R-009-207.4

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EE/CA SOUTH PLUME
U.S. DOE FERNALD
OH6 890 008 976

05/17/90

USEPA/DOE-FMPC
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LETTER
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[redacted]

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

MAY 24 1990

MAY 17 1990

5HR-12
REPLY TO ATTENTION OF:

cc: Hoppaw

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Bobby Davis
U.S. Department of Energy
Feed Materials Production Center
P.O. Box 398705
Cincinnati, Ohio 45239-8705

RE: EE/CA South Plume
U.S. DOE Fernald
OH6 890 008 976

Dear Mr. Davis:

On April 16, 1990, the United States Department of Energy (U.S. DOE) submitted a draft Engineering Evaluation/Cost Analysis (EE/CA) for removal action #1 that is to address the south groundwater contaminant plume at the Feed Materials Production Center (FMPC) site in Fernald, Ohio. The United States Environmental Protection Agency (U.S. EPA) has reviewed this draft document and is disapproving it because of the deficiencies that have been identified.

On January 3, 1990, U.S DOE submitted a preliminary version of the draft EE/CA for removal action #3. On March 30, 1990, U.S. EPA provided comments on this preliminary draft. U.S. DOE informed U.S. EPA that these comments were not specifically addressed by the April 16, 1990 draft because internal drafts had been prepared prior to receipt of U.S. EPA's comments. Many of U.S. EPA's comments are still relevant and are included below with some additional comments specific to the April 16 draft.

General Comments:

1. Generally, the EE/CA does not provide adequate information regarding several major areas, including detailed cost information, the contaminant transport model, NPDES requirements and discharge limits, and exploration of treatment and alternate discharge locations.

2. The assumptions used in calculating risks to potential receptors were not presented. These risks need to be presented in terms of incremental risk.

3. The two documents used in developing risk estimates, U.S. DOE documents 5400.XX and 5480.XX, were not submitted with the EE/CA. A copy of all reference materials should be provided to U.S. EPA and the information repositories. The request for these documents was put forth in the comments on the January draft of the EE/CA.

4. Several references are made to permits required for the alternatives discussed. Section 121(e)(1) of the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA) provides that "No Federal, State, or local permit shall be required for that portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section." Section 300.5 of the March 1990 National Oil and Hazardous Substances Contingency Plan (NCP) defines on-site as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action."

5. Several specific comments identify the misuse of the term "on-site". The term "site" should be used only in its meaning as defined under CERCLA and the NCP.

6. To provide support for a statement by citing "DOE 1988" is insufficient. Moreover, throughout the document factual statements are made with no reference provided for the public to determine the validity of those statements. The reference list and tables are provided in the document and they should be used throughout the text.

7. When providing the requirements of an analysis, please cite the reference setting forth those requirements.

8. The historic effectiveness of institutional controls presented in several of the alternatives needs to be presented.

9. State Applicable and Relevant and Appropriate Requirements (ARARs) should have been identified in consultation with the appropriate State representative. Was this done and if so, was it documented?

10. Cost estimates should be explained in detail, possibly in an appendix.

11. The discharge of the pumped groundwater to the Great Miami will require coordination with an approval from the Ohio Environmental Protection Agency (OEPA) through the National Pollution Discharge Elimination System (NPDES) permitting program. A modification to the FMPC's existing discharge permit may be required. If the discharge is considered to be "on-site", the discharge would not be subject to the procedural permit

requirements at the point of discharge. Only substantive requirements must be met.

12. Alternatives that include treatment and other discharge locations were not fully addressed in the EE/CA. As agreed during the negotiations for the 1990 Consent Agreement, operable unit #6 would be dropped if a removal action would address the south plume contamination. The intent was to install a system that could ultimately be the final remedial action for the plume. The south plume is currently considered a part of operable unit #5.

13. The risk associated with uranium can not be isolated from risk presented by other hazardous substances in the plume.

14. There appears to be an over reliance on U.S. DOE guidance instead of U.S. EPA guidance documents. U.S. DOE guidance is considered "To Be Considered" (TBCs) in this response action. The methodology used to estimate dose equivalents to the general public due to the transport of uranium from groundwater and surface water is the Nuclear Regulatory Agency (NRC) Regulatory Guide 1.109. This methodology is not presented in this report. Because this methodology differs from the methodology used by U.S. EPA (EPA-PRESTO) to esimate exposures to populations following releases of radionuclides from low-level waste disposal facilities, this methodology and justification for its use should be included in the EE/CA. Tabulated summaries for the calculated exposure concentrations derived using this methodology, summaries of the risk factors considered in the risk evaluation, and a summary of the calculated risks.

15. Estimates of when the plume will contact the Great Miami River, with and without pumping, should be presented.

Specific Comments:

16. Section ES, Page ES-1: The language regarding the July 1986 Federal Facility Compliance Agreement (FFCA) should be updated with information regarding the 1990 Consent Agreement.

17. Section ES, Page ES-1, Third paragraph: "Releases from the FMPC" should be changed to read "releases on and from the site", or some equivalent language. The site is a larger area than the FMPC boundary. This comment also applies to the third sentence.

18. Section ES, Page ES-1, Last sentence: This sentence is incorrect. The removal action is required by the 1990 Consent Agreement and the decision for performing the removal action is not "pending the outcome of the Remedial Investigation/ Feasibility Study (RI/FS) and the implementation of a final remedial action".

19. Section ES, Page ES-2, First paragraph: It is not U.S. EPA's position that an EE/CA was required for this removal action. The six-month period was not required for planning of the removal, but rather for characterization of the plume.

