G-000-105.28

3859

SITE-WIDE CHARACTERIZATION REPORT

10/29/92

DOE-0242-93
DOE-FN/EPA
35
LETTER

[redacted]

Department of Energy
Fernald Environmental Management Project
P.O. Box 398705
Cincinnati, Ohio 45239-8705
(513) 738-6357

3859

OCT 29 1992

DOE-0242-93

Mr. James A. Saric, Remedial Project Director
U.S. Environmental Protection Agency
Region V - 5HR-12
230 South Dearborn Street
Chicago, Illinois 60604

Mr. Graham E. Mitchell, Project Manager
Ohio Environmental Protection Agency
40 South Main Street
Dayton, Ohio 45402

Dear Mr. Saric and Mr. Mitchell:

SITE WIDE CHARACTERIZATION REPORT

The purpose of this letter is to transmit draft comment responses on the Site Wide Characterization Report (SWCR) to provide a basis for discussion at the meeting scheduled for November 5, 1992. The SWCR comment responses are organized in the same manner as those provided. Each section and commentor is identified with a draft response and action to be taken. It is expected that these comments will be addressed at the November 5 meeting in Chicago.

If you or your staff have any questions, please contact Randy C. Janke at FTS/Commercial 513-738-6883.

Sincerely,

Jack R. Craig
Fernald Remedial Action
Project Manager

FN:RC Janke

Enclosure: As Stated

Recycled and Recyclable

cc w/enc.:

3859

K. A. Hayes, EM-424, TREV
T. Schneider, OEPA-Dayton
T. W. Hahne, PRC
L. August, GeoTrans
P. Van Leeuwen, USEPA-V, 5 HSM
S. Fauver, EM-424, TREV

cc w/o enc.:

J. J. Fiore, EM-42, TREV
L. Jensen, USEPA-V, AT-18J
B. Barwick, USEPA-V, 5CS-TUB-3
J. Kwasniewski, OEPA-Columbus
P. Harris, OEPA-Dayton
M. Proffitt, OEPA-Dayton
F. Bell, ASTDR
R. L. Glenn, Parsons
N. C. Kaufman, FERMCO/72
J. A. Rasile, FERMCO/72
J. W. Thiesing, FERMCO/72
D. J. Carr, WEMCO/52-8
L. S. Farmer, WEMCO/2
J. P. Hopper, WEMCO/52-8
J. D. Wood, ASI/IT
J. E. Razor, ASI/IT
AR Coordinator, WEMCO

USEPA GENERAL COMMENTS

1. **Response:** The purpose of the SWCR is to provide a summary of FEMP site data as of December 1, 1991, not to discuss the nature and extent of contamination at the site. The nature and extent discussions will be provided in the operable unit RI reports, which will contain the validated data required for remedial action decision-making. For example, groundwater plumes and contaminant sources will be identified in the RI report for Operable Unit 5. It is impractical to use the SWCR to identify data gaps because the document does not contain all the data which will presented in the RI reports, due to the data cutoff date.

   Action: No change is required in the text.

4. **Response:** The SWCR presents data from a wide variety of sources which do not always clearly state the rationales for analyzing various contaminants, or the particular objectives of the study. Further, it is not the purpose of the SWCR to determine whether the studies cited met their objectives or had appropriate rationales. The intent of the SWCR is to summarize the available data. As stated in the response to Comment 1, it is impractical to use the SWCR to identify data gaps because the document does not contain all the data which will presented in the RI reports, due to the data cutoff date.

   Action: No change is required in the text.

5. **Response:** The information requested will be added to the methods section in Part I, Section 3.

   Action: In the first listing of each study described in Part I, Section 3, it will be indicated whether the project plan and any extant reports were subject to U.S. EPA or OEPA review or approval.

6. **Response:** As stated in the response to Comment 1, it is impractical to use the SWCR to identify data gaps because the document does not contain all the data which will presented in the RI reports, due to the data cutoff date. Section 4.2.1.5 of the approved work plan for the RI/FS program (Revision 3, March 1988) at the FEMP presents the objectives, scope, and rationale for the sampling of surface water bodies. This section of the work plan identifies the number and location of surface water and sediment samples for the RI/FS program. Table 4-3 of the work plan document explains which groups of constituents would be analyzed for each general sampling location for the RI/FS effort. The inorganic analyses were only conducted for those samples that were evaluated for extended hazardous substance list constituents. The RI/FS surface water and sediment sampling program was designed to make use of ongoing WEMCO monitoring programs, and the majority of the collected samples were typically analyzed for total uranium, gross alpha, gross beta, and a full radiological analysis. The extended hazardous substance list

constituent analyses, which included cyanide analyses, were only performed for a small subset of the surface water and sediment samples collected for the RI/FS program.

Cyanide was identified as an analyte that would be evaluated for a single round of sediment samples and for specifically identified surface water samples. A preliminary review of the data indicate that there were no detectable concentrations of cyanide.

Groundwater samples collected from selected monitoring wells in accordance with the RI/FS Work Plan and subsequent addenda were analyzed for cyanide. The SWCR uses the data available in the referenced reports or in the Fernald database. The cyanide analytical results of these samples are summarized in Tables 4-55, 4-61, and 4-62, and tables in Appendix M.

Action: Additional discussion of existing cyanide data will be presented in the revised SWCR where these tables are referenced.

9. **Response:** WEMCO had an active monitoring program for surface water quality on Paddys Run and the Great Miami River in 1988 prior to the initiation of the RI/FS program. The Sampling Plan for the RI/FS stated that the existing monitoring points on the Great Miami River (3), Paddys Run (6), the Storm Sewer Outfall Ditch (1) and the Main Effluent Line at Manhole 175 (1) would be sampled quarterly for one year for RI/FS purposes. In addition, four sampling points on the Great Miami River were added by the RI/FS to augment the established monitoring points. These fifteen points were shown in the Sampling Plan (Figure 5.1, p.5-6, DOE, 1988) and were subsequently approved by the U.S. EPA. Sampling Points W1 on the Great Miami River and W9 on Paddys Run are sufficiently upstream that surface water or groundwater from the FEMP is not entering the stream and influencing water quality at these points. This may or may not also be true of Sampling Points W5 on Paddys Run and GMR1 on the Great Miami River (Figure 3-10).

It is possible that some airborne contaminants may have been deposited in the watersheds of Paddys Run upstream of Sampling Point W9 and the watershed of the Great Miami River upstream of Sampling Point W1. However, this does not necessarily mean that this potential source has a measurable effect on water quality in those streams, particularly the Great Miami Aquifer which has a very large upstream drainage area.

In the case of Sampling Point W1, there may be other upstream sources of radionuclides unrelated to the FEMP (e.g., Mound Laboratory). Also, the data for Sampling Points W1 and W9 have not been validated. Thus, it is possible that some anomalously high values of radionuclides or other constituents in the background stream sample data may be due to errors. For example, the one high value of Tc-99 found at Sampling Point W1 in 1984 may be invalid (see Response to EPA Specific Comment #105).

Action: All of the background stream water and sediment data will be validated and thoroughly evaluated during the preparation of the Operable Unit 5 RI Report. These data will also be compared against other water quality data collected upstream (e.g., USGS data from Hamilton gaging station) in order to establish legitimate stream water and sediment background concentrations.

10. **Response:** As stated in the response to Comment 1, it is not the intent of the SWCR to provide the detail necessary to discuss the nature and extent of contamination at the FEMP. The requested maps should be based on a complete and validated database, which will be available for the operable unit RI reports, but was not available for the SWCR.

    Action: No change is required in the text.

12. **Response:** It is not the purpose of the SWCR to identify potential data gaps. A review of some of the more recent and comprehensive sampling efforts at the FEMP indicates that an appropriate Great Miami River sampling location, downstream of the confluence of Paddys Run, has usually been included as part of the program. For example, the 1986 "Interim Report" by IT Corporation used a sampling location on the Great Miami River (R-4) that was located approximately 1500 feet downstream of the Paddys Run confluence (see Figure 3-6). The 1988 "FMPC Sampling and Analysis Report" also contained similar downstream sampling locations (see Figure 3-8, sample locations 0420 and 0421). The RI/FS sampling effort included a downstream sampling point (GMR-4, Figure 3-10) that coincides with the location in the two reports identified above.

    Action: No change is required in the text.

15. **Response:** The requested analyses and descriptions will be provided in the Operable Unit 5 RI report and are currently available in part in the Groundwater Report. It is not the intent of the SWCR to predict future contaminant trends, evaluate plume migration or identify continuing sources of release.

    Action: No change is required in the text.

17. **Response:** Please see the response to Comment 10.

    Action: No change is required in the text.

