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RESPONSE TO USEPA AND OHIO EPA COMMENTS ON THE OU1 DRAFT REMEDIAL INVESTIGATION REPORT FEBRUARY 1994

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DOE-FN/EPA
249
RESPONSES
OU1

RESPONSE TO USEPA AND OHIO EPA COMMENTS OU1 DRAFT REMEDIAL INVESTIGATION REPORT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

FEBRUARY 1994

U.S. DEPARTMENT OF ENERGY
FERNALD FIELD OFFICE

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FOREWORD

FOREWORD

This document provides responses to U.S. Environmental Protection Agency (EPA) and Ohio EPA (OEPA) comments on the October 1993 draft Remedial Investigation (RI) Report for Operable Unit 1. In total, 489 comments were received. Of those, 314 were from EPA and 175 were from OEPA. The following is a users guide, for the reader, of the rationale used to develop this comment response document and an overview of how the responses to the comments from both agencies are presented in the revised RI report.

Within each section of the comment response document, responses to EPA comments are provided, followed by those for OEPA. All comments have been re-numbered, sequentially, such that responses may be reviewed in the order the comment-driven revised text is presented in the October draft RI report, facilitating simultaneous review of the comment response document and the revised RI report. The original comment numbers designated by the agencies have been retained in parentheses within the headers of the comments. A comment number cross reference list follows in this section.

Each response to a comment has three components: the agency comment, a narrative response, and an action statement that identifies the specific changes made to the corresponding text in the RI report. Each action statement includes a reference to the location in the RI where the revision can be found. To maintain consistency with the October draft RI report, the reference location is made to the appropriate table, figure, or section/page/line of that document. It is important to note that due to revisions and changes made for the February 1994 RI report, the originally referenced table, figure, or page/line numbers have shifted in most cases, however, for text revisions, the referenced RI document section can be used to locate the revised text. Tables and figures that were included in the RI report as a result of a response to a comment are also included in this document where applicable.

All text deletions are either in response to comments or for clarification of central issues. To avoid confusion and retain the overall readability of the RI document, deletions are not shown.

To the extent appropriate, EPA and OEPA comments and recommendations to other FEMP operable units have been considered in the development of this comment response document and the revised RI report. For example, in the conditional approval of the final Operable Unit 4 Remedial Investigation Report, the EPA requested that "future changes in all documents be indicated in the review copy by shading or bold print." Accordingly, all substantial revisions or additions to the text of the Operable Unit 1 Draft RI, submitted in October 1993, have been shaded in the accompanying February 1994 RI submittal. Shaded sections that result from a response to a comment are preceded by a comment number in the left margins and followed by a bracket (}). Other shaded areas indicate revisions or additions to the text that are either ancillary text corrections, or further clarification of major

conclusions. Revisions to tables and figures are not shaded in order to preserve the clarity of the information presented.

A list of major revisions that were not direct results of responses to comments follows:

Section 1 and Appendix F

1. Tables 1-11 and 1-12 and the supporting documentation in Appendix F.6 have been modified to provide a better understanding of the waste streams that had entered the pits. This action was taken to present a more complete description of waste pit contents based on the process knowledge study that was undertaken for the RI. Specifically, the changes to Table 1-11 are based on further understanding of in-plant material control and accounting records and include a reduction of the metric tons of uranium and an increase in metric tons of waste treatment sludge accounted for in Waste Pits 3 and 5.

2. The distribution of constituents within each of the waste pits, except for Waste Pit 6, have been modified in Table 1-12.

Section 2

1. All data tables in Section 2 were evaluated for consistency with revisions required in Section 4 and Appendix E (Risk Assessment) as a result of responses to comments. Modifications were made where appropriate, particularly to Tables 2-6 through 2-13 (Data Completeness tables).

2. Figures were revised in Section 2 to reflect consistency with revisions to figures in Section 4, in response to agency comments that sample numbers should be shown on all figures illustrating sample locations.

3. Data produced during the Experimental Treatment Facility (ETF) program has been included to reflect consistency with a response to comment in Section 4.

Section 5 and Appendix D

1. Five constituents (cadmium, copper, lead, mercury, and uranium) were rerun in the groundwater model as a result of updates made to the Operable Unit 1 data base since the October submittal.

2. Updates to fate-and-transport-of-contaminants-in-air calculations were required as a result of modifications in input parameters for the air model. The new input parameters include

revised assumptions regarding particle grain size, percent of ground cover (vegetation), and the portion of Waste Pit 3, which fails in the future scenario. These revised assumptions are based on site-wide policy and are consistent with those introduced in the Operable Unit 4 RI.

Section 6 and Appendix E

1. Risks were calculated and presented using a linked spreadsheet format to eliminate entry errors. This spreadsheet set was extensively checked to ensure accurate risk calculations.

2. Receptors were aligned for consistency with the Operable Unit 4 Baseline Risk Assessment. Accordingly, two receptors were added: the "expanded trespasser" and the "off-site resident child." The more inclusive, occupationally exposed "groundskeeper" receptor replaced the "site visitor."

