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# CONTROL MEASURES EVALUATION - SOILS/RUBBLE PILE NORTH OF THE PLANT 1 PAD

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## CONTROL MEASURES EVALUATION - SOILS/RUBBLE PILE NORTH OF THE PLANT 1 PAD

The purpose of this document is to provide an evaluation of potential release prevention control measures with regard to their longevity, cost, and applicability for use on the soils/rubble pile north of the Plant 1 Pad. A description of the soils/rubble pile and its purpose is given as part of this evaluation.

### Current Situation

The soils/rubble pile consists of approximately 22,000 cubic yards of material, located near the northwest corner of the Plant 1 storage pad. The soils/rubble pile was intended to be a construction staging area for soil containing less than 150 ppm of U as designated in FMPC Site Policy and Procedures Manual #FMPC-720.

In its current situation, the soils/rubble pile contains contaminated soil and contaminated construction rubble, including large slabs and blocks of concrete; piping; and rock. The soils/rubble pile currently occupies approximately 45,000 square feet. Field investigations of the pile have revealed uranium concentrations ranging from 11 to 941 ppm (7 to 636 pCi/g). A detailed description of the soils/rubble pile can be found in the Removal Site Evaluation (RSE) for the Stockpile for Excavation/Demolition Soils and Rubble - North of Plant 1 Pad. The materials in the pile are stored as loose uncompacted materials with no vegetative or manmade cover.

### Alternatives for Release Control

Several alternatives have been identified as possible candidates for consideration as a method of controlling potential releases from the soils/rubble pile. These alternatives are:

1. No Action
2. Covering the pile with vegetation
3. Surface stabilization with a material such as the Polymeric Barrier System developed by the University of Cincinnati
4. Box and remove exposed construction rubble, followed by covering of the remainder of the pile with vegetation
5. Box and remove exposed construction rubble, followed by installation of the Polymeric Barrier System
6. Physical removal of the pile; box all material and ship it offsite.

### Description of Alternatives

All alternatives except for the No Action alternative will include the installation of straw bales and/or a silt fence around the perimeter of the soils/rubble pile to reduce the potential for contaminated solids to be carried with runoff reaching adjacent land.

1. No Action

Under this alternative, the pile would be allowed to remain in its present state with no alterations. The RSE for the Stockpile for Excavation/Demolition Soils and Rubble - North of Plant 1 Pad makes this statement regarding the current situation:

> "The potential threat posed by the above background levels of uranium found in the soils/rubble piles north of the Plant 1 pad is the potential for exposure as a result of suspension of soil particles in the atmosphere and the potential migration of the contaminants through wind and water erosion. The concentrations of uranium present in the soils in the stockpile are low level, with an average concentration of 155 ppm in the east side of the stockpile, and an average concentration of 58 ppm in the west side of the stockpile. However, these concentrations may be in excess of possible final remediation soil cleanup standards for the FMPC. ...The migration of these stockpiled materials to previously clean areas could result in more extensive soils cleanup as part of final remediation actions."

Uncompacted soil is a large component of the soils/rubble pile; this material can be expected to be easily eroded by rain. Some of the drainage from the soils/rubble pile area is toward the south across undeveloped land toward the Plant 1 Pad. If the soils/rubble pile is left in its current condition for an extended period of time, contamination of the land between the pile and the Plant 1 Pad can be expected.

2. Covering the Pile With Vegetation

The surface of the soils/rubble pile is comprised of areas of loose, rocky soil and areas of concrete slabs and other construction rubble. Neither of these provides suitable soil for growth of an erosion-preventing vegetation cover. In addition, the surface of the soils/rubble pile is irregular, with exposed portions of concrete slabs at various angles. To provide a vegetation cover, the soils/rubble pile must be graded, and the rubble laid flush with the resulting surface. The soils/rubble pile would then be covered with vegetation.

Implementation of this alternative will involve redistribution of the pile's mass which raises the possibility of increased fugitive dust emissions to the air during grading operations. In addition, growth of a vegetation cover will not be immediate, and until a well-developed root system has been established by such vegetation, the soils/rubble pile will still be subject to erosion. Straw and commercially available geotextile mesh will be used to minimize dust emissions and erosion of developing vegetative cover.

3. Surface Stabilization With a Material Such As the Polymeric Barrier System Developed By the University of Cincinnati

The Polymeric Barrier System (PBS) appears promising as an interim method for covering open storage piles; it is, however, biodegradable over time. Proper

application of this material for controlling runoff is on the order of one pound of material per square foot of exposed surface area. This would require approximately 50,000 pounds of coating, at a cost of $50,000, to cover the approximately 50,000 square feet of the soils/rubble pile. The biodegradability of the coating will necessitate routine re-applications. It is not known at present if it is possible to prepare this material in the quantities needed to accomplish this project.

