TRANSMITTAL OF RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE ENGINEERING TECHNOLOGY REPORTS

09/27/96

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DOE-FN EPAS
16
RESPONSES

Department of Energy
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SEP 27 1996

DOE-1404-96

Mr. James A. Saric, Remedial Project Director
U.S. Environmental Protection Agency
Region V - SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE ENGINEERING TECHNOLOGY REPORTS

This letter transmits the responses to Ohio Environmental Protection Agency (OEPA) comments on the Engineering Technology Reports. A commitment was made in the Operable Unit 5 Record of Decision to evaluate emerging technologies for the treatment of soils and sediment before placement into the on-site disposal facility. DOE has been working with OEPA to understand their concerns regarding these Reports and to reach agreement on their comments. Through these discussions, an agreement has been made to perform a Value Engineering Study on concrete crushing. The U.S. Environmental Protection Agency approved the Engineering Technology Reports without comment.

Please contact Rod Warner at (513) 648-3156 if there are any questions regarding this transmittal.

Sincerely,

Johnny W. Reising
Fernald Remedial Action
Project Manager

FN:Warner

Enclosure: As Stated

cc w/enc:

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RESPONSE TO OEPA COMMENTS ON TECHNOLOGY REPORTS FOR THE ON-SITE DISPOSAL FACILITY

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: I Pg.#: 2 Line#: Bullet "c" Code: c
Original Comment# 1

Comment: Are estimates available for the volumes of moisture that will result from the extrusion process? The volume of wastewater to be treated could be reduced by blending wet soils with dry soils. Has the potential cost savings of this blending been factored into the cost analysis?

Response: An estimate of water generation rates was not made for the report. However, assuming an average in situ moisture content of 3% wetter than required for the brickmaker, the volume of water generated in the extrusion of 1 million cubic yards of soil could be about 12,000,000 gallons. The DOE agrees that blending of soils with different moisture contents will reduce the volume of wastewater treated. However, the increase in time, manpower, and equipment to accomplish this task on the surface appears to out weigh the benefit. Excavated material is moisture conditioned at source prior to delivery to OSDF or Brickmaker. Standard moisture-conditioning techniques (i.e., water spay, discing, etc.) are anticipated to be adequate. The volumes of water in site soils varies from season to season in the remediation areas supplying the soils, but are typically near or fully saturated (see Table G-2 of the Geotechnical Investigation Report, On-Site Disposal Facility, Operable Unit 2. This cost savings from soil blending has not been factored into the cost evaluation. However, the additional costs to condition the soil are also excluded from cost analysis.

Action: Provide Cost Benefit Analysis of blending soils versus wastewater treatment in Fiscal Year 97.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: III Pg.#: 3 Line#: Bullet 2 Code: c
Original Comment# 2

Comment: The Ohio EPA agrees that cost must be included in the analysis of emerging technologies. However, it is our concern that costs considered are being limited to direct costs and benefits without taking into account total life cycle costs. The "Draft Decision Methodology for Fernald Scrap Metal Disposition Alternatives" discusses additional performance measures that take into consideration socioeconomic and environmental, safety, and health issues. Also included in these considerations is stakeholder concerns. The cost analysis doesn't include a way to factor into the cost analysis the benefits of an incremental shortening of the length of the OSDF or the benefits of a small but quantifiable reduction in permeability of bricks versus compacted soils material. This issue is exacerbated by the artificially low costs of disposal in the OSDF. A combination of these factors would seem to preclude any use of new technologies that does not cause a reduction in the direct cost.

Response: OEPA has raised several points in this comment. They are: cost concerns, methodology concerns, and engineering concerns. The cost comparison provided in the report accounts for total life cycle costs, including the shortening of the On-Site Disposal Facility. Cost estimates are updated (see Proposal for Accelerated Completion of Remedial Activities, Fernald Environmental Management Project, March, 1995) as further refined by current engineering estimates. Minor changes are expected in the volumes and costs of OSDF construction but no substantial added costs are expected.