3. A non-agricultural, land-use scenario was added to the future source-term configuration. This was done to emulate a future land use with continued federal ownership as a reserve. This land use-scenario complements the "expanded trespasser" receptor.

4. Appendix E.6.3, has been updated to include information regarding the 1993 Supplemental Sampling Program. Background information and a sensitivity evaluation is introduced in Section E.6.3.1 and summarized in Section 6. All data related to the 1993 sampling program is presented in Appendix G-4.

Section 7

1. The summary of fate and transport by air was modified as a result of assumptions regarding particle grain size, percent of ground cover (vegetation), and the portion of Waste Pit 3, which fails in the future scenario. (See above comments for Section 5).

2. The summary of the Baseline Risk Assessment was revised using an updated data set, and the resulting changes were developed through the fate and transport models.

3. Table 7-7, Data Limitations and Recommended Actions, was updated to reflect the June/July 1993 Supplemental Sampling Program for Operable Unit 1. Although the data was not available for use in assessing baseline risks, it was available for linear assessment in a semi-quantitative manner and for comparison with the data used as input to the Fate and Transport of Contaminants (Section 5 and Appendix D) and Baseline Risk Assessment (Section 6 and Appendix E) for Operable Unit 1. As indicated in Table 7.7, this recent data provides additional confidence in the content and conclusions of the Baseline Risk Assessment.

Responses to Comments
Operable Unit 1 RI
Cross Reference List

Comment Number				Reference	
DOE	EPA			Section	Page
001	USEPA	OGC	001	4.0	NA
002	USEPA	OGC	002	4.0	NA
003	USEPA	OGC	003	4.0	NA
004	USEPA	OGC	004	4.0	NA
005	USEPA	OGC	005	4.0	NA
006	USEPA	OGC	006	4.0	NA
007	USEPA	OGC	007	4.0	NA
008	USEPA	OGC	008	4.0	NA
009	USEPA	OGC	009	D	NA
010	USEPA	OGC	010	D	NA
011	USEPA	OSC	001	1.2.2.3	1-31
012	USEPA	OSC	002	1.2.2.3	1-32
013	USEPA	OSC	003	2.1.1	2-02
014	USEPA	OSC	004	2.2.3	2-06
015	USEPA	OSC	005	2.3	2-07
016	USEPA	OSC	006	2.9.2	2-43
017	USEPA	OSC	007	3.1.1	3-02
018	USEPA	OSC	008	3.1.2	3-02
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043	USEPA	OSC	033	4.2.1.4	4-018
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Responses to Comments
Operable Unit 1 RI
Cross Reference List

Comment Number				Reference	
DOE	EPA			Section	Page
111	USEPA	OSC	101	4.5.2.2	4-111
112	USEPA	OSC	102	4.5.2.2	4-111
113	USEPA	OSC	103	4.5.2.3	4-112
114	USEPA	OSC	104	4.5.2.3	4-112
115	USEPA	OSC	105	4.5.2.3	4-112
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172	USEPA	OSC	029	E.3.3.1	E-3-11
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179	USEPA	OSC	036	E.3.3.2.7	E-3-28
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187	USEPA	OSC	044	E.3.5.4.1	E-3-43
188	USEPA	OSC	045	E.3.5.4.1	E-3-44
189	USEPA	OSC	046	E.3.5.4.1	E-3-44
190	USEPA	OSC	047	E.3.5.4.2	E-3-46
191	USEPA	OSC	048	E.3.5.4.2	E-3-47
192	USEPA	OSC	049	E.3.5.4.4	E-3-48
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197	USEPA	OSC	054	E.3.5.7.5	E-3-54
198	USEPA	OSC	055	E	E-3-63
199	USEPA	OSC	056	E	E-3-71
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208	USEPA	OSC	065	E	E-3-93
209	USEPA	OSC	066	E	E-3-94
210	USEPA	OSC	067	E.4.1.2	E-4-05
211	USEPA	OSC	068	E.4.4	E-4-10
212	USEPA	OSC	069	E.4.3.29	E-4-30
213	USEPA	OSC	070	E.4.3.47.2	E-4-41
214	USEPA	OSC	071	E.4.3.58.1	E-4-48
215	USEPA	OSC	072	E.4.3.59	E-4-48
216	USEPA	OSC	073	E.4.3.64.1	E-4-52
217	USEPA	OSC	074	E.4	E-4-87
218	USEPA	OSC	075	E.4	E-4-89
219	USEPA	OSC	076	E.4	E-4-89
220	USEPA	OSC	077	E.4	E-4-90