18. **Response:** A general discussion of groundwater chemistry is presented in Section 4.1.4.4 of the SWCR.

    Action: A detailed evaluation of trends, seasonal fluctuations, and geochemical interactions with other media will be presented in the OU5 RI Report.

19. **Response:** Please see the response to Comment 10.

Action: No change is required in the text.

21. **Response:** As stated in the response to Comment 1, it is not the intent of the SWCR to provide the detail necessary to discuss the nature and extent of contamination at the FEMP. That analysis should be based on a complete and validated database, which will be available for the operable unit RI reports, but was not available for the SWCR.

Action: No change is required in the text.

22. **Response:** Please see the response to Comment 10.

Action: No change is required in the text.

24. **Response:** It is acknowledged that the June 1992 work plan states that lead toxicity will be evaluated with the EPA Uptake/Biokinetic Model. There are, however, several limitations with the use of this model. First, the Uptake/Biokinetic model is available only in draft form. Second, because a child is recognized as the most sensitive receptor to lead, the model applies only to a child receptor aged from birth to seven years, not to any adult receptors. Finally, the model provides output in the form of blood lead levels; additional information would be needed to evaluate "risk" from this output (i.e., some measure of health risk as a function of blood lead levels).

There are several receptor scenarios in the SWCR with an adult receptor. In order to be health protective and provide quantitative estimates of site exposure to lead, "acceptable daily intakes" were estimated for lead based on a blood lead level of 15 μg/dℓ. This is the blood lead level below which children do not demonstrate neurological deficit (Marcus 1986). This level was used for adults and children. Factors that describe the relationship between oral intake and blood lead (Ryu et al. 1983 and Pocock et al. 1983) along with an uncertainty factor of 5 were used to derive oral acceptable daily intake levels for adults and children. The lowest of the two levels was used for all receptors. This acceptable daily intake was then used in the same manner as an RfD. We feel that this is a defensible approach in the absence of a Uptake/Biokinetic model for adult receptors.

Action: The latest available version of the Uptake/Biokinetic model (version 5.0) will be used for the child receptor in the current land use scenarios with and without access controls. For model parameters where site-specific values are not available, default parameters in the model will be used. Recognizing that the model is in draft form, blood lead levels for the child receptors will be presented in the revised SWCR and HI values deleted from the results. HI values estimated using the method cited above will be retained in the SWCR for adult receptor/scenarios to compare relative levels of concern for lead with other chemicals of potential concern.

25. **Response:** DOE agrees with the comment.

Action: Cancer risks and hazard quotients will be summed across all chemicals in a scenario and the sum presented in the Section 5 tables. In addition, chemicals that are major contributors to the HI and their target organ(s) will be noted for those scenarios with a total HI greater than 1.

27. **Response:** It should be noted that the title of Part III of the SWCR is "Feasibility Study Support," not "Feasibility Study." The purpose of Part III is to provide the preliminary remediation goals for the FEMP and to provide, in Section 3, a list of the Leading Remedial Alternatives to be used in writing the FS Comprehensive Response Action Risk Evaluations. There is no intent to define "final remedial technologies" or to screen alternative remedial actions. This will be done in the operable unit feasibility studies and proposed plans.

    Action: No change is required in the text.

28. **Response:** Please see the response to Comment 27.

    Action: No change is required in the text.

29. **Response:** The Operable Unit 2 FS Comprehensive Response Action Risk Evaluation will use the preferred alternative for OU2, rather than the LRA. The preferred alternative will be selected based on the results of the screening process in the FS, which will be subject to EPA review. It is therefore more appropriate to defer this discussion to the OU2 FS.

    Action: No change is required in the text.

32. **Response:** As stated in the response to Comment 1, it is impractical to use the SWCR to identify data gaps because the document does not contain all the data which will presented in the RI reports, due to the data cutoff date of December 1, 1991. Several sampling efforts which included nonradionuclides were either incomplete or not yet entered on the RI/FS database on that date. Potential data gaps can only adequately be discussed in the operable unit RI reports.

    Action: No change is required in the text.

33. **Response:** The reviewer is correct that a poor correlation exists between field-derived estimates of radioactivity when compared to laboratory-derived analytical results. In the SWCR discussion of surface water and sediment data, the reporting of field data is generally limited to the laboratory-derived radionuclide measurements rather than the field derived radioactivity measurements presented in the 1988 "FMPC Sampling and Analysis Report." The field data are presented for the purposes of providing a summary of the historical non-RI/FS environmental data collected at the site, and should not be directly comparable to data collected under the protocol established in RI/FS work plan. The

discussion of the data was focused on the radionuclide-specific laboratory data rather than the field-derived radioactivity measurements.

Action: A sentence will be added to qualify the data from the 1988 "FMPC Sampling and Analysis Report," and identify that there would appear to be a poor correlation between the field data and the correlative laboratory data.

34. **Response:** Please see the response to Comment 10.

Action: No change is required in the text.

USEPA SPECIFIC COMMENTS

1. **Response:** Based on data presented in Tables 4-11 and 4-23, there is an increase of total uranium in downstream water samples relative to upstream samples in the Great Miami River.

Action: The text will be modified to explicitly state the upstream and downstream average values of total uranium and the relative increase on a percentage basis.

46. **Response:** It is not the intent of the SWCR to evaluate the usefulness or rationales of previous sampling efforts at the FEMP. The RI/FS program added four new sampling locations (GMR1, GMR2, GMR3, and GMR4) to the Great Miami River to supplement the existing sampling points. These sampling locations were approved by the U.S. EPA in the 1988 RI/FS Work Plan for the FMPC, Revision 3. The RI/FS sampling effort includes a sampling location on the Great Miami River (GMR-4) that was located approximately 1500 feet downstream of the Paddys Run confluence.

Action: No change is required in the text.

50. **Response:** The purpose of the SWCR is to provide a summary of the environmental data collected for the FEMP. It is not the intent of the SWCR to evaluate the usefulness or rationales of previous sampling efforts at the FEMP. When possible, the planning documents and related quality assessment documents resulting from these various monitoring programs are referenced. It is suggested that the commentor examine both the sampling plan and the quality assurance plan documents for this program (cited at the top of page 3-52) for this level of information.

Action: No change is required in the text.

52. **Response:** Section 4.2.1.5 of the approved work plan for the RI/FS program (Revision 3, March 1988) at the FEMP presents the objectives, scope, and rationale for the sampling of surface water bodies for water and sediment sample collection and analysis. This

section of the work plan identifies the number and location of surface water and sediment samples for the RI/FS program. Table 4-3 of the work plan document explains which groups of constituents would be analyzed for each general sampling location for the RI/FS effort. The organic analyses were only conducted for those samples that were evaluated for extended hazardous substance list constituents. The RI/FS surface water and sediment sampling program was designed to make use of ongoing WEMCO monitoring programs, and the majority of the collected samples were typically evaluated for total uranium, gross alpha, gross beta, and a full radiological analysis only. The extended hazardous substance list constituent analyses, which includes VOCs, SVOCs, pesticides, and PCB compounds were only scheduled and performed for a small subset of all of the collected surface water and sediment samples collected for the RI/FS program.

Action: No change is required in the text.

56. **Response:** The purpose of the SWCR is to provide a summary of the environmental data collected for the FEMP. It is not the intent of the SWCR to evaluate the usefulness or rationales of previous sampling efforts at the FEMP.

Action: No change is required in the text.

74. **Response:** As stated in the response to the USEPA Specific Comment 56, it is not the intent of the SWCR to evaluate the usefulness or rationale of previous sampling efforts at the FEMP.

Action: No change is required in the text.

87. **Response:** The elements analyzed for during this sampling effort are stated in Section 3.1. Elements analyzed for but not detected are not included in Section 4.0 in order to reduce its length and focus on those substances which were found. The complete data set for the silos will be provided in the RI report for Operable Unit 4.

Action: No change is required in the text.

88. **Response:** The complete data set for the silos will be provided in the RI report for Operable Unit 4.

Action: No change is required in the text.

96. **Response:** As stated in the response to Comment 1, it is not the intent of the SWCR to provide the detail necessary to discuss the nature and extent of contamination at the FEMP. Any required graphics identifying areas of varying contaminant levels will be provided in the Operable Unit 4 RI reports.

Action: No change is required in the text.

104. **Response:** Please see the Response to USEPA General Comment #9.

Action: The background surface water and sediment data will be validated and thoroughly evaluated in the Operable Unit 5 RI report. These data will also be compared with other water quality data collected upstream, for example, from the USGS gaging station at Hamilton.