With regard to permeability, it is only a significant factor for the clay liner and the cap materials. These two elements act as engineered barriers to leachate. As such, these elements require low permeabilities. Lower permeabilities are generated by compacting the clay liner and cap soils at wetter than optimum conditions. The impacted materials need to provide structural stability for the cells. Therefore, a different criteria for placement is necessary. Also within the cell, the goal is to minimize Leachate contact time with the impacted material. This will reduce the potential for generating contaminated leachate.
On the subject of methodology and impacts on new technology, a full life cycle cost for evaluation brickmaker technology was made. Standard financial tools were used to evaluate the brickmaker technology versus on-site disposal. The cost for disposal in the OSDF were based on the engineering estimate to construct and close the OSDF.

The brickmaker is an excellent tool for preparing small volumes of contaminated soil for shipment in strong tight boxes since extensive double handling of waste is already required for offsite shipments. It is inherently inefficient to add extra handling steps for large bulk volumes of soils that are to be excavated, hauled, placed, and compacted the OSDF in one continuous operation. Bulk handling of soils can be done for a few dollars a ton compared to labor and administratively intensive handling of discrete bricks, not to mention the additional costs required to operate the brickmaker and place the bricks.

Action: None.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: IV Pg.#: 3 Line#: Performance Code: c
Original Comment# 3

Comment: Was an evaluation performed on the use of extruded soil pellets to infill around debris? This would add 900,000 cubic yards to the total amount of soil that could be extruded and nearly double the amount of soil that could be extruded.

Response: An evaluation was not conducted for extrusion of soil pellets for placement around debris. However, the extruded pellets would still require compaction as would loose soil placed around debris. Pellets compacted to 140 lbs./cu. ft. would still only have a bulk density of approximately 90 lbs./cu. ft. The required compactive effort would be approximately the same for the pellets as for loose soil, since bonding of the pellets would require the same compactive effort in the

OSDF as that originally used in the brickmaker. The use of pellets rather than bricks would provide more throughput from the extruder but would not reduce the amount of field compaction required for the infilling soil in the OSDF.

Action: None.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: IV Pg.#: 4 Line#: 2nd paragraph Code: c
Original Comment# 4

Comment: How representative of the site soils was the sample used to for the compaction analysis? Typical soils at Mound are extruded to a density of between 118 and 126 pounds per cubic foot which is significantly higher than the 112 pounds per cubic foot quoted in this study. Comparing the density of the extruded Mound soils to the 97 lbs/cubic foot density estimated for compacted materials in the OSDF results in a 27% increase in density. This is twice the benefit quoted in this report. If a majority of Fernald soils could in fact be extruded to the higher density, the benefits of the brickmaker technology would be greater than the current estimates.

In a previous comment about the potential use of extruded soil pellets to fill the voids between debris, the Ohio EPA identified an additional 900,000 cubic yards of soil that could potentially be extruded through the brickmaker. Adding the potential benefits of both these improvements (doubling the volume of extruded soil and doubling the density increase of extruded soil) gives a factor of four increase in the potential benefit. The resulting decrease in the length of the OSDF could be as much as 800 feet. It is Ohio EPAs contention that this is a significant improvement.

Response: The densities reported at Mound are believed to be wet densities. A 112 pcf dry density with a moisture content of 17 percent gives a wet density of 131 pcf. This is above the range of 118 to 126 pounds per cubic foot reported at Mound. Therefore, the benefit quoted is not understated and the perceived additional benefit is not achievable. The sample used for compaction analysis is a typical glacial till from the upper soil stratum at FEMP (see Table G-7 of the Geotechnical Investigation Report, On-Site Disposal Facility). Standard compaction methods can be employed to obtain higher dry densities in the range of 126 lb/cu. ft. (i.e., modified Proctor criteria could be used). However, this benefit doesn't warrant the extensive time, effort, and additional expense. The length of the OSDF could be reduced several hundred feet with intensive compaction effort, but would not be cost effective.