Comment Number				Reference		Comment Number				Reference	
DOE	EPA			Section	Page	DOE	EPA			Section	Page
221	USEPA	OSC	078	E.4	E-4-96	276	USEPA	OC	008	4.2.7.4	4-063
222	USEPA	OSC	079	E.5.1.2.1	E-5-02	277	USEPA	OC	009	4.2.7.4	4-064
223	USEPA	OSC	080	E.5.2.1	E-5-04	278	USEPA	OC	010	4.3.1	4-074
224	USEPA	OSC	081	E.5.2.1.1	E-5-05	279	USEPA	OC	011	4.4.3	4-105
225	USEPA	OSC	082	E.5.2.1.2	E-5-06	280	USEPA	OC	012	4.12	4-639
226	USEPA	OSC	083	E.5.2.2.1	E-5-07	281	USEPA	OC	013	5.3.3.2	5-27
227	USEPA	OSC	084	E.5.2.2.2	E-5-08	282	USEPA	OC	014	7.7.2.3	7-27
228	USEPA	OSC	085	E.5.2.3	E-5-09	283	USEPA	OC	015	7.7.2.3	7-27
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249	USEPA	OSC	106	E.6.2.4	E-6-13	304	OEPA	OC	014	1.2.1.1	1-14
250	USEPA	OSC	107	E	E-6-16	305	OEPA	OC	015	1.2.1.2	1-15
251	USEPA	OSC	108	E	E-6-17	306	OEPA	OC	016	1.2.1.2	1-15
252	USEPA	OSC	109	E	E-7-05	307	OEPA	OC	017	1.2.1.2	1-16
253	USEPA	OSC	110	E	E-7-07	308	OEPA	OC	018	1	1-16
254	USEPA	OSC	111	EIII.2.2	EIII-03	309	OEPA	OC	019	1.2.1.3	1-16
255	USEPA	OSC	112	EIII.2.2	EIII-03	310	OEPA	OC	020	1.2.1.3	1-16
256	USEPA	OSC	113	EIII.3.3	EIII-14	311	OEPA	OC	021	1.2.1.3	1-19
257	USEPA	OSC	114	EIII.3.9	EIII-27	312	OEPA	OC	022	1.2.1.4	1-20
258	USEPA	OSC	115	EIII.3.9	EIII-28	313	OEPA	OC	023	1.2.1.4	1-20
259	USEPA	OSC	116	EIII.4.2	EIII-30	314	OEPA	OC	024	1.2.1.5	1-22
260	USEPA	OSC	117	EIII.4.3	EIII-30	315	OEPA	OC	025	1.2.1.5	1-22
261	USEPA	OSC	118	EIII.4.3	EIII-30	316	OEPA	OC	026	1	1-23
262	USEPA	OSC	119	EIII.4.3	EIII-31	317	OEPA	OC	027	1.2.1.7	1-24
263	USEPA	OSC	120	EIII.4.5	EIII-35	318	OEPA	OC	028	1.2.2	1-26
264	USEPA	OSC	121	E	EIII-38	319	OEPA	OC	029	1-12	1-30
265	USEPA	OSC	122	E	EIII-41	320	OEPA	OC	030	1.2.2.2	1-31
266	USEPA	OSC	123	E	EIV-39	321	OEPA	OC	031	1.2.2.4	1-33
267	USEPA	OSC	124	E	EIV-43	322	OEPA	OC	032	1.2.2.8	1-34
268	USEPA	OSC	125	E	EIV-45	323	OEPA	OC	033	1.2.2.9	1-35
269	USEPA	OC	001	3.2.5.1	3-07	324	OEPA	OC	034	1.3.1	1-36
270	USEPA	OC	002	4.2	4-006	325	OEPA	OC	035	1.5.2.2	1-05
271	USEPA	OC	003	4.2.0.4	4-013	326	OEPA	OC	036	1.5.4.1	1-49
272	USEPA	OC	004	4.2.0.4	4-013	327	OEPA	OC	037	2.2.1	2-05
273	USEPA	OC	005	4.2.2.2	4-026	328	OEPA	OC	038	2.3	2-07
274	USEPA	OC	006	4.2.2.4	4-028	329	OEPA	OC	039	2	2-08
275	USEPA	OC	007	4.2.5.1	4-053	330	OEPA	OC	040	2	2-12

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Responses to Comments
Operable Unit 1 RI
Cross Reference List