105. **Response:** Monitoring Station W1 on the Great Miami River was sampled 6 times by WEMCO between 1985 and 1990. TC-99 was not detected in 8 out of the 12 samples collected; the highest activity of Tc-99 detected was 5 pCiℓ. Also, Tc-99 was always nondetectable (detection limit was 30 pCiℓ) in 6 samples collected and analyzed for from Station W1 during RI/FS characterization efforts. One sample collected at Station W1 in 1984 by NLO supposedly had a Tc-99 activity of 1351 pCiℓ. It is strongly presumed that this older data point is incorrect and probably due to some sampling, labeling, analytical, or transcription error. Activity of Tc-99 was consistently lower at Station W1 than downstream monitoring stations.

Action: The background surface water and sediment data will be validated and thoroughly evaluated in the Operable Unit 5 RI report. These data will also be compared with other water quality data collected upstream, for example, from the USGS gaging station at Hamilton.

106. **Response:** The early environmental sampling program for the Great Miami River consisted of three sampling points:

- W1 - upstream of the effluent line discharge point, located near the Venice Bridge (Ross),
- W3 - downstream of the effluent line discharge point, but upstream of the confluence with Paddys Run, located near the New Baltimore Bridge, and
- W4 - downstream of the confluence with Paddys Run, located near the Miamitown Bridge.

The nature of the materials discharged to the Great Miami River through the effluent line was evaluated at point W2, which coincided with manhole-175 at the facility.

Although this may indeed be an historical data gap for the Environmental Monitoring Program effort at the FEMP, the RI/FS sampling program has supplemented this monitoring network, so that potential radionuclide or chemical point sources to the Great Miami River (i.e., the FEMP effluent line, Blue Rock Creek (just upstream from New Baltimore], and Paddys Run [and consequently the storm sewer outfall ditch]) are adequately monitored to evaluate and quantify water quality impacts caused by tributary and effluent sources.

Action: The text will be revised to improve the explanation of the RI/FS surface water and sediment sampling locations for the Great Miami River.

109. **Response:** Please see Response to USEPA General Comment #9.

In Table 4-11 of the SWCR, Tc-99 was listed as much higher upstream than downstream. This conclusion is incorrect, because it was based on one bad data point of 1351 pCiℓ (please see Response to USEPA Specific Comment #105). Isotopes of uranium (U-234, U-235, U-236, and U-238) were all listed as slightly higher upstream than downstream. However, this may be due simply to a small data population. Based on total uranium data in Table 4-11, it is clear that total uranium is slightly higher at the downstream stations. There are more than 750 total uranium data for each sampling station. Thus, one must assume that the conclusions based on the total uranium data are more reliable, i.e., uranium concentrations are increasing in a downstream direction. Aside from the Tc-99 and the uranium isotopic data, there are no other radionuclides higher at Station W1 (upstream station). It is not the purpose of the SWCR to address the appropriateness of using particular sampling locations as background. However, the text will be expanded to include the discussion above.

Action: Expand the text to discuss the higher values for some constituents at W1 relative to downstream locations.

112. **Response:** The Ross Bridge (or Venice Bridge) sampling station is the same as Station W1 on the Great Miami River (Figure 3-10), which has been used repeatedly during many FEMP studies and programs as the upstream sampling station. Based on several studies and many hundreds of samples analyses, the total uranium concentration at Station W1 is in the range of 1 to 2 pCiℓ (Table 4-11 and 4-23).

Action: The statement on p. 4-40, line 12 is incorrect and will be corrected. Also, the paragraph containing this statement will be expanded and clarified.

126. **Response:** No heavy metals were found to be significantly higher in downstream stations from Station W1 than concentrations found at Station W1. In general, this statement is true. However, data populations for each constituent at each station is often 2 or less, so conclusions can not be stated emphatically. For a few metals (e.g., mercury), it even appears that concentrations upstream are higher than downstream.

Air emissions from FEMP may have contributed minor amounts of metals to the streams (Paddys Run and Great Miami River). However, many other potential sources of metals may be entering the streams upstream of the FEMP and there is absolutely no way to identify how much of the metals originated from FEMP airborne emissions and how much originated from other upstream sources.

Action: No change is required in the text.

132. **Response:** The standard used for comparison was the applicable guideline in effect at that time, DOE Order 5480.xx, which limits the discharge of radionuclides including Th-228, Th-230, Th-232, U-234 (500 pCiℓ), U-235 (600 pCiℓ), and U-238 (600 pCiℓ). However, these drainage ditch samples occur in areas with intermittent flow conditions, and should not be compared to "background levels" observed for other water courses as the reviewer has suggested.

Action: The standard is incorrectly stated in the text as 550 pCiℓ and will be corrected and explained in more detail. Those specific sample locations that exceeded the DOE guidelines will be properly identified in Section 4.1.3.4.

143. **Response:** As stated in the response to Comment 1, it is not the intent of the SWCR to provide the detail necessary to discuss the nature and extent of contamination at the FEMP. The requested figures should be based on a complete and validated database, which will be available for the operable unit RI reports, but was not available for the SWCR.

Action: No change is required in the text.

144. **Response:** Please see the response to Comment 143.

Action: No change is required in the text.

147. **Response:** Please see the response to Comment 143.

Action: No change is required in the text.

151. **Response:** The requested analyses and descriptions will be provided in the Operable Unit 5 RI report and are currently available in part in the Groundwater Report. Those analyses should be based on a complete and validated database, which will be available for the operable unit RI reports, but was not available for the SWCR.

Action: No change is required in the text.

158. **Response:** Please see the response to Comment 143.

Action: No change is required in the text.

163. **Response:** The background perched groundwater data will be reevaluated for purposes of RI reports. It is not clear how high UTLs may lead to inaccurate data reporting.

Action: The 1000 Series background wells used to represent background perched groundwater quality will be reevaluated and UTLs will be recalculated for purposes of the RI reports.

164. **Response:** Organic compounds detected in perched groundwater have been summarized in Table 4-56 based on the compound variety, the well locations, the potential source areas, and the degree of contamination (i.e., concentration range). Further extrapolation of these data beyond this should be performed after the completion of the data validation process.

Action: Detailed discussion and evaluation of these organic analytical results will be presented in the OU5 RI Report following the completion of the data validation process.

170. **Response:** The suggestion that the use of different analytical laboratories may have accounted for the year to year differences originated in the report cited, not the SWCR. It is important to point out that switching laboratories may confound the interpretation of interyear differences, whether or not it can be "proved."

Action: No change is required in the text.

171. **Response:** The statement originated in the report cited, not in the SWCR.

Action: No change is required in the text.

174. **Response:** Available data on surface water quality at and adjacent to the FEMP are provided in Section 4.1.3. It should be noted that the general patterns observed are similar to those for decreasing macroinvertebrate diversity found by Facemire et al. (1990) in their 1986-1987 study.

Action: No change is required in the text.

181. **Response:** This comment requests that Risk Based Quantitation Limits (RBQLs) be derived and presented for radionuclides, using the approach used to derive RBQLs for chemicals in Appendix N. RBQLs are presented for chemicals in order that reported detection limits that greatly exceed detected measurement values can be eliminated from a data set to avoid a bias in calculated statistical summary parameters. Such a bias could result in high risk estimates for chemical constituents that may not actually be present in samples. Generally, radiological sample analytical results that are reported as less than a detection limit are within the project-specific detection limits, do not exhibit great variation for a given medium and analyte, and do not greatly exceed detected measurement values reported for radionuclides. For these reasons, RBQLs for radionuclides are not necessary and are not included in the SWCR.

It is noted that unusually high detection limits are reported for nondetections for waste samples from the K-65 silos and Silo 3. However, the raw data reveal that the magnitude of these detection limits is consistent with the magnitude of detected measurement values in the same data sets.

Action: RBQLs for radionuclides will not be added to the SWCR, Appendix N. However, the existing RBQLs in Appendix N will be reviewed to ensure that they reflect the use of the same toxicity data used to assess the human health impacts for chemicals in the risk characterization of the SWCR.

182. **Response:** The concentration-toxicity screening procedure is a "risk-based" calculation since it involves calculation of "chemical-specific risk factors" as they are described in RAGS Part A. Furthermore, page 5-24 of RAGS Part A describes the ratio calculated using the concentration-toxicity screening procedure as the ratio of the risk factor for each chemical to the total risk factor for the medium (as it is also described in the SWCR), rather than as the sum of all eliminated chemicals as described in the comment.

Action: No text change is required.

184. **Response:** Please see response to USEPA General Comment #9.

Action: Please see action to USEPA General Comment #9.

186. **Response:** The population within a 5-mile radius of the FEMP is determined from an origin located in the center of the former production area. Population estimates for the RI/FS use the standard approach of estimating populations from the source of all releases. Because of the difficulty in preparing a separate population estimate from the boundary of each release from the site, the center of the FEMP was chosen as the source and center point for estimating potentially exposed populations.