20. Section ES, Page ES-2, First paragraph: The last sentence is misleading. The NCP was finalized in March 1990.

21. Section ES, Page ES-2, First paragraph: References to the National Environmental Policy Act (NEPA) are not relevant to this document and causes confusion regarding what is the controlling authority. This document should be prepared in accordance with requirements of the NCP and not the NEPA.

22. Section ES, Page ES-3, Last sentence: The RI/FS is not past tense. It is not complete.

23. Section ES, Page ES-4, Continuing sentence: There is an incorrect use of the term off-site and on-site. Off-FMPC property and on-FMPC property should be used. The term site is defined by the NCP and its use in this sentence is incorrect.

24. Section ES, Page ES-4, First paragraph: RI/FS data that has been collected beyond September 15, 1989 has to be used for evaluation of this removal action. The most recent data is required to be used.

25. Section ES, Page ES-4, First paragraph: There is no drinking water standard for uranium.

26. Section ES, Page ES-4, First paragraph: All hazardous substances in the south plume are "contaminant(s) of concern" for this removal.

27. Section ES, Page ES-5, Second paragraph: The use of the term "off-site" is incorrect. Again, this should be corrected throughout the document.

28. Section ES, Page ES-5: The EE/CA states that "because the south plume is not predicted by the model to migrate to the Great Miami River or any other surface water course within the project life of the removal action (i.e. within five years)...". Data is not presented to support this conclusion.

29. Section ES, Page ES-6: The EE/CA states that "mitigation of the source of groundwater contamination, which in this case is represented by the prevention of future releases across the FMPC site boundary". This secondary objective is not stated consistently, e.g., in Section 3.2, it is omitted.

30. Section ES, Page ES-5, Second paragraph: The 33 ppb calculated value is incorrect. The 15 pCi/l Maximum Concentration Level (MCL) for gross alpha should be used, since there is not a specific standard for uranium. This number may actually need to be lower because of additional contaminants that are also in the south plume. The effective dose should be calculated over seventy years, not fifty. All of U.S. DOE's guidance documents are "to be considered" (TBCs) and are not necessarily "applicable" requirements.

31. Section ES, Page ES-5, Third paragraph: Groundwater discharges to surface water has to be considered as an exposure pathway in the EE/CA.

32. Section ES, Page ES-6, First paragraph: The discussion needs to be updated with more recent groundwater RI information.

33. Section ES, Page ES-6, Fourth paragraph: The scope of the removal action is to remediate the south groundwater contaminant plume. The scope is not limited to radionuclides, but is to includes all hazardous substances. Alternatives that address the other contaminants need to be further analyzed under this EE/CA.

34. Section ES, Page ES-6, Fourth paragraph: Again, the use of the 33 ug/l figure is inappropriate and should be removed from the entire document.

35. Section ES, Page ES-6, Fourth paragraph: The fundamental objective of the removal action is to begin remediation of the south groundwater contaminant plume. This is the reason that the sixth operable unit was eliminated.

36. Section ES, Page ES-10: Table ES-1 should address compliance with ARARs and list TBCs.

37. Section 1.0: Background information should be updated to reflect the requirements of the 1990 Consent Agreement.

38. Section 1.0, Page 1-2: NCP references should be updated to reflect March 1990 finalization of the revised NCP.

39. Section 2: The southern/downgradient extent of the uranium plume is not defined. The text should be modified to include the most recent information.

40. Section 2: The south field area and fly ash piles should be shown in a figure.

41. Section 2.1, Page 2-4: The existing effluent line was installed in 1952, is 4,200 feet long, and is made of 16-inch diameter cast iron pipe with a minimum and maximum slope of 0.1% and 12.7%, respectively. The second paragraph states that the same pipeline has a capacity of 6.5 mgd, or

10 cfs. This capacity calculation is not consistent with a minimum slope of 0.1%. The minimum slope required to handle 10 cfs is approximately 2%.

42. Section 2.1, Page 2-4: Leachate from the "fly-ash piles" and other disposal in the south field area may have caused contamination from hazardous substances other than uranium. Analysis of groundwater samples from around the waste piles should include Radium-226 and Radium-228 because these substances are typical contaminants of fly-ash.

43. Section 2.3, Table 2-2: Analytical data on uranium from sampling rounds 7 and 8 should be included in EE/CA.

44. Section 2.3, Tables 2-3, 2-4, and 2-5: Sampling from rounds 5 and 6 was conducted 9 to 12 months ago and data must to be included in the EE/CA.

45. Figure 2-9, Page 2-20: The location of the Southwest Ohio Water Company (SOWC) wells should be shown on this figure. A potentiometric surface distribution should also be added to this map.

46. Section 2.3, Page 2-27: The uranium concentration presented in Table 2.3 is not consistent with concentrations listed in the analytical database. Uranium concentrations in the database for monitoring well 2015 (round 2) is 175 ug/l, for monitoring well 2068 is 2 ug/l (round 2) and 2 ug/l (round 3).

47. Figure 2-11, Page 2-31: Data from wells 2094 and 3137 indicate that the uranium plume extends far beyond what is indicated by this figure. The isocontour maps should be extended south to the area of wells 2094 and 3137 and other recently installed wells.

48. Section 2.3, Page 2-31: The concentration contours for observed uranium concentrations shown on Figure 2-11 do not closely match the simulated present-time uranium concentration predicted by the groundwater contaminant transport model shown in Figure A-2. Since the predictive model does not match, the conclusions of the contaminant transport model are suspect.

49. Section 2.4.1, Page 2-41, Third paragraph: It is not clear how the "apparent historical nature of the plume area" and the "anticipated accelerated movement of the existing plume" support the conclusion to treat only the off-site portion of the south plume. Furthermore, the assumption that there is no continuing source for the south plume contaminants is not supported in the report by any specific data.

