of contaminated materials placed. As per the NRC guidance on RAIPs (Reference 3), the frequency of in-place moisture content tests should be same as that for in-place density tests, which should be one test per 1,000 cyd of contaminated materials placed. The current provision of one moisture content test per 2,000 cyd of contaminated materials placed should be changed to one test per 1,000 cyd of contaminated materials placed.

DOE Response 4

The STP Guidelines do not provide a testing frequency for performing moisture tests (only) as referenced in RAIP Section 6.1.4.1. The NRC references a moisture/density test frequency of one test per 1,000 cy of contaminated materials placed. The NRC's reference is out of context, since the referenced test frequency is delineated under the heading, Compaction Evaluation Procedure, in Section 3.2.3 of their STP Guidelines. There is no specified frequency for performing tests to merely verify moisture content of soils within the NRC's STP Guidelines, the guidelines specify moisture/density tests to evaluate compaction.

NRC Comment 5. Section 6.1.5.2

The statement that all contaminated materials shall be placed at a moisture content of less than 3 percent below the optimum moisture content limitations agreed-to by the DOE (Reference 4). The intent of the design is to place the contaminated materials of moisture contents that are as close as possible to their steady-state moisture condition. The DOE has committed to place the tailings materials at an average volumetric moisture content less than or equal to 10.6 percent. Please note that the above moisture contents are volumetric, and the RAIP should highlight the difference between this and the moisture content by weight that is normally used by geotechnical engineers. This section of the RAIP should be revised to reflect the above moisture content requirements.

DOE Response 5

The approved design documents required contaminated materials to be placed at a moisture content less than 3 percent below the optimum moisture content by weight. Actual placement was considerably below that requirement and approached the agreed to maximum 5 percent moisture by volumetric measurement. Moisture was added above the 5 percent level only when it was absolutely necessary to suppress hazardous dust to protect the health and safety of the workers. This condition was communicated to and acknowledged by the NRC on June 13, 1989. It was then decided the final RAP should address the impact of the as-built moisture condition on the compliance with the EPA ground water protection standards. The Green River RAIP does address the subject of volumetric moisture content for tailings, windblown and vicinity property contaminated materials in Section 6.4.6. The RAIP in its present revision clearly delineates percent moisture content by weight requirements (RAIP Section 6.1.5.2) and percent moisture content by volume of all contaminated materials target figures (RAIP Section 6.4.6). Presently the placement was completed in accordance with Revision C.

NRC Comment 6. Section 6.1.7

The RAIP requires one one-point Proctor test at a frequency of one for each five field density tests for radon barrier material and one for each ten field density tests on all other materials. The NRC guidance document (Reference 3) requires one-point proctor test at a frequency of one for every five field density tests for all materials, and this should be followed in the RAIP.

DOE Response 6

Revision D of the RAIP will be submitted requiring a one-point proctor test for each five in-place field density test for each type material.

NRC Comment 7. Section 6.3.1 Erosion Protection Materials Testing

This section of the RAIP indicates that different durability tests will be conducted on Type A and Type B riprap. Additionally, a different number of tests will be conducted on each type. It is not clear why different types and number of tests will be conducted. Since the riprap will be produced from the same source, the selection of such tests seems unwarranted and unnecessarily complicated. We recommend that the same test proposed for the Type A riprap are acceptable. Alternately, additional justification should be provided for the selection of different tests for the Type B rock.

DOE Response 7

The ASTM testing requirements will be applied to Type A riprap, Type B riprap, and bedding material. Only Type B riprap will be tested for the International Society of Rock Mechanics (ISRM) requirements since Type A riprap and bedding materials are physically too small to be tested.