Action: None.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: Performance Pg.#: 4 Line#: 4th paragraph Code: c
Original Comment# 5

Comment: The text states that the brickmaker process will decrease the permeability of the soil. What is the estimated brickmaker compacted permeability? Please provide a more detailed discussion/analysis relating the advantages of decreased permeability as it relates to the performance over time of the OSDF.
Would the brickmaker technology provide lower in-place water content? How would this affect the development of leachate within the OSDF? Would lowering the volume of leachate provide a significant advantage?

Response: The permeability of compacted glacial till bricks is anticipated to be in the range of 1x10-8 to 1x10-5 cm./sec. , depending on material type (CL-SM). The permeability of compacted soils in the OSDF is dependent upon soil gradation, plasticity, moisture, and density achieved during compaction. The permeability of the emplaced impacted soils is a function of percent saturation during the compaction process and the amount of kneading during compaction. Both controlled moisture and kneading effort can be achieved with either roller compacted soils or extruded bricks.
Achieving low permeability during compaction requires a soil wet of optimum moisture content which would increase the in-place water content. Water used in compaction of the impacted soils would tend to stay tied up in the soil matrix.

The OSDF is a containment landfill designed to isolate the waste material from the groundwater environment. It is not designed to be a natural attenuation landfill where the leachate is expected to percolate through the waste mass and surrounding soil allowing the natural soils to adsorb the contaminants. Results from HELP Model calculations, which formulate the basis for cap design, are available in the OU5 Feasibility Study. A small reduction in the permeability of the waste mass would not significantly improve the performance of the OSDF. Since the greatest amount of leachate comes from rain onto the open disposal facility, the water used in compaction has minimal effect on leachate generation volumes.

A disposal facility constructed of stacked bricks would have areas of very high permeability between the bricks. Also, the structural stability of stacked bricks would be extremely low under seismic loading, compared to a single mass of compacted bulk material.

Action: None.

Geochemical Barrier Report

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: V Pg.#: 12 Line#: Bullet 2 Code: M
Original Comment# 6

Comment: DOE's assertion to "closely monitor barrier development efforts through interaction with EPA RTDF and DOE/OTD" is unacceptable to Ohio EPA. It was and remains our understanding that DOE would undertake pro-active technology development activities. The quoted phrase implies that DOE's efforts will be little more than literature surveys.

Response: DOE is committed to seeking and applying new technologies to site remediation as they become available and are safer, better, faster, and cheaper. The primary mission of the DOE-FN is safe remediation of the FEMP while addressing stakeholder concerns.

The FEMP will continue interacting with the federal and private R&D community, to: a) persuade and encourage resolution of its unique problems, b) provide contaminated soils and groundwater for developmental work, c) leverage funds and resources between agencies, d) provide necessary input to experimental design, cost, and performance criteria for useable technologies, and e) request data from independent agencies. Relationships are well established on a number of innovative technologies (e.g., real-time uranium detection in soil and water, electrokinetics, phosphate stabilization) with DOE researchers at Ames, Argonne, Sandia, Grand Junction and Oak Ridge; each is partnered with private industry capable of commercializing innovative technologies. Relationships with EPA/RREL vendors, universities and the private sector are generally limited to those who have access to NRC labs and private funding to conduct independent research.

Action: Discuss a method of keeping OEPA statused as to developments.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: I Pg.#: 2 Line#: Bullet b Code: c
Original Comment# 7

Comment: The replacement of pea gravel with phosphate rock in the leachate collect system raises several questions relating to the long-term ability of the LCS to operate. What assessments have been performed on the relative molar volumes of the phosphate rock before reaction with leachate versus the molar volume after the reaction with the leachate? Will the phosphate rock swell and restrict the drainage? What is known about the load-bearing capacity of the reaction products? Will they be able to support the weight of the OSDF and the contents?

Response: The issues stated in this comment are only several of the many unknowns further identified on Pages 10 and 11 of the Geochemical Barrier Report. We

are working with Ohio State University to determine the fundamental chemical characteristics of phosphate rock which control sorption of uranium from solution, and to examine the resulting bulk permeabilities. If shown to be an effective extraction medium, additional work may be done to evaluate physical characteristics such as compressive strength, long-term performance capability and cost justifications. The evaluations conducted to date have not addressed long term performance, and the potential for leachate collection system clogging remains a serious concern.