50. Section 2.4.1, Page 2-41: The EE/CA's definition of an operable unit is not consistent with the NCP, which defines an operable unit as a discrete part of an entire response action that decreases a release,

threat of release, or pathway of exposure. The EE/CA defines the operable units as a geographic area.

51. Section 2.4.2, Page 2-42: This section should address the long-term characteristics of heavy metal contamination. For example, the persistence and half-lives of the radionuclides in question should be included.

52. Section 2.4.3.1, Page 2-42: The EE/CA does not presents data to support the statement that uranium is the only contaminant of concern in the south plume.

53. Section 2.4.3.1, Page 2-42: The statement that organic chemicals in the groundwater are not persistent and are far below MCLs is not sufficiently supported. The data submitted to U.S. EPA indicates that only six out of 29 2000-series wells were sampled for organic analytes and only one was sampled for organic compounds more than once. In addition, none of the 3000-series wells or 4000-series wells were sampled for organics.

54. Section 2.4.3.1, Page 2-42: The EE/CA does not present any data to support the statement that uranium is the only contaminant of concern in the south plume.

55. Section 2.4.3.1, Page 2-43, Second paragraph: The EE/CA states that chemical toxicity is the principal concern for soluble uranium compounds in the south plume groundwater. However, the derived concentration limit is based on intake of radiological materials. The EE/CA should support the use of a radiologically based standard for a chemically-toxic compound.

56. Section 2.4.3.1, Page 2-44, Second paragraph: The text states "...approximately 100 acres of off-site property is underlain by groundwater exceeding the derived concentration...". An estimate of total volume of contaminated groundwater should also be made in order to estimate the potential scope of the action. Also, an estimate of total acreage above background for each hazardous substance should also be presented.

57. Section 2.4.3.1, Page 2-44, Second Paragraph: The derived concentration of 33 ug/l should also be expressed in terms of excess cancer risk in order that risks posed by this site can be compared with other CERCLA actions.

58. Section 2.4.3.2, Page 2-44: Information on the location and estimated time that contaminated surface waters will discharge to the Great Miami River is necessary to evaluate the passive response actions (Alternatives 1, 2, and 3), as well as active response actions (Alternatives 4 and 5), if project delays become a factor.

59. Section 2.4.3.3, Page 2-44, Fifth Paragraph: A justification for the first sentence needs to be presented. The conclusion is questionable. Figure 2-17 and Table 2.3 show that uranium was found in well 2127 at a concentration of 37 ug/l, above the "derived" concentration of 33 ug/l. This well lies outside the south plume as defined by the EE/CA, suggesting that: (1) there may be other areas outside the plume with groundwater concentrations of uranium above 33 ug/l; and (2) this groundwater may be used for drinking water, feed-stock watering, or crop irrigation.

60. Section 2.4.3.3, Page 2-45: The sentence "untreated water is not used for drinking water supplies" is not accurate. Information on recent discoveries and industrial users should be included.

61. Section 2.4.3.3, Page 2-45, Last paragraph: A third potential future receptor of uranium in groundwater south of FMPC would include any individual who may install a well for potable use, crop irrigation, or livestock from area located within the plume.

62. Section 2.4.3.3, Page 2-45, Last paragraph: Under the no action alternative, future unrestricted potable use of private and industrial wells that have been found to be contaminated must be considered. Wells falling into this category include 2060, 2061, 3062.

63. Section 2.4.3.3, Page 2-45, First paragraph: The statement that potential receptors along "Paddys Run Road to the west reportedly use cisterns with imported water..." seems inaccurate considering the level of contamination and public concern. Documentation on a door-to-door survey should be presented. The survey should include wells not documented as a drinking water source, but may be used for irrigation or animals.

64. Section 2.4.3.3, Page 2-45, First paragraph: The EE/CA should provide supporting groundwater monitoring data from the residential and commercial wells discussed.

65. Section 3.2, Page 3-1, Third paragraph: The identification of a source of uranium from FMPC areas north of the south plume is not consistent with the information provided in Section 2.4.1.

66. Section 4: The issue of contaminated sediments continuing contribution to groundwater contamination needs to be addressed in the EE/CA. If sediments are still contributing to groundwater contamination, removal alternatives need to include sediment and stream remediation. If RI information indicates that sediments are not currently contributing to groundwater contamination, this information should be included.

67. Section 4.2.2, Alternative 2: The results from all water supply wells within the plume should be included in alternative screening and in Section 2.

68. Section 4.2.3, Page 4-2, Alternative 3: There is no substantiation to support the claim that a well discharging from the base of the aquifer at 50 gpm will not draw contaminated groundwater down into the lower aquifer.

69. Section 4.2.3, Page 4-2, Alternative 3: Alternate water supplies are proposed for two affected industries. Plans/criteria for providing alternate water to other users/residents should be presented.

70. Section 4.2.3, Page 4-3, Second paragraph: Siting a replacement well within the same aquifer, even if it is screened below the expected depth of contamination, is questionable. If this is permitted, extreme care must be taken to ensure well integrity, so that deeper portions of the aquifer are not affected. This option assumes that hydrogeologic conditions are extremely well understood and are static, a situation that is not completely supported by current data.

71. Section 4.2.3, Page 4-3, Second paragraph: It is not clear why both industrial users cannot be served from the same well along Willey Road. This proposal appears feasible since, according to Figure 4-1, both receptors are located adjacent to the proposed water line.

72. Section 4.2.4.1, Well location: Much of the text of this section does not strictly relate to well location. To avoid confusion, model predictions of the impact of pumping may be more appropriate in Section 4.2.4.2.