NRC Comment 8. Section 6.4.3.1 Embankment Fill and Backfill

This section prescribes the procedures and the equipment to be used in compacting the contaminated materials. Normally the density to be achieved by compaction is specified and not the method of compaction without any provision to verify the in-place or compacted density. The trial compaction proposed and carried out by the DOE was to develop the compaction procedures that would enable compacting at such dry or low moisture conditions and to demonstrate that the density assumed in the design, 90 percent Proctor density, could be achieved. It was not intended to eliminate the density requirement from the design specifications or from the RAIP. The placement density requirement for all contaminated materials should be included in the specifications and RAIP.

DOE Response 8

Trial compactions of contaminated materials were performed in accordance with Design Specification No. 2200 Section 3.5.A.5 and RAIP Section 6.4.5. Trial compaction test records, as well as in-process test records during contaminated material placement indicate the low moisture content and high percent of maximum dry density achieved during Remedial Action. The deletion of the 1,000 cy in-place density testing was approved by the NRC in their review of the Design Documents. If procedural specifications (number of roller passes) produce a product below a desired (not specified) level, then the procedural specification is modified restoring the performance level. There is a defacto rejection of the work when the procedural specification is modified (See responses 2, 3, 8, & 9).

NRC Comment 9. Section 6.4.5 Contaminated Materials - Trial Compaction

This section states that after the trial compaction of the contaminated materials is completed, further testing for in-place moisture and density during the construction will be at a frequency of one test per each 6,000 cyd of contaminated materials placed. It is stated that these test results and records are for information only and are not subject to acceptance or rejection. As stated previously in comment 2, all test results should be considered as official records of the remedial action. In addition given the importance of maintaining moisture contents as low as reasonably achievable, the records should be used for acceptance or rejection. Neither the proposed frequency of testing (one test per 6,000 cyd of materials placed) nor the assertion that the results would not be considered for acceptance or rejection of compacted materials are in compliance with the NRC guidance on RAIPs (Reference 3). As stated in above Comments No. 3 and 4, all the contaminated materials placed in the disposal cell should be tested for both in-place moisture and density at a frequency of one test per 1,000 cyd of materials placed, and the results should be used to evaluate compliance with the design assumptions and design specifications.

DOE Response 9

The moisture/density records were purposely required to be designated as information only tests based on the fact that the procedural specification has no density criteria specified. It is not consistent to require compaction of a material by a specified number of roller passes with specified equipment, and then perform density tests that are not required by design which also have no accept/reject criteria. The QA/QC Organization verifies that procedural requirements are complied with and implemented in accordance with approved Design Documents and Procedures, which provide adequate accept/reject criteria.

The Design Documents required one moisture test for each 2,000 cubic yards of contaminated material placed, as did the RAIP requirements. The Design Documents required the moisture content of contaminated material to be less than 3 percent below optimum moisture content during placement, as did the RAIP requirements. Considering there were 254 moisture tests (excluding moisture/density tests) performed, and approximately 339,377 cubic yards of material placed, this provides a test frequency of one moisture test for each 1,336 cubic yards of contaminated materials placed. From the 254 moisture tests, the lowest moisture content was 1.1%, the highest moisture content was 9.2%, with an average of 5.1%. The average deviation from the optimum moisture content was minus 7.3%. (A weighted average would be lower still since more frequent testing was performed when the moisture ran higher than 5%.)

The RAIP required one in-place moisture/density test for each 6,000 cubic yards of contaminated material placed. The Design Documents do not require moisture/density tests. Considering there were 79 moisture/density tests performed, and approximately 339,377 cubic yards of material placed, this provides a test frequency of one moisture/density test for each 4,296 cubic yards of contaminated materials placed. The average percent of maximum density was 95.2%, with a high of 100.0%, and a low of 90.0%. The average moisture content of the moisture/density tests was 5.2%, with a high of 7.7%, and a low of 1.9%. The average deviation from the optimum moisture content was minus 7.4%.

Considering there were a total of 333 moisture tests (including moisture/density tests) performed on approximately 339,377 cubic yards of contaminated materials placed, this provides a frequency of one moisture test for each 1,019 cubic yards of material placed. The average moisture content during placement was 5.1%, with an average deviation from the optimum moisture content of minus 7.3%.