Action: This response and action must be made consistent with whatever changes are made on Appendix C of Part I entitled: "1990 POPULATION ESTIMATES AND PROJECTED POPULATION DATA".

190. **Response:** The groundwater concentration screening limits were applied to groundwater immediately prior to its mixing in the aquifer. This additional mixing generally results in a further dilution of modeled constituent concentrations. This dilution decreases the constituent concentration by a factor of 10 to 40, depending on the source type and its physical location. Thus the 10^{-7} risk screening level for water entering the aquifer results in estimated concentrations in the aquifer of 10^{-8} or lower. The Hazard quotient screening level of 20 percent would be decreased by the same factor, to 2 percent or lower.

Action: DOE will add text clarifying that the screening level concentrations chosen for constituents in water in the vadose zone insure that concentrations corresponding to a risk level of 10^{-8} and a Hazard quotient of 2 percent in the aquifer are not exceeded.

192. **Response:** The alteration of individual parameters by themselves is quite feasible and corresponds with DOE's commitment to follow EPA's guidance in the CERCLA process at the FEMP. However, the cumulative effect of changing all of the parameters listed in

the various EPA comments should be considered. To change all of the parameters, recalculate all of the intakes, ILCRs and HI's and present them in an understandable manner will require considerable time and effort. Therefore DOE proposes to change only those parameters which result in significant changes to the risks presented for important exposure scenarios at the FEMP.

In this case, changing the breathing rate for the hypothetical visitor from 2.0 m^3/hr to 0.83 m^3/hr would increase the risks calculated for this receptor by a factor of 2.0 m^3/hr 0.83 m^3/hr or 2.4. As shown on Table 5-2 of Volume II of the SWCR, risks from radon inhalation dominate the airborne risks to this receptor. The ILCR for a visitor breathing at a rate of 0.83 m^3/hr is about 5×10^{-5}. The ILCR for a visitor breathing at a rate of 2.0 m^3/hr would increase to about 1.2×10^{-4}. Given the uncertainties in the exposure scenario and the radon inhalation slope factor, DOE feels these are essentially the same number (ie: 10^{-4}). For this reason, DOE does not propose to change this parameter in the preliminary baseline risk assessment.

Action: No text change in the SWCR is proposed at this time. In response to EPA's guidance in this matter, the breathing rate for the visitor pathway will be changed to 2.0 m^3/hr in subsequent drafts of the operable unit risk assessments.

194. **Response:** An exposure duration of nine (9) years for this receptor is correct. The receptor in question is the "typical on-property resident", not the RME individual. The parameters selected for this receptor are intended to investigate risks that are closer to the central tendency for on-property individuals. For this reason, the national median residency time of nine (9) years for a typical homeowner (listed on page 5-34 of The Exposure Factors Handbook, EPA 600/8-89/043) was used.

Action: No text change in the SWCR is required.

195. **Response:** Radionuclide slope factors are available in HEAST. The 1992 HEAST was used to obtain slope factors for radionuclides for the SWCR.

Action: The text will be clarified to reflect guidance priorities for sources of toxicity values and the toxicity values used will be confirmed.

200. **Response:** Please see Response to EPA General Comment #9.

Action: Please see action to USEPA General Comment #9.

203. **Response:** DOE is prepared to include soil ingestion as a pathway for the white-footed mouse and sediment ingestion for the muskrat and raccoon for the Operable Unit 5 Sitewide Ecological Assessment, and would appreciate guidance from U.S. EPA and OEPA on what values would be acceptable to use for soil intake by these species. It is suggested that this addition be made in the Operable Unit 5 assessment because it will

be able to rely on a complete and fully validated data set, which was not available for the SWCR.

Action: No change is required in the text. Request the assistance U.S. EPA and OEPA in identifying appropriate values for soil and sediment ingestion rates for the white-footed mouse, muskrat, and raccoon.

204. **Response:** The LOEL to NOEL factor was taken from Newell et al. (1987), as stated in the text. Newell et al. (1987) also used a factor of 0.1 to extrapolate short-term or subacute studies to chronic NOELs. Given that an acute NOEL should be higher than a chronic NOEL, a value of 0.2 is reasonable. If U.S. EPA wishes to provide guidance on this issue, it is suggested that this be done in the course of preparing the Operable Unit 5 Sitewide Ecological Assessment, as in the response to Comment 203.

Action: No change is required in the text of the SWCR. Request the assistance U.S. EPA and OEPA in identifying satisfactory wildlife toxicity criteria for use in the Operable Unit 5 Sitewide Ecological Assessment.

210. **Response:** The July 1992 MCLs were unavailable when the SWCR was prepared. DOE will add the latest MCLs to the table if EPA will provide them.

Action: Request July 1992 MCLs from EPA and incorporate them into Table 2-2.

215. **Response:** The population within a 5-mile radius of the FEMP is determined from an origin located in the center of the former production area. Population estimates for the RI/FS use the standard approach of estimating populations from the source of all releases. Because of the difficulty in preparing a separate population estimate from the boundary of each release from the site, the center of the FEMP was chosen as the source and center point for estimating potentially exposed populations.

Action: This response and action must be made consistent with whatever changes are made on Appendix C of Part I entitled: "1990 POPULATION ESTIMATES AND PROJECTED POPULATION DATA".

216. **Response:** This comment requests that Risk Based Quantitation Limits (RBQLs) be derived and presented for radionuclides, using the approach used to derive RBQLs for chemicals in Appendix N. RBQLs are presented for chemicals in order that reported detection limits that greatly exceed detected measurement values can be eliminated from a data set to avoid a bias in calculated statistical summary parameters. Such a bias could result in high risk estimates for chemical constituents that may not actually be present in samples. Generally, radiological sample analytical results that are reported as less than a detection limit are within the project-specific detection limits, do not exhibit great variation for a given medium and analyte, and do not greatly exceed detected

measurement values reported for radionuclides. For these reasons, RBQLs for radionuclides are not necessary and are not included in the SWCR.

It is noted that unusually high detection limits are reported for nondetections for waste samples from the K-65 silos and Silo 3. However, the raw data reveal that the magnitude of these detection limits is consistent with the magnitude of detected measurement values in the same data sets.

Action: RBQLs for radionuclides will not be added to the SWCR, Appendix N. However, the existing RBQLs in Appendix N will be reviewed to ensure that they reflect the use of the same toxicity data used to assess the human health impacts for chemicals in the risk characterization of the SWCR.

RESPONSES TO USEPA VAN LEEUWEN COMMENTS

3. **Response:** The Risk Assessment Work Plan Addendum proposed the comparison of the Upper Tolerance Limit (UTL) of background concentration data to site-related concentration data as one criterion for determining Chemicals of Concern (COC) at the site. This criterion was discussed with U.S. EPA and Ohio EPA with the resolution that, for the purpose of determining COCs, this is an acceptable method. There has never been any intention of using the UTL for background concentrations as the value from which background risks are calculated. There has never been any intention of subtracting these UTLs from site-related concentrations to obtain "above-background" concentrations.

   DOE agrees that the values of UTLs presented in different sections of the SWCR should be internally consistent.

   For certain chemicals in certain media, background concentrations were below the analytical detection limits for these chemicals and media. Approximate values for UTLs were listed as "less than" values in these instances. There are very few of these instances since many chemicals are assumed to have background concentrations of zero (i.e., UTL = 0).

   Action: Values of UTLs presented in different sections of the Report will be made to be internally consistent. Values of UTLs presented as "less than" values will be noted as approximate values estimated in the absence of measured concentrations exceeding the analytical detection limits.

8. **Response:** DOE agrees that this seems to be an area of reoccurring miscommunication which needs permanent resolution at the earliest possible time. The Site-Wide Characterization Report considers two groups of land use scenarios. The first group, known as current land use scenarios, are those which encompass current activities and land uses. The second group, called future land use scenarios, encompasses all potential activities and land uses, including those listed under the current land use scenarios.

Perhaps this is where the misunderstanding lies. All land uses are included in the group of future scenarios. Risks associated with future containment failures are evaluated for all future land uses (including the subset of scenarios shared with the current scenarios) during the preliminary Baseline Risk Assessment.

The SWCR calculates current risks for existing receptors under current land use practices using the concentrations of constituents currently reaching those receptors. The SWCR also calculates risks for these same existing receptors under future conditions using current land use practices and the concentrations of constituents which could reach those receptors in the future due to a loss of containment on the site. For example, the off-property farmer current land use scenario is also included as a subset of future land use scenarios. Risks to this receptor from potential releases are presented several times in the document. Figure 5-7 in the preliminary baseline risk assessment depicts risks to both on- and off-property farmers from estimated concentrations os radon in air. Another example is in Figure 5-9, which depicts the risks from all constituents and all sources to both on- and off-property farmers using the Great Miami River as a source of groundwater. Since the focus of the SWCR has been the determination of risks to the site-wide RME receptor, the lesser risks to current receptors from potential exposures are not generally reported.