73. Section 4.2.4.1: This section does present information regarding the assumptions that were made when the model simulations were run. The additional information that is required to be presented includes pumping rates, the number of extraction wells, extraction well locations, compliance monitoring, and values used for hydraulic gradient and transmissivity. This information is required to determine if the results of the model are valid. The data presented in the EE/CA is insufficient to provide for an independent verification of the model results. If the results of the model cannot be verified, the conclusions of the authors that are based on the results of the modelling cannot be evaluated.

74. Section 4.2.4.1: There does not appear to be a good correlation between the location of the five-year plume boundary presented in Figure 4-2 and the current location of the plume. This is particularly true in the vicinity of well 2127 and the southeast tip of the modelled plume.

75. Section 4.2.4.1: Clarification should be provided on what exactly the five-year plume denotes.

76. Section 4.2.4.1: This section provides discussion on the inadequacy of the proposed pumping schemes. In order to construct a pumping system, the objectives and parameters need to be defined, including the number of wells, pumping rates, location, and cleanup goals. Until a system is designed, or these parameters are defined, a complete analysis can not be completed. This discussion may be best moved to another section of the EE/CA.

77. Section 4.2.4.1: A pumping system that collects water from both the center and the southern boundary of the plume should be evaluated for this removal. This scenario may provide the most effective long-term solution to control of the contaminant plume.

78. Section 4.2.4.1, Page 4-5, Third paragraph: Quantitative data should be incorporated into the report to support the conclusion that "...the continuing release across the site boundary via groundwater transport are not considered significant when compared to the historical releases that represent the hypothesized underlying course of the off-site (off-FMPC) plume."

79. Section 4.2.4.1, Page 4-6, Second and third paragraphs: Two sets of extraction wells should be considered, one near the center of the plume to extract highly contaminated groundwater, and another near the southern edge of the plume to prevent further contaminant migration.

80. Section 4.2.4.1, Page 4-6, Third paragraph: The third sentence requires further explanation. It is unclear why "...future reliance on ... additional remedial action under the RI/FS ... would no longer be required."

81. Section 4.2.4.2, Removal options: Orienting the wells north to south instead of east to west would remove the largest amount of contaminant from the largest section of the aquifer if the capture zone for a well or pair of wells can encompass the width of the plume.

82. Section 4.2.4.2: The impact of pumping four wells at 500 gpm on the contaminant distribution needs to be presented. This section indicates that the impact will be sufficient to make pumping an effective choice, while earlier in the document the effect is presented as being minimal. A clarification is required.

83. Section 4.2.4.3, Page 4-8, Discharge options: What is the closest municipal wastewater treatment facility is in the area?

84. Section 4.2.4.3, Page 4-8, Discharge options: The elimination of the alternative of discharging water far south in Paddy's Run needs to be described more fully.

85. Section 4.2.4.3, Page 4-8, Discharge options: The alternative of discharging water via a pipeline through the Village of Fernald is inadequately evaluated. It would definitely be less expensive than pumping the water back to FMPC. There is inadequate justification for pumping water back to Manhole 175, when no benefit is gained except diluting FMPC current effluent discharge.

86. Section 4.2.4.4, Page 4-9, Treatment options: This section is inadequate. There is no detailed description of appropriate treatment technologies that can be used to remove all the hazardous substances from the pumped groundwater. There is no data to support the contention that any remedial technology/treatment option is not cost effective, particularly when a description of applicable treatment options are not presented. A complete list of technologies, a discussion of how each works, and benefits and costs needs to be provided.

87. Section 4.2.4.4, Page 4-9, Treatment options: The removal of an equivalent mass of uranium from the current FMPC effluent to offset proposed actions is an unacceptable approach. If a quantity of uranium can be removed from the current effluent, it should be done immediately. The radionuclides currently being discharged are not regulated under the facility's NPDES permit. The current effluent concentrations (660 pCi/l in 1987) exceed U.S. DOE Derived Concentration Guides limits of 550 pCi/l. This effluent is subject to treatment requirements of U.S. DOE Order 5500.5 that requires the use of best available technology (BAT) for treatment. The dilution of the current effluent with less contaminated groundwater should not be a means of achieving an internal U.S. DOE requirement.

88. Section 4.2.4.4, Page 4-9: The statement that a new treatment facility "...is not cost effective due to the high flow, low concentration nature of the extracted groundwater..." is not supported. This statement is later used to support a "no treatment" alternative for removed groundwater.

89. Section 4.2.4.4, Page 4-9: This section proposes the construction of a new treatment plant as an alternative, but does not propose to use it for groundwater remediation. Because the purpose of this EE/CA is to evaluate the means for south plume remediation, it is not clear how this alternative can be considered a treatment option.

90. Section 4.2.4.4, Page 4-9, Third paragraph: The meaning of the last sentence in this paragraph is not clear. To what level does the industry presently treat the groundwater?

91. Section 4.2.4.4, Page 4-9, Fifth paragraph: Any treatment scheme should minimally achieve a net reduction in uranium discharged by FMPC to the Great Miami River. As indicated on page 5-17, current release rates for uranium exceed discharge limits.

92. Section 4.2.4.4, Page 4-9: The meaning of the last sentence is not clear. To what level does the present industry treat the groundwater?

93. Section 4.2.4.4, Page 4-9: The industry's treatment unit could be supplemented with additional units and should be considered for treatment for this removal.

94. Section 4.2.4.4, Page 4-9: The fact that Alternative 5 would generate uranium-containing sludges is not a significant negative factor. The new wastewater treatment plant planned for FMPC will generate similar sludges for which treatment and disposal provisions will also have to be made.