Comment Number				Reference		Comment Number				Reference	
DOE	EPA			Section	Page	DOE	EPA			Section	Page
331	OEPA	OC	041	2.3.2.1	2-15	386	OEPA	OC	096	4.3.1.2	4-076
332	OEPA	OC	042	2	2-22	387	OEPA	OC	097	4.3.1.2	4-078
333	OEPA	OC	043	2.3.2.1°	2-16	388	OEPA	OC	098	4.3.1.2	4-078
334	OEPA	OC	044	2.5.1.1	2-21	389	OEPA	OC	099	4.3.1.3	4-079
335	OEPA	OC	045	2.5.2.1	2-25	390	OEPA	OC	100	4.4.1	4-085
336	OEPA	OC	046	2.6.1	2-28	391	OEPA	OC	101	4.4.1	4-086
337	OEPA	OC	047	2.6	2-28	392	OEPA	OC	102	4	4-086
338	OEPA	OC	048	2.6	2-28	393	OEPA	OC	103	4.4.1.1	4-088
339	OEPA	OC	049	2.6.2	2-29	394	OEPA	OC	104	4.4.1.1	4-088
340	OEPA	OC	050	2.6.3	2-31	395	OEPA	OC	105	4.4.1.1	4-088
341	OEPA	OC	051	2.12	2-52	396	OEPA	OC	106	4.4.1.1	4-088
342	OEPA	OC	052	2	2-60	397	OEPA	OC	107	4.4.1.2	4-091
343	OEPA	OC	053	2	2-72	398	OEPA	OC	108	4.4.1.2	4-092
344	OEPA	OC	054	2-13	2-88	399	OEPA	OC	109	4.4.2.1	4-096
345	OEPA	OC	055	2	2-94	400	OEPA	OC	110	4	4-096
346	OEPA	OC	056	2	2-96	401	OEPA	OC	111	4.4.2.2	4-098
347	OEPA	OC	057	3.1.1	3-01	402	OEPA	OC	112	4.4.2.2	4-100
348	OEPA	OC	058	3.1.7	3-03	403	OEPA	OC	113	4.4.2.3	4-103
349	OEPA	OC	059	3.1.9	3-05	404	OEPA	OC	114	4..2.3	4-104
350	OEPA	OC	060	3	3-07	405	OEPA	OC	115	4	4-104
351	OEPA	OC	061	3	3-08	406	OEPA	OC	116	4	4-104
352	OEPA	OC	062	3.4.1.3	3-15	407	OEPA	OC	117	4-19	4-256
353	OEPA	OC	063	3.4.1.6	3-18	408	OEPA	OC	118	4-25	4-652
354	OEPA	OC	064	3	3-19	409	OEPA	OC	119	5.1.2	5-03
355	OEPA	OC	065	3.4.2.1	3-24	410	OEPA	OC	120	5	5-04
356	OEPA	OC	066	3	3-25	411	OEPA	OC	121	5	5-04
357	OEPA	OC	067	3	3-26	412	OEPA	OC	122	5.2.1	5-04
358	OEPA	OC	068	3.4.2.2	3-26	413	OEPA	OC	123	5.2.1	5-05
359	OEPA	OC	069	3	3-27	414	OEPA	OC	124	5.3.2.3	5-19
360	OEPA	OC	070	3.6.3.1	3-33	415	OEPA	OC	125	5.3.2.4	5-21
361	OEPA	OC	071	3	3-59	416	OEPA	OC	126	5	5-22
362	OEPA	OC	072	4	4-001	417	OEPA	OC	127	5.3.2.5	5-25
363	OEPA	OC	073	4.1	4-003	418	OEPA	OC	128	6.2	6-03
364	OEPA	OC	074	4	4-009	419	OEPA	OC	129	6.3	6-04
365	OEPA	OC	075	4	4-009	420	OEPA	OC	130	6.5.4	6-09
366	OEPA	OC	076	4	4-010	421	OEPA	OC	131	6.7.2	6-14
367	OEPA	OC	077	4.2.0.5	4-013	422	OEPA	OC	132	6-1	6-18
368	OEPA	OC	078	4.2.0.5	4-015	423	OEPA	OC	133	6-7	6-25
369	OEPA	OC	079	4.2.1.3	4-018	424	OEPA	OC	134	7	7-01
370	OEPA	OC	080	4.2.1.4	4-019	425	OEPA	OC	135	7.3.1	7-06
371	OEPA	OC	081	4.2.1.6	4-024	426	OEPA	OC	136	7	7-58
372	OEPA	OC	082	4	4-025	427	OEPA	OC	137	D.3.6.2	D-3-24
373	OEPA	OC	083	4.2.2.3	4-027	428	OEPA	OC	138	D.3.6.1	D-3-21
374	OEPA	OC	084	4	4-036	429	OEPA	OC	139	E.1.2.4.2	E-1-13
375	OEPA	OC	085	4	4-037	430	OEPA	OC	140	E.1.2.4.2	E-1-13
376	OEPA	OC	086	4	4-043	431	OEPA	OC	141	E.1.2.4.6	E-1-15
377	OEPA	OC	087	4	4-045	432	OEPA	OC	142	E.1.3.2	E-1-16
378	OEPA	OC	088	4	4-046	433	OEPA	OC	143	E.2.1.9	E-2-04
379	OEPA	OC	089	4.2.4.4	4-047	434	OEPA	OC	144	E.2.2.2.1	E-2-07
380	OEPA	OC	090	4.2.5.5	4-057	435	OEPA	OC	145	E.2.3.1.2	E-2-09
381	OEPA	OC	091	4.2.6.5	4-060	436	OEPA	OC	146	E-2-3	E-2-14
382	OEPA	OC	092	4	4-063	437	OEPA	OC	147	E-2-3	E-2-14
383	OEPA	OC	093	4.2.8	4-069	438	OEPA	OC	148	E-2-5	E-2-16
384	OEPA	OC	094	4.2.8.5	4-073	439	OEPA	OC	149	E-2-11	E-2-28
385	OEPA	OC	095	4.3.1.2	4-076	440	OEPA	OC	150	E-2-13	E-2-33