Action: No changes are proposed in the SWCR.

11. FI portion of comment:

Response: DOE disagrees with the comment. The trespasser is postulated to spend a fraction of their day on the FEMP. Therefore, it is reasonable to assume that only a fraction of the dirt eaten during that day would come from the particular on-property source(s) investigated. An FI of 0.1 was selected as a reasonable valve for this parameter, in the absence of clear EPA guidance, as of December 1, 1991.

Action: No change is required in the SWCR. Should EPA guidance on the FI for the transient exposures incurred by a trespasser become available, they will be incorporated in operable unit risk assessments submitted after October 20, 1992.

11. EF portion of comment:

Response: DOE disagrees with the statement that EPA has provided prior guidance on this matter. Prior to this comment, DOE has not received guidance from EPA region V on parameter values for the trespasser scenario. DOE has been preceding in good faith by using what it considered, in the lack of EPA guidance, as reasonable assumptions for this scenario. DOE welcomes the information on the parameter values which apparently are now sanctioned by EPA for use in Region V risk assessments. DOE regrets that these values were not provided as part of the Risk Assessment Work Plan Addendum review process.

Action: Three separate actions are required:

1) DOE requests that a copy of the previous written communication from EPA Region V to DOE about the trespasser parameter values be forwarded to DOE as soon as possible to allow DOE to assess where communications may have been interrupted.
2) To satisfy project quality assurance standards, DOE will also require a written copy of this new guidance, and the rational used to derive the parameter values cited in the comment.
3) No change is required in the SWCR. However, in keeping with DOE's commitment to follow EPA guidance in the CERCLA process at the FEMP, the scenario involving the trespassing child without access controls will be changed to reflect this new EPA guidance in operable unit risk assessments submitted after October 20, 1992.

11. ED portion of comment:

Response: DOE has reported calculated results for the RME receptor in the SWCR. The exposure duration (ED) used to calculate results for the RME individual is 70 years, as stipulated in the Risk Assessment Work Plan Addendum. The estimated risks to a more typical on-property resident have also been reported and are considered supplemental to the RME results. This is clear from the scenario's use and presentation in Table 5-47 and its supporting text in Volume II of the SWCR.

The parameters selected for a more typical on-property resident are intended to investigate risks which are closer to the central tendency for on-property residents than are those calculated for the RME scenario. Consistent with this approach, the national median residency time of nine (9) years for a typical homeowner (listed on page 5-34 of The Exposure Factors Handbook, EPA 600/8-89/043) was used. Note that risks calculated for this more typical receptor are not presented as a "true" central tendency because this scenario is more conservative than the central tendency, as defined in the February 26, 1992 memo from EPA's Deputy Administrator F. H. Habricht to EPA's Assistant and Regional Administrators concerning "Guidance on Risk Characterization for Risk Managers". As the lead agency in the CERCLA process at the FEMP, DOE feels information provided by this more central calculation will be helpful to decision makers reviewing this document. DOE agrees with the commentor that a presentation of the true central tendency for hypothetical on-site residents is not required in this preliminary baseline risk assessment.

Action: No action required.

11. IR portion of comment:

Response: DOE disagrees. The soil ingestion rate (IR) of 0.1 g/d cited by the commentor is an upper-bound estimate. Since the behavior described by this receptor scenario is intended to be more typical of on-property residents than the RME receptor, a more central value was sought. Page 2-57 of the Exposure Factors Handbook cites two studies in which adult soil ingestion rates were reported. These IRs range across three

orders of magnitude, from 0.001 to 0.1 g/d. The value selected for use in this scenario represents the middle order of magnitude, 0.01. Since risks calculated using this number are presented only as a comparison to risks calculated for the RME individual, DOE feels that the selection of 0.01 g/d for the soil ingestion rate of a more typical on-property resident is reasonable.

Action: No action is required.

11. SA portion of the comment:
Response: The values used for SA are consistent with the Work Plan.

Action: No action is required.

13. **Response:** (1) It is acknowledged that the June 1992 work plan states that "lead toxicity will be evaluated with the EPA Uptake/Biokinetic Model". There are, however, several limitations with the use of this model. First, the Uptake/Biokinetic model is available only in draft form. Second, because a child is recognized to be the most sensitive receptor to lead the model applies only to a child receptor from birth to seven years of age, not to any adult receptors. Finally, the model provides output in the form of blood lead levels; additional information would be needed to evaluate "risk" from this output (i.e., some measure of health risk as a function of blood lead levels).

There are several receptor scenarios in the SWCR with an adult receptor. In order to be health protective and provide quantitative estimates of site exposure to lead, "acceptable daily intakes" were estimated for lead based on a blood lead level of 15 µg/dl. This is the blood lead level below which children do not demonstrate neurological deficit (Marcus 1986). This level was used for adults and children. Factors that describe the relationship between oral intake and blood lead (Ryu et al. 1983 and Pocock et al. 1983) along with an uncertainty factor of 5 were used to derive oral acceptable daily intake levels for adults and children. The lowest of the two levels was used for all receptors. This acceptable daily intake was then used in the same manner as an RfD. We feel that this is a defensible approach in the absence of a Uptake/Biokinetic model for adult receptors.

(2) Agreed.

Action: (1) The latest available version of the Uptake/Biokinetic model (version 5.0) will be used for the child receptor in the current land use scenarios with and without access controls. For model parameters where site-specific values are not available, default parameters in the model will be used. Recognizing that the model is in draft form, blood lead levels for the child receptors will be presented in the revised SWCR and HI values deleted from the results. HI values estimated using the method cited above will be retained in the SWCR for adult receptor/scenarios in order to compare relative levels of concern for lead with other chemicals of potential concern.

(2) Another chemical will be used as an example for air toxins.

15. **Response:** Agreed that profiles for chemicals of potential concern that are major contributors to high risk levels or hazard indices should be included.

Action: Summary toxicity profiles will be included for those chemicals of potential concern shown to be major contributors to high risk levels or hazard indices.

17. **Response:** Existing groundwater contaminant concentrations are included in potential exposures to present off-property residents under the current land use scenarios. Existing contaminant concentrations include contaminants from the South Plume, as reflected in existing groundwater sample analytical results; however, contaminant concentrations that may arise from migration of contaminants from the South Plume are not included in the current land use scenarios, these contributions are included in the future land use scenario. Risks from groundwater exposure pathways under the current land use scenarios are based on groundwater sample analytical results, which are from samples collected in 1991 and earlier. It should be noted that the Amended Consent Agreement specifies a data cut-off date of December 1, 1991 for the SWCR. Potential exposures from migration of contaminants from source areas (e.g., existing soil and waste contamination) to the groundwater are also included under the future land use scenario, given no action in the future.

Action: Add the following passage to the end of line 32 on page 5-4, as a new paragraph:

> "Existing groundwater contaminant concentrations are included in potential exposures to present off-property residents under the current land use scenarios. Existing contaminant concentrations include contaminants from the South Plume, as reflected in existing groundwater sample analytical results; however, contaminant concentrations that may arise from migration of contaminants from the South Plume are included in the future land use scenario."
>
> Add the following passage to the end of line 9 on page 5-5:
>
> "Potential future contaminant concentrations in groundwater are estimated by modeling the migration of contaminants from source areas (e.g., existing soil and waste contamination) to the groundwater under the future land use scenario, given no action in the future."

18. **Response:** The overall risk to each receptor will be presented in a table(s) to be added to Section 5.5.4.1. Contrary to the comment, Tables 5-44, 5-45, and 5-46 do not include information pertaining to the typical on-property resident; however, Table 5-47 does include the typical on-property resident receptor. The purpose of Table 5-47 is to present the risks contributed from various radionuclides in different media for each of the

receptors listed. Contrary to the comment, the risk assessment results for the typical on-property resident can be compared to the results for other receptors, keeping in mind that the typical on-property resident does not represent an RME receptor.

Action: Produce table(s) that present the overall risk to each receptor from all pathways. Add these table(s) to Section 5.5.4.1.

19. **Response:** (1) Agreed

(2) EPA guidance (HHEM 1989) suggests adding together hazard quotients for all chemicals, and for those hazard indices above 1, separating chemicals by target organ(s) or effect.

Action: (1) Receptors will be added to the table.