95. Section 4.2.4.5, Pump and discharge: It is not possible to evaluate the proposed locations of interceptor wells because of the lack of information on the model. The proposed locations are not supported by the data in the EE/CA. The wells are not located in a position that will prevent the water supply wells on New Haven Road and Paddys Run south of New Haven Road from receiving contamination. Data needs to used to support the location of the wells proposed through use of the model.

96. Section 4.2.4.5, Page 4-10: The EE/CA should present the rationale for pumping groundwater uphill to Manhole 175. The sampling point could be relocated to one of the manholes further down the line, such as Manhole 180. Also, creating a new discharge point should be further developed.

97. Section 4.2.4.5, Page 4-10: If the pumped groundwater is brought back to FMPC, the water has to be tested prior to mixing with the existing effluent discharge.

98. Section 4.2.4.5, Page 4-10, Second paragraph: Given the data in Table 2.3 and the well locations in Figures 2-11 and 2-17, the definition of the southern plume boundary and the location of proposed extraction wells are questionable. Figure 2-11 shows a gap of approximately 4000 feet in the monitoring well network between Wells 2061 and 2094, making it difficult to identify the southern plume boundary. In addition, Well 2127, with a maximum uranium concentration of 37 ug/l, is approximately 2000 feet south of the proposed extraction wells. Finally, Figure 2-17 shows that several residential and commercial wells are located adjacent to and immediately upgradient of the proposed extraction wells.

99. Section 4.2.4.5, Page 4-10, Third paragraph: It is unclear why recovery wells were designed with 40-foot well screens at the top of the aquifer, when data from 3000-Series wells indicate groundwater contamination at depths to at least 75 to 100 feet. The recovery well system should be designed with well screens installed from the top of the aquifer to the bottom of the existing plume in order to increase efficiency in the recovery of contaminants.

100. Section 4.2.4.5, Page 4-10, Fourth paragraph: The existing effluent line constructed in 1952 may not be large enough to accommodate the additional flow. Testing of the effluent line for exfiltration to identify bad joints, etc., which could reintroduce the contaminated groundwater back into the ground at a different location, needs to be completed.

101. Section 4.2.4.5, Page 4-10, Fourth paragraph: The EE/CA should discuss the rationale for pumping groundwater uphill to Manhole 175. The sampling point could be relocated to one of the manholes downstream, such as Manhole 180, and the ground water could be discharged into the same manhole, with considerable savings in power consumption costs.

102. Section 4.2.4.5, Page 4-12, First paragraph: The last line of this paragraph indicates that six monitoring well clusters will be installed. Figure 4-3, however, shows 11 well clusters.

103. Section 4.2.4.6, Page 4-12: The design of a treatment system to ensure that total uranium released as effluent would not exceed FMPC release values is discussed in this section. The rationale for not exceeding this release value should be given since the current release concentration exceeds U.S. DOE guidance.

104. Section 4.2.4.6, Page 4-12, Fourth paragraph: Provisions should be made to sample the FMPC effluent prior to treatment. Central valves and bypasses should be installed so that when the uranium concentrations are below the discharge limit, the flow can bypass the treatment system and increased pumping of recovery wells may occur. Conversely, when sampling shows that uranium concentrations exceed the effluent limit, groundwater could be diverted to the treatment system. This comment is only relevant if the treatment is effective at removing low concentrations of contaminants.

105. Section 4.2.4.6, Page 4-14, First paragraph: If the treatment system is to operate at 700 gpm when the extraction wells produce 1,500 to 2,000 gpm, not all the contaminated ground water will be treated before discharge. This is not consistent with the intent of the treatment alternative, and will not "...ensure that the uranium discharge to the Great Miami River is not increased over current levels."

106. Section 4.2.4.6, Page 4-14: Again, a reference is made to design goals of not increasing total uranium discharges over current levels. U.S. DOE Order 5400.5 has an effective date of May 8, 1990 and requires current levels be reduced.

107. Section 4.2.4.6, Page 4-14: Provisions should be made to sample FMPC prior to treatment. Central valves and bypasses should be installed so that when contaminant concentrations are below the discharge limits, the flow can bypass the treatment system and increased pumping of recovery wells may occur.

108. Section 4.2.4.6, Page 4-14: If the treatment system is to be operated at 700 gpm when the extraction wells will be producing 1,500 to 2,000 gpm, not all of the contaminated groundwater will be treated. This is not consistent with the intent of the treatment alternative.

109. Section 5.1.1, Page 5-2: The statement that "uranium is the only constituent...that could present a public health risk from chemical or radiological exposures" is not substantiated by data in the EE/CA.

110. Section 5.1.1, Page 5-2: Direct contact and inhalation through showering is not considered in the exposure pathways risk analysis.

111. Section 5.1.1, Page 5-2: The EE/CA does not provide sufficient data to support the focus on uranium alone.

112. Section 5.1.1, Page 5-2: An additional pathway that is required to be considered is direct exposure to groundwater resulting from the water of lawns and gardens. This activity could cause surface deposition at close proximity to residents. Inhalation of resuspended dusts, particularly those associated with lawn mowing or gardening, should be considered.

113. Section 5.1.1, Page 5-2: The exposure pathway analysis, along with all data and sample calculations, is not included and should be presented in a separate appendix to the EE/CA to allow for a complete evaluation of this document. Section 5 evaluates the effectiveness of each alternative in protecting public health, using estimated doses to potentially exposed populations. It is unclear how uranium doses were calculated for: (1) drinking ground water from the South Plume; (2) other exposures to groundwater from the South Plume; and (3) exposure to uranium via water from the Great Miami River. The EE/CA should clearly present the assumptions and procedures used to calculate these doses, so that the calculations can be independently verified.