4. Box and Remove Exposed Construction Rubble, Followed By Covering of the Remainder of the Pile With Vegetation

This alternative is similar to Alternative 2, except that the exposed construction rubble (e.g. concrete, piping, etc.) will be boxed and removed from the soils/rubble pile for offsite shipment prior to installation of the vegetation cover. This alternative can be expected to reduce the volume and surface area of the soils/rubble pile by approximately 25%, based upon observation of the pile. This can be expected to reduce the amount of vegetation cover required by a similar amount. It has the disadvantage of requiring the boxing and shipment of an estimated 5500 cubic yards of material, adding this appreciable cost to that of Alternative 2.

Implementation of this alternative will involve redistribution of the pile's mass which raises the possibility of increased fugitive dust emissions to the air during grading operations. In addition, growth of a vegetation cover will not be immediate, and until a well-developed root system has been established by such vegetation, the soils/rubble pile will still be subject to erosion.

5. Box and Remove Exposed Construction Rubble, Followed By Installation of the Polymeric Barrier System

This alternative is similar to Alternative 3, except that the construction rubble will be boxed and removed from the soils/rubble pile for offsite shipment prior to installation of the Polymeric Barrier System. This alternative can be expected to reduce the volume and surface area of the soils/rubble pile by approximately 25%, based upon observation of the pile. This can be expected to reduce the amount of PBS material required by a similar amount. It has the disadvantage of requiring the boxing and shipping of an estimated 5500 cubic yards of material, adding this appreciable cost to that of Alternative 3.

Implementation of this alternative will involve redistribution of the pile's mass which raises the possibility of increased fugitive dust emissions to the air during grading operations.

6. Physical Removal of the Pile; Box All Material and Off-Site Disposal

This alternative will eliminate completely the potential for the spread of contamination from the soils/rubble pile. This alternative is contingent upon finding a location for disposal of the approximately 22,000 cubic yards of

material found in the pile. Some demolition work will be needed to reduce the size of some concrete slabs, pipes, etc., to a size suitable for packaging. Completion of this alternative should eliminate the need for any further action to be taken on the soils/rubble pile site.

Implementation of this alternative will involve redistribution of the pile's mass which raises the possibility of increased fugitive dust emissions to the air during grading operations.

Another alternative, that of covering the pile with a man-made cover, was rejected from consideration in this evaluation. A man-made cover is subject to physical deterioration from sunlight, low temperatures, and wind action. Such a cover, while certainly effective in preventing wind and water erosion, would need to be replaced frequently, with the deteriorated cover being disposed of as contaminated waste.

Evaluation of Alternatives

A matrix has been developed to evaluate the alternatives based upon the criteria of Effectiveness, Implementability, and Cost. Each criterion has been further subdivided as follows:

> Effectiveness - Public Health; Reduction in Volume; Short Term Reduction in Mobility; Long Term Reduction in Mobility; Long Term Reduction of Liability; Integration with Future Projects; and Consistency with Final Remedial Action.
>
> Implementability - Technical Feasibility; Administrative Feasibility; Protection of Workers; Availability of Materials; and Timeliness.
>
> Cost - Construction including Demolition, Earthwork, Sample/Analysis, and Maintenance.

Ranking is on a scale of 0 (Not Acceptable) to 3 (Most Desirable). The matrix is presented in Attachment II.

Clarification of Evaluation Criteria and Ranking Matrix

The following is a summary of the factors which were considered when preparing the evaluation matrix included in Attachment II.

1. The public health criteria considered is the probability of public exposure to contamination during proposed work activities of the removal action alternatives. Potential public exposures could occur from fugitive dust generation during earthwork activities and transportation accidents during off site shipment of soils and rubble. All of the removal action alternatives evaluated with the exception of the no action alternative would require some degree of soils and rubble displacement with earthmoving equipment. However, the amount of disturbance of the existing pile is expected to be less with Alternatives 2 and 3 than Alternatives 4,

5, and 6. The potential for public exposure to contamination via transportation accidents exists for Alternatives 4, 5, and 6. The potential for public exposure to contamination from the no action Alternative 1 is also considered under this criteria.

2. The reduction in volume criteria is the ability of the removal action alternative to reduce the amount of contaminated materials at the FMPC. The amount of contaminated material at the FMPC would remain unchanged for Alternatives 1, 2, and 3. Alternatives 4 and 5 would reduce the amount of contaminated materials at the FMPC, while Alternative 6 would remove all of the contaminated materials from the FMPC. Newly generated materials will require similar actions.

3. The short term reduction in mobility criteria is the ability of the removal action alternative to reduce the mobility of the contamination via weathering immediately after implementation. This criteria is evaluated since a vegetative cover as specified in Alternatives 2 and 4 may take several years to develop an effective root system to deter weathering of the pile.