(2) Hazard quotients will be summed across all chemicals in a scenario and the sum presented in the section 5 tables. In addition, chemicals that are major contributors to the HI and their target organ(s) will be noted for those scenarios with a total HI greater than 1.

21. **Response:** The methods used for calculating dermal exposure are described in the workplan section 7.2.1.7. It is not always indicated in IRIS or HEAST whether a toxicity value is based on absorbed or applied dose. Also, oral absorption values are not available in the guidance. Appendix A states that if an oral absorption value is not available, it should be assumed to be equal to 1, which would not change the toxicity value used. Given the lack of available data, all oral absorption factors were assumed to be equal to 1.

Action: No action is required.

22. **Response:** DOE disagrees. DOE has calculated the Unit Risk Factors used in the SWCR by considering the risks incurred by a receptor from one constituent in one media via a number of pathways simultaneously. Appropriate parameter values and exposure models were used and the results summed to produce one medium specific concentration to risk conversion factor for that unique receptor. Since the parameter values and exposure models used to assess receptor exposures are not concentration dependent, the concentration to risk relationship is linear. The slope of the linear concentration vs. risk plot is the Unit Risk Factor for that receptor from that constituent in that medium.

The answer to the commentor's example question is "Yes", all of them are combined to produce the unit risk number.

Action: DOE recognizes that the methodology used to calculate the Unit Risk Factors is not evident from the current presentation provided in the SWCR. Additional

explanations and examples will be provided in the next revision as part of an expanded Appendix S.

USEPA RADIATION SECTION COMMENTS

General. **Response:** This is a potential problem in a large report, but it is time-consuming and expensive to duplicate all the figures referenced in later sections of the report.

Action: No change is required in the text.

14. **Response:** Cattle could drink from the pits if access controls were removed. Risks to users of meat and dairy products from cattle drinking from Pits 5, 6, and the Clearwell are presented in Section 5.2.2.4.

Action: No action required.

15. **Response:** Selection of COCs is the general issue in this comment. The comment states that the list of COCs for a medium should be consistent for all assessments that involve that medium. The comment presents the example of contaminant concentrations in groundwater from wells. Concerning the specific example of contaminant concentrations in groundwater, pages 2-9 and 3-20 state that statistical evaluations are performed on all potential COCs in each of the wells selected as potential RME groundwater well locations. The results of the statistical evaluations are presented in separate data summary tables for each potential RME well location in Appendix R. The wells are statistically evaluated separately in order to facilitate selection of an RME location for groundwater. The list of COCs selected in each of those data summary tables varies because sample analytical results for each of the wells vary. Therefore, the list of COCs in groundwater is not necessarily the same from well location to well location.

The list of COCs in other media vary because the media are considered in discrete subsets (e.g., distinct waste areas or distinct areas of contamination) to facilitate evaluating distinct areas rather than averaging data for a medium over the entire FEMP site. The list of COCs selected in each of those areas varies because sample analytical results for each of those areas vary. Other examples of this type of comment are requested from the commentor.

Action: No text change is required.

20. **Response:** The Upper Tolerance Limit (UTL) for background data is a parameter to which site-related data are compared as one criterion for determining chemicals of concern. It is a recognized method that has a sound statistical basis for evaluating whether site-related data are within the natural background distribution. Use of UTLs was

proposed in the Risk Assessment Work Plan Addendum that has been approved by U.S. EPA.

Action: No action required.

21. **Response:** DOE agrees that Table 2-3 to Table 2-28 need additional clarification on certain points. These include a description of how series radionuclides will be addressed in the risk assessment and a description of how blank data will be used.

Net concentrations of radionuclides will not be used for the risk assessment. Risks will be calculated for total radionuclide concentrations including background.

Action: Revise the descriptions and footnotes of Table 2-3 to Table 2-28 to indicate how series radionuclides will be addressed and how blank data will be used.

27. **Response:** Cattle could drink from the pits if access controls were removed. Section 3.2.4 states that these surface water bodies are considered as sources of site-related exposures. Section 3.3.3.1 presents exposure point concentrations for these impoundments. Section 5.1.3 states the intent to quantify risks from these areas. Section 5.2.2.4 presents calculated risks to users of meat and dairy products from cattle drinking from Pits 5, 6, and the Clearwell.

Action: No action required.

32. **Response:** The passage referenced in the comment presents the basis for identifying potential RME well locations. The passage on page 3-20, lines 31-33 states that risk calculations are performed to identify the potential RME well locations that yield the highest overall risks; therefore, both concentration and toxicity are considered in the determination of the RME well locations.

Action: No text change is required.

42. **Response:** Section 3.6.5 simply presents a discussion of contaminants detected in soil and waste media. No discussion of concentration or concentration-toxicity screening/selection is presented in Section 3.6.5.

Action: No text change is required.

50. **Response:** DOE does not understand the comment. The referenced section describes calculated risks to users of meat and dairy products from cattle grazing on exposed areas of the site. The potential for cattle to drink from the pits, and the calculated risks from this behavior are presented elsewhere. Section 3.2.4 states that these surface water bodies are considered as sources of site-related exposures. Section 3.3.3.1 presents exposure point concentrations for these impoundments. Section 5.1.3 states the intent to quantify

risks from these areas. Section 5.2.2.4 presents calculated risks to users of meat and dairy products from cattle drinking from Pits 5, 6, and the Clearwell.

Action: No action required.

52. **Response:** It is unclear what purpose would be served by discussing what radionuclides are not part of the routine effluent monitoring at the FEMP. The results of the effluent toxicity testing suggest that toxic effects of the effluent would not be detectable in the Great Miami River, regardless of its composition, if that composition is similar to that during the testing periods.

Action: No change is required in the text.

54. **Response:** The 11 samples were archived. As discussed in the response to Comment 1, it is not the intent of the SWCR to draw conclusions about the nature and extent of contamination at the FEMP. The nature and extent discussions will be provided in the operable unit RI reports, which will contain the validated data required for remedial action decision-making. The samples were analyzed following the 1988 RI/FS Work Plan, which was approved by U.S. EPA.

Action: No change is required in the text.

63. **Response:** DOE agrees with the comment.

Action: Add the following sentence to the end of line 12:

> "Unit risk factors and unit toxicity factors are derived based on the latest EPA guidance available at the time of the draft and they will be modified in the appropriate RI/FS risk assessment draft reports for the FEMP to reflect changes in EPA guidance."

64. **Response:** The Upper 95% Confidence Limit on the Mean (UCL) for background data is a statistic that is considered to be representative of the true mean of the background data, with a 5% probability that the true mean exceeds the UCL. The use of the UCL was presented in the Risk Assessment Work Plan Addendum that has been approved by the U.S. EPA.

Action: No action required.

USEPA COMMENTS FROM EILEEN HELMER

1. **Response:** There are no operable units expected to not be remediated to levels protective of human health, if that is what is meant by "low risk." U.S. EPA and OEPA have

previously agreed that operable unit-specific ecological assessments will not be required. If this additional level of detail is necessary, it is suggested that it be provided in the Operable Unit 5 Sitewide Ecological Assessment, which will be able to rely on a complete and fully validated data set, which was not available for the SWCR.

Action: No change is required in the text. Discuss the required level of detail in the Operable Unit 5 Sitewide Ecological Assessment with U.S. EPA and OEPA.

2. **Response:** Refinements of the kind suggested would be appropriate for the Operable Unit 5 Sitewide Ecological Assessment. However, it should be noted that the requested change will not have a major effect on the conclusions of the assessment, as it would increase estimates of radiation dose and hazard index by two-fold at most. The effort required to address this issue would be better directed at the OU5 assessment, which will have more complete and validated data.

   Action: See action for Helmer Comment 1.

5. **Response:** See response to Helmer Comment 2. Any U.S. EPA requirements for additional vegetation sampling will affect the schedule for the Operable Unit 5 RI report, with no clear benefit to remedial action decision-making. It is suggested that the existing WEMCO environmental monitoring program, which analyzes annual vegetation samples for uranium, would provide an indicator of the effects of plant operation on contaminant concentrations in vegetation.

   Action: No change is required in the text. If U.S. EPA requires additional vegetation sampling, the schedule for the Operable Unit 5 report will need to be extended.

9. **Response:** The requested studies would affect the schedule for the Operable Unit 5 RI report with no clear benefit to remedial action decision-making. U.S. EPA has not provided guidance on ecologically safe clean up levels other than the use of ambient water quality criteria as PRGs.

   Action: No change is required in the text. If U.S. EPA requires additional studies, the schedule for the Operable Unit 5 report will need to be extended.

10. **Response:** It is not clear how the results of effluent toxicity tests are to be used for comparisons with contaminant concentrations in waste disposal areas or on-site soils. The constituent concentrations in the effluent samples tested were "normal," in the sense that the values were not extremes. There is no intent to conduct further toxicity testing at the FEMP.