In this case, the NRC STP Guidelines are not applicable to testing requirements for contaminated materials, particularly since the NRC did concur with the Design Documents. There is sufficient data to evaluate and conclude that Design Document moisture requirements have been complied with. There is also sufficient data to evaluate and conclude that the contaminated material was compacted in excess of 90% of maximum dry density, even though this was not a Design Document requirement. For a definition of Information Test see DOE Response 2.

NRC Comment 10. Section 6.4.6

This section provides the maximum volumetric moisture content for which the tailings, windblown and other vicinity property materials can be placed in the disposal cell. However, the RAIP indicates that exceptions to these values are permitted because of field conditions. Also, the RAIP states that "Records required by this section are considered as providing information only, and are not subject to acceptance or rejection." This is contrary to NRC guidance on RAIPs, procedures followed in previously approved RAIPs, and completed UMTRA projects. Moisture and density testing requirements for placing contaminated materials should be as per NRC guidance (Reference 3) and as suggested in above No. 3, 4, 5, and 9.

DOE Response 10

Refer to DOE Responses 2 and 5.

NRC Comment 11. Section 6.4.10

RAIP Section 6.4.10 provides for application of protective erosion control measures on exposed surfaces during shutdown periods. The RAIP, however, does not describe the composition and characteristics of the protective measures or reference appropriate specifications. Use of surfactants or other chemical additives applied on the surface of the tailings may be effective in temporarily mitigating erosion. However, their addition may also adversely affect the performance of the disposal unit by adding constituents to the contaminated material that may be hazardous constituents themselves or may release complex hazardous constituents and increase their mobility. The RAIP should be revised to describe the types of interim protective measures that may be applied at the site or reference appropriate specifications for such applications. In addition, the RAIP or a supporting document should demonstrate that such measures do not adversely affect the performance of the disposal unit in terms of groundwater protection if chemical additives, surfactants, or binding agents are applied as protective measures.

DOE Response 11

The Green River RAIP Section 5.11 references the Green River design specifications. By referencing the design documents in Section 5.11 of the RAIP, there is traceability to Section 3.1 of Design Specification No. 2200. This section of the specification provides adequate protective erosion control measures. It should be noted that the RAIP is not a design document, but is used as a means of verifying that remedial actions are performed in accordance with design documents. The NRC STP does not address the application of protective erosion control measures on exposed surfaces during shut down periods.

NRC General Comment

Agreement no. 4 of the April 6, 1989 NRC/DOE agreement letter (Reference 4) states that DOE will place and maintain contaminated materials at specific steady state moisture contents. Density verification of compacted contaminated materials in the disposal cell are normally part of the RAIP and the NRC/DOE agreement letter does not waive this requirement. If the DOE's interpretation of the agreement is not to have any verification of as-compacted density (as reflected in this RAIP), then it is not acceptable to NRC. All the contaminated materials to be placed in the disposal cell should be compacted to a minimum dry density of 90 percent Proctor density (density assumed in the design to establish stability of the disposal cell) and to less than or equal to the volumetric moisture contents mentioned in Agreement 4 of Reference 4.

DOE General Response

Placement of contaminated materials at Green River, Utah began April 5, 1989, and was completed May 25, 1989. The NRC conducted an on-site construction review/surveillance June 13, 1989, at the Green River site. NRC representatives on site June 13, 1989, documented the following statements: "In general, remedial action at the Green River site appears to be progressing in an excellent manner, based upon site appearance, exceptional records management, record results, and site personnel," and, "records indicate that the average moisture content (by volume) of the in-place tailings was approximately 7%. This represents an average 2% above the 5% agreed to at the 4/5/89 DOE/NRC meeting. The final RAP should address the impact of this on compliance with the EPA groundwater standards."