114. Section 5.1.1, Page 5-2, Third paragraph: The environmental transport model discussed here and in the following paragraph should be presented in an appendix.

115. Section 5.1.1, Page 5-3: "A value of 2.7 ug/l/kg/day ....used as the acceptable intake rate for uranium was derived in an earlier report (IT 1989). What report is this? Has it been reviewed and validated?

116. Section 5.1.1, Page 5-3: "Uranium isotopes...which exceed background concentrations in the off-site south plume." Explain why background concentrations are a basis for making a decision.

117. Section 5.1.1, Page 5-3: Data needs to be presented that supports the statement that "this condition has been generally satisfied...in support of the RI/FS."

118. Section 5.1.1, Page 5-3: Using a 730 l/yr water intake, a 50%/50% activity mix of uranium-238 and uranium-238, and conversion factors from Federal Guidance Document 11, a 19 pCi/l (29 ug/l) figure is calculated.

119. Section 5.1.1, Page 5-3: As previously stated, it is not appropriate to use this 4 mrem effective dose equivalent for uranium. Use of this number is inconsistent with current regulations under the Safe Drinking Water Act. A limit of 15 pCi/l (22.5 ug/l) for gross alpha is more consistent with the intent of the regulations.

120. Section 5.1, Page 5-3, Second Paragraph: The EE/CA must show how the acceptable daily intake of 2.7 ug/kg/day was derived and not just reference another report. The EE/CA is an independent document and all exposure assumptions, including estimated daily intake and acceptable daily intake) and calculations must be provided. The risk assessment evaluation must be consistent with U.S. EPA's Risk Assessment for Superfund, Volume I--Human Health Evaluation Manual (Part A).

121. Section 5.1.1, Page 5-3, Fourth paragraph: An explanation of the assumptions used to convert the U.S. DOE guideline of 4 mrem/yr into a groundwater concentration of 33 ug/L should be presented. Provide a regulatory citation for the 100 mrem limit in this paragraph.

122. Section 5.1.1, Page 5-4, First paragraph: State the source of the derived concentration threshold (chemical toxicity) of 95 ug/l for uranium.

123. Section 5.1.1, Page 5-4: A reference is required for the statement that "a concentration of...at the limit of 33 ug/l is below the derived concentration threshold of 95 ug/l for chemical toxicity in humans."

124. Section 5.1.1, Page 5-5: "The objective of plume control will be evaluated by an alternative, as well as the portion of the south

plume that will be controlled. A precise quantification of this factor is limited by the remaining uncertainties as to the nature and extent of the leading, southern edge of the plume." How precise does this quantification need to be in order to initiate installation of the system? Why has this information not been obtained? U.S. EPA guidance calls for the EE/CA to provide a framework for evaluating and selecting alternative technologies (March 30, 1988).

125. Section 5.1.2, Page 5-5: "There remains a lack of direct observations on both the chemical plume to the south of the FMPC and the degree to which the plumes have already mixed. Model results indicate, however,..". Direct observations should be going on right now.

126. Section 5.1.2, Page 5-5, Second paragraph: The meaning of "this factor" and "remaining uncertainties" in the last sentence should be specified.

127. Section 5.1.2, Page 5-5, Fourth paragraph: The first and second sentences are contradictory. If the plumes have already mixed (first sentence), it is not clear how the model results can show otherwise (second sentence).

128. Section 5.1.4, Page 5-6, Second paragraph: The discount rate used throughout the EE/CA is 5 percent. The EPA EE/CA guidance specifies that a 10 percent discount rate is to be used.

129. Section 5.1.4, Page 5-6, Second paragraph: The text states that "...cost estimates are intended to provide an accuracy of ± 25 percent." While this level of accuracy is acceptable for preliminary RI/FS activities, the intent of an EE/CA is to provide a higher level of accuracy in cost estimation. Given that the objective of an EE/CA is cost analysis, accuracy of ± 10-15 percent should be attainable.

130. Section 5.2.1, Page 5-6: Calculated doses of 36, 18, 88, and 47 mrem are presented. No time interval is specified. Additionally, none of these calculations include exposure components due to vegetation watering, mowing, and gardening.

131. Section 5.2.1, Page 5-6: The uranium concentrations and assumptions used throughout this section (and for all subsequent alternatives) to calculate radiation and uranium intake doses should be specified. Calculations should be presented either in the text or in an appendix for verification.

132. Section 5.2.1, Pages 5-6 and 7: The EE/CA must show how radiation doses were calculated for the all pathways, including drinking water. These calculations must include both the hypothetical maximally exposed receptor and the average exposed receptor. The individual data that was used to calculate average

exposure conditions must also be provided. It is unclear what data was averaged and how it was averaged. Again, the term "site" is being misused.

133. Section 5.2.1, Page 5-7, Third paragraph: List the mass of the uranium discharged by each user of contaminated groundwater. Specify how the figure of 1500 pounds of discharged uranium was calculated.

134. Section 5.2.1, Page 5-8: It is not clear how the risk of exceeding the limit of 4 mrem relates to the Hazard Index.

135. Section 5.2.1, Page 5-8, Second Paragraph: The EE/CA must show how the Hazard Indices were calculated for the exposed individuals.

136. Section 5.2.2, Page 5-9: The statement that "plume mixing would also continue or would occur..." is confusing. An earlier reference to plume mixing indicates that there is none. Which is correct?

137. Section 5.3.1, Page 5-9: What historically has been the effectiveness of institutional controls? If no regulatory or statutory authority exists for such "controls," this should be made clear in the evaluation of the alternatives. Ohio has been reluctant to respond to U.S. EPA inquiries in the past because of its concerns that institutional controls will be relied on in lieu of adequate engineering solutions.