Responses to Comments
Operable Unit 1 RI
Cross Reference List

Comment Number				Reference		Comment Number				Reference	
DOE	EPA			Section	Page	DOE	EPA			Section	Page
441	OEPA	OC	151	E-2-17	E-2-38	466	USEPA	OC	001	6.5.5	6-10
442	OEPA	OC	152	E-2-21	E-2-43	467	USEPA	OC	002	7.2.2.1	7-23
443	OEPA	OC	153	E-2-23	E-2-47	468	USEPA	OC	003	Ln 26-31	E-1-18
444	OEPA	OC	154	E.3.2.4	E-2-06	469	USEPA	OC	004	Ln 1-5	E-1-17
445	OEPA	OC	155	E.3.2.9	E-3-10	470	USEPA	OC	005	Ln 28-33	E-1-17
446	OEPA	OC	156	E.3.3.1.6	E-3-17	471	USEPA	OC	006	E.2.2.2	E-2-06
447	OEPA	OC	157	E.3.3.2.2	E-3-22	472	USEPA	OC	007	D.2-2	E-2-07
448	OEPA	OC	158	E.3.4.8	E-3-35	473	USEPA	OC	008	Ln 6	E-2-09
449	OEPA	OC	159	E-3-5	E-3-68	474	USEPA	OC	009	Ln 12	E-2-09
450	OEPA	OC	160	E.6.2.1	E-6-04	475	USEPA	OC	010	Ln 14-16	E-2-09
451	OEPA	OC	161	E.6.2.2.1	E-6-07	476	USEPA	OC	011	Ln 22-25	E-2-09
452	OEPA	OC	162	E-6-1	E-6-01-16	477	USEPA	OC	012	E.2.3.2	Tables
453	OEPA	OC	163	E-6-1	E-6-01-16	478	USEPA	OC	013	E.3.3	Site Mod
454	OEPA	OC	164	E.II	E-II-01	479	USEPA	OC	014	Ln 28-34	E-3-18
455	OEPA	OC	165	E.II-1	E-II-05	480	USEPA	OC	015	3.3.2	E-3-19
456	OEPA	OC	166	E.II-2	E-II-14	481	USEPA	OC	016	Ln 11-13	E-3-41
457	OEPA	OC	167	E.II-3	E-II-27	482	USEPA	OC	017	Ln 19-22	E-3-51
458	OEPA	OC	168	E-II-18	E-II-95	483	USEPA	OC	018	Ln 19-22	E-3-51
459	OEPA	OC	169	E.IV-1	E-IV-02	484	USEPA	OC	019	Ln 4-7	E-3-52
460	OEPA	OC	170	E.IV-9	E-IV-10	485	USEPA	OC	020	E.3.5.7.3	E-3-52
461	OEPA	OC	171	E.IV-12	E-IV-15	486	USEPA	OC	021	3.5.7.9	E-3-56
462	OEPA	OC	172	E.IV-16	E-IV-19	487	USEPA	OC	022	E.4.3	Tox Prof
463	OEPA	OC	173	E.IV-18	E-IV-22	488	USEPA	OC	023	Lead Prof	E-4-40
464	OEPA	OC	174	E.IV-21	E-IV-28	489	USEPA	OC	024	Tab E.4.4.4	
465	OEPA	OC	175	E.IV-22	E-IV-30						

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OEPA COMMENTS

EXECUTIVE SUMMARY

Commenting Organization: OHIO EPA Commentor: DERR
Section #: ES Page #: ES-6 Line #: 7-8 Code:E
Original Comment #: 001 (OC 9)
Comment: On lines 34-35 of page ES-5, the report indicates that no subsurface investigation was made of the Burn Pit in contradiction to the sentence on lines 7-8 of page ES-6 referenced above.
Response: Lines 33 and 34 of page ES-5 states that an inventory is not available of the materials disposed in the Burn Pit. This is true. No records were made at the time of disposal of the waste materials placed in this area. The use of "inventory" may be confusing.
Action: The sentence (lines 33 and 34 of page ES-5) has been replaced with the following: "No burial records of materials placed in the Burn Pit have been located in FEMP operational archives."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: ES Page #: ES-7 Line #: 26 Code: E
Original Comment #: 002 (OC 10)
Comment: The "off-property farmer" should be replaced by the "on-property farmer."
Response: Agree
Action: One of the two references to the "off-property farmer" has been replaced with "on-property farmer."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: ES Page #: ES-10 Line #: 31-35 Code: C
Original Comment #: 003 (OC 11)
Comment: Do the assumptions used in the OU1 risk assessment differ from the those used in the OU4 risk assessment? If so, they should be discussed and the basis for deviating from the OU4 risk assessment should be provided in the text.
Response: Some difference exists in the two risk assessments as a result of comments received from the agencies on the Operable Unit 4 Risk Assessment after the Operable Unit 1 draft risk assessment was finalized. These differences have been evaluated and adjustments or acknowledgements made, as appropriate, in the revised risk assessment.
Action: The baseline risk assessment has been revised to reflect the agreed to assumptions and scenarios of the Operable Unit 4 Risk Assessment. Remaining differences in exposure scenarios and assumptions have been identified and discussed. No changes have been made to the Executive Summary.