Action: Discuss a method of keeping OEPA statused as to developments.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: II Pg.#: 2 Line#: Code: c
Original Comment# 8

Comment: A summary table of the technology review would be helpful in conveying the progress of each of the laboratories and the relevant studies, including pertinent information such as different media and chemicals being tested, and the experimental conditions under which the experiments are being conducted. The text in this section should also include a discussion of the factors that would affect the feasibility and in-situ practicability of geochemical barrier technology at FEMP.

Response: The intent of this and its companion reports is to evaluate the status of emerging technologies being investigated by the R&D community relative to actual field implementation in remediation operations. Brief summaries, including tables of the most promising candidate materials, costs and researching agencies, are included in the report (see Page 11). No emerging technologies were identified which can be implemented now. We will keep in contact with OEPA and DOE EM-50 Office of Science and Technology to closely monitor and evaluate the progress made at each of the laboratories to examine the practicability of geochemical barriers at the FEMP.

Action: DOE will report on a quarterly basis any developments in this area.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: II Pg.#: 2 Line#: Code: C
Original Comment# 9

Comment: The technology review section should include a discussion of the actual physicochemical processes (e.g., theoretical molecular interaction) involved in soil stabilization processes. This discussion would be aimed at answering the question: How does this technology work?

Response: The engineering report describes some basics of our current understanding, but not enough research has been done to date to provide a complete understanding the actual physicochemical processes involved in soil

the actual physicochemical processes involved in soil stabilization. As new research results become available we will forward this information to you.

Action: Track on-going research and forward to OEPA.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: Geochemical Barrier Pg.#: 3 Line#: Bullet 1 Code: C
Original Comment# 10

Comment: The explanation provided for the removal of uranium from groundwater in the ESL laboratory tests is not clear. Based on the materials used and the observations noted, it appears that the $FeSO_4$ and $Ca(OH)_2$ are probably dissolving because of their high solubilities. Dissolution of $FeSO_4$ would initially drive the Eh lower. As the pH increased due to dissolution of $Ca(OH)_2$, the iron would be precipitated as $Fe(OH)_3$, and the Eh would be buffered at the Fe^{2+} /$Fe(OH)_3$ boundary. A potential mechanism for removal of uranium, and probably molybdenum, from the groundwater would be coprecipitation with the iron hydroxide. The two mechanisms, precipitation of CaUO4 (which occurs at elevated pH values) vs. coprecipitation of uranium with iron hydroxides, occur under different environments and would dictate under which conditions the technology would be viable.

Response: Your observations may be correct. Without additional research, it is not possible to fully understand this interaction. An effective barrier system, capable of responding to the unknown actual soil and leachate conditions generated in the OSDF, cannot be determined with adequate precision at this time.

Action: None.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: IV Pg.#: 9 Line#: last compete paragraph Code: c
Original Comment# 11

Comment: Why isn't the addition of AFO to the basal liner discussed more thoroughly in this report? This is a readily implemented and very inexpensive option. The concept of discing additives other than AFO into the basal layer appears not to have been explored. The most obvious objection to modifying the basal liner (changing the load-bearing capacity) does not appear to be a problem at the very low application rate of 300 tons. Please provide both Ohio EPA and GeoTrans copies of the complete RUST Geotech modeling studies.

Response: The most obvious objection is not load-bearing capacity, but unknown, long-term impact on liner permeability. Discing additives into liner clay materials may seem obvious; however, no data is available on necessary treatment rate and distribution in the matrix to construct an effective long-term barrier. Complete RUST modeling research is not available to FERMCO at this time. We will request a copy of these studies for you.