4. The long term reduction in mobility criteria is the same as the short term criteria except that the effectiveness of weathering control is evaluated over the long term. It is assumed the Alternatives 2 and 4 proposing vegetative covers will provide the same degree of weathering control as the Polymeric Barrier Systems proposed in Alternatives 3 and 5 over a longer evaluation period.

5. The long term reduction of liability is the ability of the removal action alternative to reduce the potential for future FMPC/DOE liability associated with the soils and rubble pile. This criteria is evaluated since off-site shipment of contaminated materials to other disposal locations as proposed in Alternatives 4, 5, and 6 may involve future liability to the FMPC/DOE. It is assumed that the materials left at the FMPC from the soils and rubble pile will be treated as required by the final remedial action which will reduce the future liability associated with these materials.

6. The integration with future projects criteria is the ability of the removal action alternative to mesh with future soils/rubble producing projects at the FMPC. This criteria is evaluated since future generation of soils at the FMPC via construction or restoration activities is anticipated. It is believed that the vegetative cover described in Alternatives 2 and 4 would allow new additions of soils to the pile more easily than the other alternatives.

7. The consistency with final remedial action is the compatibility of the removal action alternative with potential final remedial actions for Operable Unit 3. It is believed that Alternatives 3 and 5 involving polymeric barrier systems would be more difficult to integrate with the final remedial actions proposed for Operable Unit 3.

8. The technical feasibility criteria is the ability of the removal action alternative to be installed and provide effective release control. This criteria is evaluated since Alternatives 1, 2, 4, and 6 are considered more "proven technologies".

9. The administrative feasibility criteria is the ability of the removal action alternative to be documented, controlled, and obtain administrative acceptance. This criteria is evaluated since it is believed that Alternative 1 (no action alternative) would not be acceptable to the participants involved with the implementation of this removal action.

10. The protection of workers criteria is the ability of the removal action alternative to ensure the safety of the workers responsible for installing or maintaining the selected alternative in the field. This criteria is evaluated since Alternatives 2, 3, 4, 5, and 6 will require earthmoving activities which will generate fugitive dust during the installation of the removal action. Secondly, the polymeric barrier system (PBS) proposed in Alternatives 3 and 5 has not been subjected to any sort of EPA evaluation as to toxilogical properties, particularly those concerning potential hazards to personnel installing the PBS.

11. The availability of materials criteria is the commercial availability of the materials and equipment to perform the removal action alternative. This criteria is evaluated since Alternatives 3 and 5 propose large quantities of PBS material which may be difficult to obtain.

12. The timeliness criteria is the ability of the removal action alternative to be completed in reasonable amount of time. This criteria is included since it is believed that boxing along with off-site shipment of materials (Alternatives 4, 5, and 6) will prolong the required time to complete the removal action. It is also believed that the installation of a PBS system (Alternative 3 and 5) will increase the length of time required to complete the removal action.

13. The initial cost criteria is the evaluation of the cost to implement the removal action alternative. The costs evaluated include demolition, earthwork, labor, materials, and sampling/analysis. This criteria is evaluated since there will be different costs associated with the proposed work for each alternative.

14. The operational and maintenance cost criteria is the cost to operate and maintain the removal action alternative at the designed environmental protection levels. These costs evaluated were for reapplication/repair of PBS material and reseeding/mowing costs for vegetative covers.

Recommended Alternative

It is recommended that Alternative 4, to box and remove exposed construction rubble, followed by covering the remainder of the pile with vegetation, be adopted. This alternative involves no technical uncertainties; it should

mitigate the potential of fugitive dust emissions to the air; and should also mitigate the potential for waterborne contamination of adjacent land. It should not be prohibitive in cost, and it can be accomplished rapidly. This alternative will also eliminate the irregularly shaped rubble from the soils/rubble pile and will result in a smaller pile needing to be covered.

Should the soils/rubble pile be needed for further use as a construction staging area, the new material should be added to the face of the covered pile. This new material should itself be covered, in a manner similar to the entire pile, upon its reaching a thickness of 5-10 feet. The soils/rubble pile should not be used as a staging area for materials such as concrete slabs and blocks or piping.

Technical Uncertainties

The technical uncertainties in this assessment concern the properties of the Polymeric Barrier System (PBS). The PBS has not been subjected to any sort of EPA -acceptable evaluation as to toxicological properties, particularly those concerning potential hazards to personnel installing the PBS. The PBS material is believed to be biodegradable; there is no estimate available as to the longevity of this substance in field use. There is also some uncertainty as to the availability of this substance in the quantities necessary (up to 50,000 pounds) for implementation of Alternative 3.