USEPA COMMENTS

SECTION 1

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 1.2.2.3 Page #: 1-31 Line #: 30 to 34 Code:
Original Comment #: 004 (OSC #1)

Comment: The text discusses materials such as filter cake, slag leach residue, lime sludge, flyash, and sludge removed from Waste Pit 5 being used for cover material in Waste Pit 3. However, these materials are discussed as wastes earlier in Section 1.1.3.2. U.S. DOE should state why these materials are considered cover materials and not wastes for Waste Pit 3.

Response: The cover of Waste Pit 3 was constructed by depositing a wide variety of "dry" materials on the edge and pushing them into the pit. These materials were mixed to varying degrees as the construction of the cover proceeded. Therefore, the top 14± feet of Waste Pit 3 is a mixture of dry material and considered cover, as opposed to the unstable, "soupy" condition of wastes. The cover versus waste designation is not intended to be an indication of the presence or lack of contamination.

Nearly 90% of the material described as cover is accounted for in Table 1-4. There are no records regarding the relative amounts of the other materials that were used.

Action: The following has been added after the last sentence of the paragraph on line 34: "This was done because the amount of these materials deposited was not documented and their consistency is different than that of the other wastes slurried into the waste pit."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 1.2.2.3 Page #: 1-32 Line #: 16 and 18 Code:
Original Comment #: 005 (OSC #2)

Comment: Line 16 states that Waste Pit 3 contains 41,183 metric tons (MT) of magnesium fluoride (MgF_2); however, this amount is not listed in Table 1-11. In addition, Table 1-12 lists 97 MT of thorium wastes in Waste Pit 3, while Table 1-11 lists only 89 MT of thorium wastes. U.S. DOE should address these discrepancies.

Response: The amount of MgF_2 listed for Waste Pit 3 is incorrect. It should be 42,677 MT, which is comprised of trailer cake (30,072 MT) and slag leach (12,605), as shown on Table 1-11. Two types of thorium are in the waste pits, Thorium-232 and Thorium-230. The Thorium-232 is the result of processing thorium and is identified as "thorium wastes." Thorium-230 is the result of processing uranium. The figure shown on Table 1-12 is total thorium, while those shown on Table 1-11 are total mass and volume of wastes containing Thorium-232, but don't include the amount of thorium contained.

Action: The text has been revised to reflect the correct amount of MgF_2 in Waste Pit 3 and reference the amounts shown on Table 1-11 for trailer cake and slag leach. The text and tables have been revised to clarify the difference between Thorium-230 and Thorium-232.

OEPA COMMENTS

SECTION 1

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.0 (GENERAL) Page #: Line #: Code: C
Original Comment #: 006 (OC 2)

Comment: The OU1 RI report does not discuss the K-65 drum storage area. The OU4 RI discussed this area and stated that the area lies within OU1 and would be addressed therein. DOE should review the OU4 RI and incorporate a discussion of the K-65 drum storage area within the OU1 RI.

Response: Comment acknowledged. The former K-65 drum storage area resides outside and south of the Operable Unit 1 (OU1) study area boundaries. Available data indicate that radium-226 and uranium-238 activity concentrations are above background levels in the surface soil of the drum storage area. Cesium-137, ruthenium-106 and thorium-232 were not detected in surface soils at levels that were more than two times background concentrations. The evaluation of the complete status of this region of the FEMP falls within the purview of CRU5, and will be reported as part of the Operable Unit 5 (OU5) remedial investigation. The following discussion presents the information that supports this response.

A) Location: Figure 1 shows the approximate boundaries of the former K-65 drum storage area. The location of this area has been established by reference to aerial photographs that were taken during the area's use for storage of the K-65 drums. The upper boundary of this area was located near northing 481,000.00 per NAD 27 Ohio State coordinates. The lower boundary of OU1 is located at northing 481033.00. There is no overlap between the former K-65 drum storage area and OU1.

B) Data Availability: The characterization of this area began with the Characterization Investigation Study (CIS). During the CIS, ten original samples and a field duplicate were collected from the top two inches of the surface soil of the former K-65 drum storage area. These samples were analyzed on-site at the FEMP for five radiological parameters. The radiological parameters for which the samples were analyzed included cesium-137 (Cs-137), radium-226 (Ra-226), ruthenium-106 (Ru-106), thorium-232 (Th-232) and uranium-238 (U-238). In addition, one sample was sent off-site for full radiological analysis. This information was supplemented during the OU5 RI/FS study by the collection of three samples that were analyzed for gross radiation, including alpha, beta and gamma radiation; pesticides and polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. The RI/FS data have been validated and are included in the sitewide environmental database. The background concentrations of the reported radionuclides in the surface soil are published in Table 4-2 of the OU1 RI report.