Action: As stated.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: IV Pg.#: 9 Line#: 2nd paragraph from bottom Code: C
Original Comment# 12

Comment: The text states that modeling results indicate that mixing powderized AFO into the lower 6 inches of the basal clay layer would "effectively extract uranium from leachate". This section needs clarification. First, it is not stated how the AFO would effect uranium mobility, but we are speculating that the material has been proposed because of its sorptive properties. However, adsorption of the uranium ion will be pH dependent, since the charge on the AFO surfaces is pH dependent. The pH of the leachate, and the chemical quality of the leachate that may affect competition for the sorption sites is not discussed in the text. Please provide chemical analyses for the leachate and summarize the processes responsible for the removal of uranium from the leachate. Additionally, the model used to do these simulations was not specified: is it a geochemical specification, mass balance, or solute transport code, and does it incorporate sorption reactions? Obviously, the model capabilities, and how well it is able to simulate the geochemical environment, will dictate whether the AFO will facilitate uranium removal. Finally, this text and the Soil Stabilization Report indicates that phosphate-amended soils is a promising technology in removing uranium from soils, based on laboratory results, and availability, acceptability, compatibility, and hazardous nature (Page 11 table). Why was this not proposed instead of AFO?

Response: We have attached a chemical analysis summary table for the contaminated perched water used to simulate leachate used in permeability testing of OSDF liner soils. This leachate is a sample of contaminated well water from the FEMP Wells #1082 and #1085. No actual leachate will be available until the OSDF has been filled.

We will send you more information about the model was that was used in these simulations as soon as we receive it.

We do not have enough information to propose one soil stabilizing material over another but will continue to examine the results from all research and development activities in this area.

Action: Request and forward model information from RUST Geotech.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: Geochemical Barrier Pg.#: 9 Line#: Code: C
Original Comment# 13

Comment: It is not clear (nor is it specified in the *Intermediate Design Specification Package*, Section 02710) whether the "limestone pea gravel in the leachate

collection system" referenced in the text is the material to be used for the LCS and LDS drainage layer. If so, then proposing to replace the limestone with phosphate rock appears to be inconsistent with the purpose of the LCS/LCD. Interaction with phosphate rock will precipitate uranium from solution, possibly plugging the collection system. Please indicate whether this has been evaluated, and if so, why the precipitates would not adversely impact the system.

Response: We agree that the LCS must be constructed to fulfill its primary purpose of fluid transport. A detailed study has not been completed to determine the amount of precipitant expected. Any substantial precipitation into the LCS would be unacceptable. Potential reduction in bulk permeability of any extraction barrier is a concern being addressed by Ohio State University. One potential use of phosphate rock to treat leachate is in the leachate collection sump after closure of the OSDF.

Action: Continue to evaluate this option as we review on-going research.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: Draft Rev.A Geochemical Barrier Report Pg.#: 10 Line#: Code: C
Original Comment# 14

Comment: In the table on Page 10, the "cost of constructing a rail receiving facility at or near the Fernald site" is included in the projected costs for phosphate rock: However, this cost is not included in the estimated costs above baseline for the remaining four materials (or for the limestone). Please indicate why the rail receiving facility is specific to the phosphate rock, and what the projected costs of using phosphate are separate from the rail facility. Additionally, the authors indicate on Page 11 that the materials can be transported via rail or truck. Please indicate how this would impact cost estimates presented in the Page 10 table.

Response: Rail delivery of 190,000 cubic yards of phosphate from central Florida mines must be considered in order to meet the 10 year plan construction schedule, relative to locally derived limestone delivered by truck to the FEMP. Potential alternate barrier materials require smaller volumes and are more readily available. Approximately $100,000 is estimated for construction of the rail off-loading facility. If a truck is used for delivery, the cost of phosphate amendment would increase.

Action: None.

Commenting Organization: Ohio EPA Commentor: ODH
Section#: V Pg.#: 12 Line#: 3rd bullet Code: c
Original Comment# 15

Comment: ODH concurs with the FEMP's conclusions on the potential for the use of phosphate rock as an alternative medium to the limestone pea gravel currently

Comment: ODH concurs with the FEMP's conclusions on the potential for the use of phosphate rock as an alternative medium to the limestone pea gravel currently planned for the leachate collection system. While studies indicate phosphate rock can stabilize uranium, composition quality control is essential as this material may also contain appreciable amounts of uranium, thorium, and radium as do many phosphate fertilizers. This suggests a potential migration of the very materials we are trying to keep out of the aquifer from this source.