    Action: No change is required in the text.

12. **Response:** It is not the intent of the SWCR to describe the nature and extent of contamination at the FEMP. The nature and extent discussions will be provided in the operable unit RI reports, which will contain the validated data required for remedial action decision-making. Tables 6-43, 6-44, and 6-46 state the HI values for all constituents of potential concern for ecological receptors.

    Action: No change is required in the text.

13. **Response:** Refinements of the kind suggested would be appropriate for the Operable Unit 5 Sitewide Ecological Assessment. The effort required to address this issue would be better directed at the OU5 assessment, which will have more complete and validated data.

    Action: See action for Helmer Comment 1.

15. **Response:** It is not clear what the reviewer is requesting.

    Action: Request clarification of the comment.

16. **Response:** See response to Helmer Comment 1.

    Action: See action for Helmer Comment 1.

OEPA COMMENTS GENERAL

1. **Response:** It is more appropriate to address the background issue in the operable unit RI reports, which will be used to support remedial action decision-making, than in the SWCR, which will not. The RI reports will contain complete and validated data, and will be able to rely on the site-specific background soils data which was not available for the SWCR. The SWCR is intended as a data summary, not as a justification for any particular sampling program. The SWCR does provide background concentrations where comparisons are made to background, for example, in the risk assessment and in the selection of constituents of potential concern in Appendix R.

   Action: No change is required in the text.

OEPA COMMENTS SPECIFIC

9. **Response:** If this additional level of detail is necessary, it is suggested that it be provided in the Operable Unit 5 Sitewide Ecological Assessment, which will be able to rely on a complete and fully validated data set, which was not available for the SWCR.

   Action: No change is required in the text. Discuss the required level of detail in the Operable Unit 5 Sitewide Ecological Assessment with U.S. EPA and OEPA.

22. **Response:** Data from these programs was not available on December 1, 1991, the cutoff date for data to be included in the SWCR.

Action: No change is required in the text.

50. **Response:** The five 1000 Series background wells and their analytical data are being reevaluated. The presence of VOCs in these wells may be due to laboratory contamination.

Action: Revisions of the text will be made to fully explain the selection process and the data for the background wells.

52. **Response:** Please see Response to OEPA Comment #50.

Action: Please see action to OEPA Comment #50.

56. **Response:** Comment noted.

Action: The selection of background wells in perched groundwater and their respective data are being reevaluated for purposes of the RI reports. New UTLs will be calculated based on new well selection and/or revision of the data set used to calculate UTLs. The text will fully explain how wells were selected to represent background and how UTLs were calculated. The claim that Tc-99 could be a laboratory contaminant will be eliminated from the text.

74. **Response:** Random contact across the site involves both temporal and spatial distributions. The arithmetic mean concept addresses the temporal distribution, but even EPA in recent guidance (EPA 1992) suggests that a lognormal spatial data distribution from sampling data collected at one point in time should be accounted for by evaluating the arithmetic mean of the log-transformed data, which is mathematically equivalent to the geometric mean. We default to a maximum concentration if the calculated UCL is greater than the maximum value.

Action: No change is required in the text.

75. **Response:** Agreed to sum chemical risks and sum chemical hazard quotients. Target organ(s) will be indicated only where the HI is greater than 1.

Action: Cancer risks and hazard quotients will be summed across all chemicals in a scenario and the sum presented in the section 5 tables. In addition, chemicals that are major contributors to the HI and their target organ(s) will be noted for those scenarios with a total HI greater than 1.

76. **Response:** All risks must be calculated using the conventional slope factor methodology. After that point, if a risk of 10^{-2} is found, the one-hit model can be used. DOE has compared the impacts of using the one-hit equation instead of the conventional methodology used in the SWCR for risks between 10^{-2} and 10^{-1}. Figure 76 presents the results of this comparison. As can be seen from this figure, risk estimates produced by the two methodologies agree to within 10% for calculated risks less than 2.0×10^{-1}. The highest risk from one constituent in one media calculated using HEAST slope factors and reported in the SWCR is below this number. DOE feels the impact of this minor change will not effect the results of the preliminary baseline risk assessment.

Action: No changes in the text are proposed at this time.

78. **Response:** The Fish and Wildlife Service documents have been consulted in the preparation of the ecological assessment, as well as the open literature on avian-specific subchronic and chronic studies. DOE welcomes the assistance of OEPA in identifying wildlife toxicity criteria it deems more appropriate than those used. Any more appropriate values identified will be used in preparing the Operable Unit 5 Sitewide Ecological Assessment.

Action: No change is required in the text of the SWCR. Request OEPA assistance in identifying satisfactory wildlife toxicity criteria for use in the Operable Unit 5 Sitewide Ecological Assessment.

79. **Response:** DOE does not agree.

Action: See actions in response to specific comments on the ecological assessment.

83. **Response:** DOE agrees.

Action: Table 2-4 will be revised to indicate the source of background data to which silo contents are compared.

84. **Response:** As discussed with Ohio EPA previously, and as noted in the Risk Assessment Work Plan Addendum, background concentrations are assumed to be equal to zero in the absence of background measurement results.

Action: The referenced table will indicate that background concentrations are assumed to be equal to zero in the absence of background measurement results.

85. **Response:** As discussed with Ohio EPA previously, and as noted in the Risk Assessment Work Plan Addendum, background concentrations are assumed to be equal to zero in the absence of background measurement results.

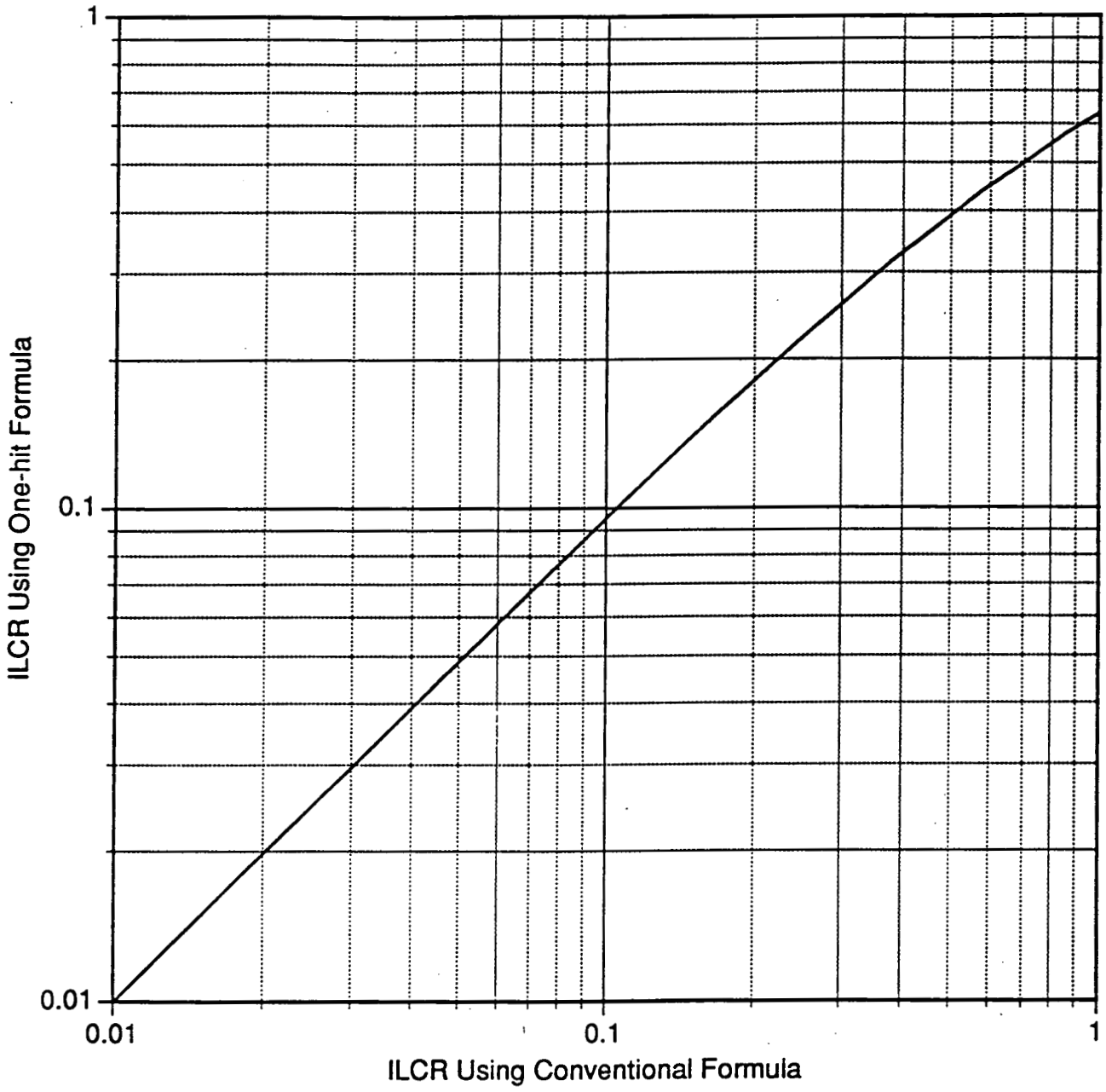

FIGURE 76 Comparison of Risks as Calculated by Conventional HHEM Methodology and the One-Hit/High Risk Methodology

Action: The referenced table will indicate that background concentrations are assumed to be equal to zero in the absence of background measurement results.