138. Section 5.3.1, Page 5-9, Fourth paragraph: Indicate the groundwater concentrations used to calculate doses for the drinking water pathway. It appears that the concentration is approximately 2.5 ug/l for maximum exposure. Since Alternative 2 is designed only to prevent exposure to concentrations above 33 ug/l, there is no justification for using this concentration as a maximum level.

139. Section 5.3.1, Page 5-10: The statement that the generation of uranium-bearing sludges would represent an additional public health or environmental concerns is not accurate, unless the site mismanages the sludges. This statement here, and elsewhere in the document (page 6-4) needs to be eliminated or clarified.

140. Section 5.3.1, Page 5-10: Calculations and assumptions used in the calculations for determining maximum and average exposures must be provided. FMPC exposures are also relevant.

141. Section 5.3.4, Page 5-12, Second paragraph: Section 5.3.3 implies that additional monitoring wells would be installed as a component of Alternative 2. Costs for these wells are not included in the cost estimate.

142. Section 5.4, Page 5-12: Alternatives that evaluate an alternate water supply should include provisions for the proper abandonment of existing contaminated wells to assure that its use curtailed.

143. Section 5.4.1, Page 5-12, Fourth paragraph: The assumptions concerning the relative amounts of uranium discharged by FMPC and the industries along Paddy's Run Road are not described earlier in the EE/CA.

144. Section 5.4.1, Page 5-13, Second paragraph: Alternative 3 includes an alternate water supply and is more protective than Alternative 2. Thus, it is not clear why maximum and average doses for the drinking water pathway are the same for both alternatives.

145. Section 5.4.2, Page 5-15: In the "Effectiveness: Other Factors" section, no mention is made of the potential need for U.S. Army Corps of Engineers permits for the stream crossing.

146. Section 5.4.4, Page 5-16, First paragraph: Capital costs should include the cost of additional monitoring wells mentioned in the previous paragraph.

147. Section 5.5.1, Page 5-16, Fourth paragraph: The estimated uranium discharge for the first year is too low. Figure A-8 indicates that the average uranium concentration in water withdrawn from the aquifer will be approximately 10 ug/l, assuming equal pumping of all four wells. Assuming continuous operation, and using the relationship between ug/l and pCi/l on page 5-3, the annual loading discharged into the river will increase approximately 27 mCi rather than 6 mCi.

148. Section 5.5.1, Page 5-16, Fourth paragraph: Figure A-9 shows the annual uranium loading to the Great Miami River during the fifth year will be 2,150 pounds, not 1,750 pounds.

149. Section 5.5.1, Page 5-16: Compliance with U.S. DOE Orders would likely results in a discharge number lower than 1500 lbs/yr (approximately 1300 lbs/yr).

150. Section 5.5.1, Page 5-16, Fourth paragraph: Current release estimates for uranium in paragraph 1 (440 mCi/1500 pounds) differ from estimates on page 5-8 (448 mCi/1500 pounds).

151. Section 5.5.1, Page 5-17, First paragraph: The information on actual current releases should have been presented in an earlier subsection of Section 5. Exposure estimates should be based on these actual releases, rather than on discharge limits that may or may not be attained in the future.

152. Section 5.5.1, Page 5-17, First paragraph: Diluting the current FMPC discharge with contaminated water extracted from the aquifer

will lower the release concentration, but it will increase the total mass of uranium discharged.

153. Section 5.5.1, Page 5-17, Second paragraph: Under Alternative 4, the amount of uranium entering the Great Miami River will increase, compared to Alternative 1 (no action). It is, therefore, not clear how doses from exposure to river water can decrease from 0.8/0.4 mrem to 0.7/0.3 mrem.

154. Section 5.5.1, Page 5-17, Third paragraph: Alternative 4 involves extracting contaminated water from the aquifer. If the amount of contaminated water decreases, it is not clear why maximum doses for the drinking water pathway should increase compared to Alternatives 2 and 3.

155. Section 5.5.1, Page 5-17, First paragraph: Current U.S. DOE (TBCs) release concentrations limit is 550 pCI/l with future concentration values of 100 pCI/l. The current value is 660 pCi/l. Any alternative providing for this process compromises U.S. DOE Order 5400.5 requiring Best Available Technology (BAT) to be applied to concentrations currently being discharged at the FMPC.

156. Section 5.5.2, Page 5-18, Second paragraph: The basis for the conclusion that there will be an "improve(d) environmental condition for aquatic biota" is not clear. Under Alternative 4, the amount of uranium discharged to the Great Miami River will increase, even if the concentration of the discharge will be lower. Any hypothetical concentration effect will be negligible given the flow rate of the discharge (4.5 cfs) compared to the river flow (3,460 cfs).

157. Section 5.5.2, Page 5-18, Fourth paragraph: The decision to locate proposed extraction wells so close to residential and commercial properties should be reconsidered. The EE/CA states that existing wells within the principal zone of drawdown for the extraction system are believed to be screened in a deeper aquifer. The screen intervals should be confirmed before finalizing extraction well locations.

158. Section 5.5.2, Page 5-19, Second paragraph: The construction period time frame has now been changed from 6 months to 12 months. No change in the costs of Alternative 4 has been noted as a result of this change.

159. Section 5.5.3, Page 5-19, Fifth paragraph: The lengthy and uncertain NPDES permit process for Alternative 4 should be sufficient reason to reject this alternative. It seems unlikely that additional discharges to the Great Miami River would be permitted, given that FMPC is not meeting current discharge limits (see Page 5-17).