Response: We agree that putting phosphate in the LCS has many drawbacks and likely will not provide net positive benefits. DOE does not plan further evaluation of this technology.

Action: None.

Physical Separation Report

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: Physical Separation Pg.#: Line#: Code: C
Original Comment# 16

Comment: Lack of sufficient material would be required to justify use of the technology? Based on the shortage of material, could physical separation/soil washing be used on other soils besides the targeted gravels?

Response: The DOE has completed several extensive soil washing studies and bench scale tests. The poor results of these tests on glacial till materials is what prompted the exploration of gravel washing.

Action: None.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: II Pg.#: 3 Line#:- Code: c
Original Comment# 17

Comment: A detailed description of conditions and parameters used for the bench-scale soil washing studies performed by IT should be included to add depth to the description of the technology.

Response: The IT soil washing studies were included as an appendix in the OU-5 Feasibility Study. It is not DOE's Policy to attach the same document to multiple reports. This policy is necessary to implement document control at the Fernald Site. DOE will provide this document with the report on a "for information only". An alternative source for the soil washing study is the OU5 Feasibility Study. Additionally, the MAWS Soil Washing Report will be included with this report.

Action: As stated.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: Physical Separation Pg.#: 5 Line#: Code: E
Original Comment# 18

Comment: The word "calcareous" is spelled incorrectly twice on this page.

Response: Agreed.

Action: Correct misspellings.

Soil Stabilization Report

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: Executive Summary Pg.#: Line#: Code: general
Original Comment# 19

Comment: Of the four technologies that have been evaluated in these reports, soil stabilization appears to be the most likely to be developed to the extent of being implementable within the time frame of the construction of the OSDF. It is Ohio EPA's expectation that the Technology Development Plan referred to in Section V of this report will be aggressively pursued. Soil stabilization should be looked at in the broader context of how it will affect other activities. For example, the regulators have not approved an Impacted Materials Placement Plan. If placement of bulk steel beams within the OSDF is precluded, the steel could be shredded and blended with soils. Another unknown is the groundwater monitoring plan. Elements of geochemical barriers could serve to substitute for some elements of the groundwater monitoring strategy.

Response: As stated in the report, considerable research needs to be effected to document potential benefits of soil stabilization; particularly long-term performance. As an example, the shredding of large steel structural members may be extremely expensive and dust intensive, and would require a very large shredder that would also need to be dispositioned after use. The extra handling, waste generation, and energy and dust concerns causes us to question the economic viability of steel shredding.
As addressed in Comment #8, DOE will keep in contact with OEPA and DOE EM-50 Office of Science and Technology to closely monitor and evaluate the progress made at each of the laboratories to examine the practicability of geochemical barriers at the FEMP.

Action: DOE is evaluating steel placement activities at other active disposal sites as to economic and operational benefits and will forward the results when they are compiled.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: Pg.#: Line#: Code: general
Original Comment# 20

Comment: There seems to have been only limited investigation of using these four technologies in combination. One obvious example would be to apply amendments to the soils as they are fed to the brickmaker. Has this possibility been explored?

Response: Researchers are beginning to understand simple interactions through bench-scale tests in a controlled lab environment. Complex soil/groundwater interactions in a simulated real environment with single chemical additives are not yet fully understood. Combinations of treatment materials and methods is beyond the current state of art and our funding capabilities at this time.