C) Radiological Results: The available information indicate the following gross radiation values: alpha, 37 pCi/g; beta, 34 pCi/g; and gamma, 170 pCi/g. U-238 activity concentration results ranged from nondetect to 143 pCi/g. The background activity concentration of U-238 in surface soil is 1.22 pCi/g. Ra-226 was detected in all samples, with the values ranging from 0.5 pCi/g to 22.5 pCi/g. The surface soil background activity concentration of Ra-226 was reported to be 1.45 pCi/g. Cs-137 activity concentrations ranged from nondetect

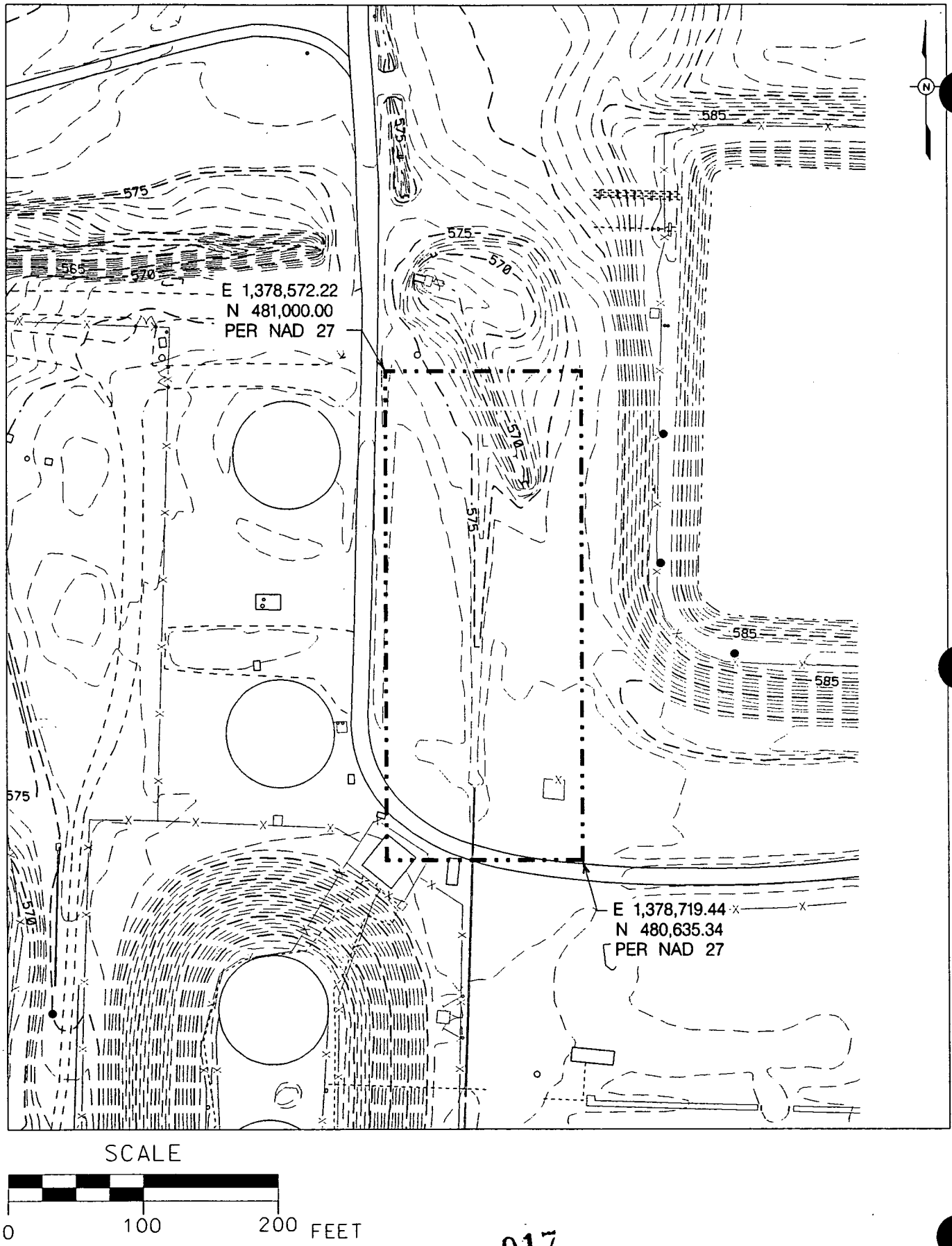

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FIGURE 1
8.5 X 11 FIG1.CRUI OUI FERMCO CADD SER. 2/2/94 @ JML

FIGURE 1 APPROXIMATE BOUNDRY OF K-65 DRUM STORAGE AREA

to 1.20 pCi/g, with detection reported in only two samples. The background activity concentration of Cs-137 in the surface soil was found to be 0.71 pCi/g. Th-232 was detected in two samples at activity concentrations of 0.4 pCi/g and 2.80 pCi/g, compared to a background value of 1.36 pCi/g. Ru-106 was not detected in any of the drum storage area samples. The highest activity concentration value for U-238 among the available data was found in the sample which was sent off-site. The uranium decay series members U-234, Th-232 and Th-238 were reported for the off-site sample. The activity concentration ratios of U-238 to U-234 and U-235 were indicative of depleted uranium. The fission products Cs-137 and Tc-99 were reported in the off-site results at 1.10 pCi/g and 4.80 pCi/g, respectively.