160. Section 5.5.3, Page 5-19, Fifth paragraph: Groundwater should be tested for any problematic chemicals.

161. Section 5.6.1, Page 5-21, Second paragraph: It is not clear why hazard indices for Alternative 5 (which includes treatment and reduced uranium loadings to the Great Miami River) exceed the hazard indices for Alternative 4 (Page 5-20).

162. Section 5.6.2, Page 5-21, Fifth paragraph: The second sentence of the fifth paragraph should be changed to indicate that the total mass of uranium will not exceed FMPC's discharge limit, rather than the "existing FMPC release value". Existing releases already exceed the discharge limit.

163. Section 5.6.2, Page 5-22, Third paragraph: The mass of uranium in the sludge will be less than the mass of uranium in the untreated water pumped to the river under Alternative 4. Proposed techniques for handling the sludge should be presented.

164. Section 5.6.2, Page 5-22: The amount of uranium sludge generated by Alternative 5 should be relatively small. If handled properly, the sludge should not pose a significant public health or environmental threat.

165. Section 5.6, Page 23: On page 19, the following statement is made: "Minimal access to and easement across other properties will be required." Is this also true of Alternative 5?

166. Section 5.7.1, Page 5-24: The chemical-specific TBC of 33 ug/l is derived from U.S. DOE Order 5400.5. Comments regarding this derivation have previously been presented. This U.S. DOE Order also requires treatment. This fact needs to be addressed as a TBC.

167. Table 5-1: This table contains no air emissions standards. Would no ARARs exist for the process and operation.

168. Table 5-1, Page 5-26: Are any wetlands located within the South Plume area?

169. Table 5.1, Page 5-28: The EE/CA did not consider any alternatives that includes the re-injection of groundwater. Where is such an alternative considered? If so, is it not on-site such that only substantive requirements need be met? The second ARAR should be deleted.

170. Table 5.1, Page 5-28: Operable Unit 6 is listed under the sixth ARAR. This requires revision.

171. Table 5.1, Page 5-30: "Established cleanup standards for inactive uranium mill tailing sites; some standards may be

applicable to the FMPC remedial response". What are they? Some others be relevant and appropriate.

172. Section 5.7.2, Page 5-31: "In addition, a Corps of Engineers (COE) wetlands permit may be required for the stream crossings necessary for the alternate water supply in Alternatives 3, 4, and 5." Will these activities be considered off-site?

173. Section 5.7.3, Page 5-31: A reference is made to supervision by the U.S. Nuclear Regulatory Commission (NRC) of actions taken as a result of releases from FMPC. The NRC authority and requirements should be clearly delineated.

174. Section 5.7.3, Action-Specific ARARs and TBCs: "...are also subject to U.S. EPA pursuant to 40 CFR 264 and 40 CFR 300." The process and operation are also subject to 40 CFR 262.

175. Section 5.7.3, Page 5-32: "Management of residuals from the treatment and disposal actions will be regulated under the NRC land disposal rules (10 CFR 62) and U.S. DOE Order 5820.2." If these residuals contain hazardous wastes, the hazardous waste portion of those residuals are subject to the 40 CFR 268 Land Disposal Restrictions.

176. Section 6.3, Page 6-2: As stated, the pump and treat alternative has been given slightly higher preference due to reduction in discharge concentrations. The preference of CERCLA for treatment and U.S. DOE's Guide 5400.5 requirement for treatment is not addressed in the EE/CA.

177. Section 6.3, Page 6-3, Second paragraph: The "unassociated releases from FMPC operations" are not subject to regulation under CERCLA, and hence are not required by SARA to employ treatment technologies that permanently and significantly reduce toxicity, mobility and volume. Thus, although this risk comparison may be valid, it does not take into account the specific intent of the SARA amendments. The EE/CA should be modified to include removal and treatment of the south plume alone as a separate alternative.

178. Section 6.3, Page 6-3, Second paragraph: The discharge needs to be treated. The current discharge already exceeds limits and it is a regulatory requirement to meet ARARs. The NCP states that there should be a preference for permanent solutions using treatment technologies.

179. Section 6.3, Page 6-3, Third paragraph: This paragraph should further describe "ongoing plans for a more comprehensive and effective treatment facility" and should state when the facility will be completed. Documentation that this facility will provide effective treatment should also be provided.

180. Section 6.4, Page 6-4: It is unclear that the treatment option will not be necessary to be protective of public health and the environment in the future. Removal actions shall, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action with respect to the release concerned (40 CFR 300.415(c)).

181. Section 6.4, Page 6-4, Second bullet: This statement could be true for any cleanup where groundwater is treated. However, the preference for treatment implicitly allows production of sludge where toxicity and volume of waste are reduced, especially where it may be necessary to implement the same treatment system for protection of public health and the environment in the future. The implementation of the treatment system now would appear to be consistent with final remediation.

182. Section 6.4: The option of both mitigating the migration of the plume at the low-concentration front edge and treatment of the more concentrated portion of the plume should be considered as an alternative in this EE/CA. The generation of highly concentrated uranium sludge (second bullet) is not a sufficient reason to reject Alternative 5.

183. Appendix: Portions of the appendix would be more appropriate for the main text of the document.

184. Section A.3.0, Model calibration: The values that were used for hydraulic conductivity and recharge are required to be presented. An explanation on how these values were derived should also be presented. This information is necessary for evaluation of the modelling. Terms, such as, "reasonable estimates" are too vague to be of any use.

185. Section A.3.0: An explanation of the interaction between surface water and groundwater in the model is required. An explanation of how the primary sources areas, Paddys Run and drainage ditch, were addressed in the model is required.

186. Figure A-2: This diagram indicates that the model does not provide a good simulation of the plume southwest of FMPC.

187. Figure A-2: There is inadequate groundwater monitoring well coverage throughout the area where the model predicted there should be contamination.