Action: None.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: Pg.#: Line#: Code: C
Original Comment# 21

Comment: The report provides a good summary of the state of innovative technologies for immobilizing radiological contaminants in soils. Soil amendment with phosphates appears very promising in immobilizing uranium in soils, based on cost, availability, acceptability, compatibility, and hazardous nature (see tables on Pages 9 and 10). FEMP has made a commitment to evaluate the viability of this technology (Page 2, 1st bullet; Page 6, ANL), which includes an evaluation of the important performance criteria listed on Page 9. Results of the evaluation must be available by March 1998 if the technology is to be incorporated into Phase I (Page 3). Because of the potential benefits of this technology and the tight time schedule, it would facilitate the process if the scope of work and corresponding work plans for the laboratory (and pilot-scale) tests were provided for immediate review. Additionally, results should be made available as soon as possible and the scope of work updated as necessary. This will assure that all parties are aware of the viability of incorporating the soil-amendment technology prior to the March 1998 deadline.

Response: The technology evaluation report has examined this technology for its potential inclusion into OSDF construction. The evaluation has shown that the rate of development for this technology is not compatible with the 10 year plan schedule. The current funding levels and R&D program schedules will not yield useful results by March, 1998.

Action: We will keep OEPA and all interested parties informed of any test planned and conducted by laboratories.

Commenting Organization: Ohio EPA Commentor: GeoTrans
Section#: II Pg.#: 3 Line#: Code: C
Original Comment# 22

Comment: The technology review (Section II) includes a review of the research status of soil stabilization technology. A summary table would be helpful in conveying the progress of each of the laboratories and the relevant studies, including pertinent information such as different media and chemicals being tested, and the experimental conditions under which the experiments are being conducted. The text in this section should also include a discussion of the factors that would affect the feasibility and practicability of soil stabilization technology at FEMP.

Response: We have evaluated the status of emerging technologies being investigated by the R&D community to allow actual field implementation in remediation operations. Brief summaries, including tables of the most promising candidate materials, costs and researching agencies, are included in the report. No emerging technologies were found which may permit timely use for soil remediation operations at the FEMP.
We will keep in contact with OEPA and DOE EM-50 Office of Science and Technology to closely monitor and evaluate the progress made at each of the laboratories to examine the practicability of geochemical barriers at the FEMP.

Action: As New developments become available, we will summarize the information into a table, which will be submitted in November.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: II Pg.#: 5.6 Line#: Bullet 4 Code: C
Original Comment# 23

Comment: Please keep the Ohio EPA informed of the results of the phytic acid studies being performed at ANL.

Response: Agreed.

Action: DOE will keep OEPA informed of all ANL phytic acid studies.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: II Pg.#: 6 Line#: Bullet 5 Code: C
Original Comment# 24

Comment: There is no "Attachment A" on any of the copies of these reports sent to the Ohio EPA. This report only contains copies of the correspondence with EM-40 and the attachments thereto. Please provide Ohio EPA with copies of the GeoSyntec compendium.

Response: Agreed.

Action: We have attached the GeoSyntec report to this transmittal.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: II Pg.#: 7 Line#: Bullet 7B Code: C
Original Comment# 25

Comment: The Ohio EPA concurs with DOE's conclusion that the results of computer modeling of contaminant migration may be useful to test potential mitigation strategies. Please provide a work plan for the path forward for these studies. Of particular interest are long-term thermodynamic stability of the sorption products, potential changes in product stability as a function of pH and re-dox potential, load bearing strengths for phosphate rock in the LCS drainage layer, and mobility of soluble phosphates in the leachate. When reduced forms of zero-valent iron are evaluated, consideration should be given to the physical form of the iron and the effectiveness of bulk steel structural members vs. the effectiveness of steel shards or steel shot.

Response: We will contact PNL for their work plan for their studies and forward them to you. We will also contact the DOE office of Science and Technology to determine if there are any plans to model contaminant migration for long term stability of sorption products, and whether or not demonstration projects are planned to verify modeled results. Upon receipt, DOE will evaluate the applicability of the model to conditions at FEMP.

Action: Forward PNL work plan to OEPA.

Commenting Organization: Ohio EPA Commentor: OFFO
Section#: II Pg.#: 5 Line#: Bullet 4, 2nd to last line Code: E
Original Comment# 26

Comment: The copies mailed to Ohio EPA do not contain the references at the end of the Soil Stabilization Report.

Response: Agreed.

Action: The referenced page is attached.