86. **Response:** As discussed with Ohio EPA previously, and as noted in the Risk Assessment Work Plan Addendum, background concentrations are assumed to be equal to zero in the absence of background measurement results.

Action: The referenced table will indicate that background concentrations are assumed to be equal to zero in the absence of background measurement results.

87. **Response:** As discussed with Ohio EPA previously, and as noted in the Risk Assessment Work Plan Addendum, background concentrations are assumed to be equal to zero in the absence of background measurement results.

Action: The referenced table will indicate that background concentrations are assumed to be equal to zero in the absence of background measurement results.

88. **Response:** DOE agrees.

Action: Table 2-10 will be revised to indicate the source of background concentration data for surface water to which standing water concentration data for the waste pits are compared.

90. **Response:** As discussed with Ohio EPA previously, and as noted in the Risk Assessment Work Plan Addendum, background concentrations are assumed to be equal to zero in the absence of background measurement results.

Action: The referenced table will indicate that background concentrations are assumed to be equal to zero in the absence of background measurement results.

91. Response: As discussed with Ohio EPA previously, and as noted in the Risk Assessment Work Plan Addendum, background concentrations are assumed to be equal to zero in the absence of background measurement results.

Action: The referenced table will indicate that background concentrations are assumed to be equal to zero in the absence of background measurement results.

92. **Response:** DOE agrees.

Action: Table 2-19 will be reviewed for accuracy and, if needed, revised to note the reason for including contaminants that were not detected at levels exceeding the background UTL.

103. **Response:** It is acknowledged that the June 1992 work plan states that lead toxicity will be evaluated with the EPA Uptake/Biokinetic Model. There are, however, several limitations with the use of this model. First, the Uptake/Biokinetic model is available only in draft form. Second, because a child is recognized to be the most sensitive receptor to lead the model applies only to a child receptor from birth to seven years of age, not to any adult receptors. Finally, the model provides output in the form of blood lead levels; additional information would be needed to evaluate "risk" from this output (i.e., some measure of health risk as a function of blood lead levels).

There are several receptor scenarios in the SWCR with an adult receptor. In order to be health protective and provide quantitative estimates of site exposure to lead, "acceptable daily intakes" were estimated for lead based on a blood lead level of 15 μg/dl. This is the blood lead level below which children do not demonstrate neurological deficit (Marcus 1986). This level was used for adults and children. Factors that describe the relationship between oral intake and blood lead (Ryu et al. 1983 and Pocock et al. 1983) along with an uncertainty factor of 5 were used to derive oral acceptable daily intake levels for adults and children. The lowest of the two levels was used for all receptors. This acceptable daily intake was then used in the same manner as an RfD. We feel that this is a defensible approach in the absence of a Uptake/Biokinetic model for adult receptors.

Action: The latest available version of the Uptake/Biokinetic model (version 5.0) will be used for the child receptor in the current land use scenarios with and without access controls. For model parameters where site-specific values are not available, default parameters in the model will be used. Recognizing that the model is in draft form, blood lead levels for the child receptors will be presented in the revised SWCR and HI values deleted from the results. HI values estimated using the method cited above will be retained in the SWCR for adult receptor/scenarios in order to compare relative levels of concern for lead with other chemicals of potential concern.

117. **Response:** The site-wide arithmetic means were used as EPCs for wildlife as a "first cut" at the analysis. It is recognized that some waste-unit-specific exposures would be substantially higher than those based on a site-wide mean. However, given that most of the hazard indices calculated using the site-wide means were greater than 1.0, the conclusion that potential ecological risk exists at the FEMP would not be altered by the use of the 95th UCL or waste-unit-specific values. If greater detail is to be required, DOE urges that this issue be discussed in the context of the Operable Unit 5 Sitewide Ecological Assessment, which will be able to rely on a complete and fully validated data set, which was not available for the SWCR. Calculating the hazard indices for aquatic organisms based on a site-wide mean would not be difficult and can be done for purposes of comparison with the terrestrial data.

Action: Calculate aquatic organism hazard indices based on mean estimated constituent concentrations in Paddys Run and include in the text of the SWCR. Discuss the level of

detail required in the Operable Unit 5 Sitewide Ecological Assessment with U.S. EPA and OEPA.

118. **Response:** Indicator species used in the ecological assessment are those stated in the approved Risk Assessment Work Plan Addendum.

Action: No change is required in the text.

119. **Response:** The text may not be clear on how NOELs were estimated from LD_{50}s. The calculation consists of three steps - first, the LD_{50} is multiplied by 0.2 to arrive at an acute NOEL. This acute NOEL is then multiplied by 0.1 to get the chronic NOEL. The chronic NOEL is then multiplied by a species/class factor of 0.1, if necessary, to arrive at the final criterion. The typical extrapolation used is thus 0.2 x 0.1 x 0.1 = 0.002. It is unclear what benefit would be gained by making this extrapolation more conservative, given that even background levels of inorganic constituents appear to be toxic given the criteria used in the draft assessment. It is also not clear what guidance indicates that the desired arsenic wildlife NOEL is over 100,000 times lower than reported LD_{50}s. As stated in the response to Comment 78, DOE welcomes the assistance of OEPA in identifying wildlife toxicity criteria it deems more appropriate than those used. Any more appropriate values identified will be used in preparing the Operable Unit 5 Sitewide Ecological Assessment.

Action: No change is required in the text of the SWCR. Request OEPA assistance in identifying satisfactory wildlife toxicity criteria for use in the Operable Unit 5 Sitewide Ecological Assessment.

121. **Response:** It is unclear what level of detail the reviewer is requesting. It is not generally considered appropriate to discuss the magnitude of HIs greater than 1.0, since an HI is not an estimate of risk but rather a comparison of an estimated intake with an intake considered acceptable.

Action: Request clarification of comment.

123. **Response:** The conclusions of the field studies cited are those of the investigators who conducted them, not of the SWCR. If there is no statistically significant difference between two groups of organisms, there is no "actual" difference between them that is not attributable to sampling error. If an effect can not be detected statistically, it is unclear how detailed discussion of it can usefully inform remedial action decision-making.

It is not the purpose of the SWCR, nor is it possible, to prove that any patterns observed in field studies are <u>not</u> a result of chemical exposure. However, given that site-wide mean inorganic chemical concentrations in soils are similar to the background values compiled in the USGS study, it seems unlikely. The degree of owl predation on-site

compared to off-site is unknown. It is unclear what specific discussion the reviewer wishes added to the text.

Action: Request clarification of comment. DOE and its contractors are available to discuss these issues.

124. **Response:** The statements that present ecological risks appear to be low is based on the conclusions of the field studies and on the comparison of FEMP site-wide mean soil and water concentrations of constituents to background values. However, given that even use of site-wide means produces HIs above unity, it should be clear that use of site-wide 95% UCLs or waste-unit-specific values would result in much greater values, readily justifying the claim that remediation is appropriate to prevent future ecological harm as well as to protect human health. Indeed, there exist substantial differences of opinion as to whether the FEMP has had a measurable impact on human health, but there is a consensus that remediation is appropriate to prevent any potential impact, whether statistically detectable or not.

The conclusion that differences in variations in robin fledgling success on and adjacent to the FEMP is not related to contaminant exposure is that of the investigators, not of DOE. It is based on the observations that the observed differences have not persisted in recent followup studies and are explainable by factors other than contaminant exposure. Hazard indices based on the USGS soil data used for background estimates in the SWCR would be similar to those based on the FEMP site-wide means. It therefore seems highly improbable that the HIs estimated for the FEMP imply any ongoing acute exposure.

It is acknowledged that it is difficult to design field studies to detect impacts. However, as stated in the response to OEPA Comment 123, if an effect can not be detected, it is unclear how detailed discussion of it can usefully inform remedial action decision-making.

Action: No change is required in the text.