D) Chemical Parameter Results: The three samples taken during the RI/FS study provided one determination for each of the chemical parameter groups: PCBs, VOCs, SVOCs and metals. All metals results were sufficiently close to background concentrations to be regarded as naturally occurring. Aroclor 1254, a PCB mixture, was detected at a concentration of 81 μg/kg. There were no other organic compounds detected.

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.1.3.1 Page #: 1-6 Line #: 2,3 Code: C
Original Comment #: 007 (OC 12)
Comment: Were the ingots depleted or enriched?
Response: Agree that the text is misleading. Ingots sent to RMI (normal, enriched, and depleted) were either processed and shipped to Hanford or processed and returned to the FEMP for further processing and shipment to Savannah River.
Action: The remainder of the paragraph beginning on line 2 has been revised to read as follows: "At RMI, uranium ingots were extruded into tubes and returned to Plant 6 at the FEMP. There, they were cut into sections, heat treated, machined to final dimensions, and inspected for final product quality. The completed target element cores were shipped to the DOE Savannah River site. Some of the ingots which went to RMI were upset forged and the resulting billets machined and shipped to the Hanford site."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.1 Page #: 1-14 Line #: 7-8 Code:
Original Comment #: 008 (OC 13)

Comment: What is the source for this information? What details exist for the documentation of the liner installation?

Response: The primary method media used to document construction of the waste pits were construction and as-built drawings. In some instances, engineering reports were used as well. In order to clarify this issue for all the waste pits, a general reference to "construction/as-built drawings" has been added at the end of the introductory paragraphs in Section 1.2.1. The individual references also have been added at specific points in the text.

Action: The text on line 5 on page 1-14 has been revised as follows: "The following is a summary of information pertaining to waste pit construction and closure according to the indicated references and construction/as-built drawings." References have been added as follows: to line 7 on page 1-14 "(WMCO 1986)"; and to line 9 on page 1-14 "(H&R 1986)."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.1 Page #: 1-14 Line #: 24-27 Code: C
Original Comment #: 009 (OC 14)

Comment: (a) Where did the water draining from Waste Pit 1 flow? Was this a discharge to Paddys Run? Discharges from the pit should be addressed with regard to potential additional contaminated soils and sediments. b) The pipe from the K-65 pipe trench was not discussed within the OU4 RI. Additional detail should be provided as to the location of the pipe and pump.

Response: a) Agree that the disposition of water drained from Waste Pit 1 is pertinent. There are no records indicating the disposition of the water drained from Waste Pit 1, other than, as referenced in the text, that they were rarely used. The "Chemical Traps" area in the southwest corner was a sump. The apparent use of this was to pump out of this sump to Manhole #175 during normal operation. Since it isn't known when the decant lines were constructed, it is impossible to determine where the discharge was routed. Since the Clearwell was not in operation during the life of Waste Pit 1, these lines were either installed while Waste Pit 1 was in operation, in which case it can only be assumed that the rare overflows went to the storm water drainage system. If they were installed after Waste Pit 1 was closed (i.e. to provide drainage for the cover), they discharged to the Clearwell.

b) The K-65 pipe trench east of the exclusion fence is in Operable Unit 3 and that west of the fence is in Operable Unit 4.

Action: a) The paragraph beginning on line 24 has been rewritten as follows: "Water drained from Waste Pit 1 through a series of three, eight-inch decant lines constructed through the west berm of Waste Pit 1, but were rarely used (NLO 1985a). There are no records indicating the disposition of water decanted from Waste Pit 1. Normal practice was to pump the water collected in Waste Pit 1 from the sump portion to Manhole 175."

b) None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.2 Page #: 1-15 Line #: 20 Code:
Original Comment #: 010 (OC 15)
Comment: What was the source of the spring?
Response: The source of the spring is unknown.
Action: The following sentence has been added between the second and third sentences of the paragraph beginning on line 21: "The source of the spring is unknown."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.2 Page #: 1-15 Line #: 23 Code:
Original Comment #: 011 (OC 16)
Comment: What is the source of the liner specifications?
Response: Construction and as-built drawings were primarily used to document construction. In some cases, engineering reports were also used.
Action: The following references have been added to the last sentence of the paragraph on line 25: "(IT 1992, EF 1956)."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.2 Page #: 1-16 Line #: 1-2 Code: C
Original Comment #: 012 (OC 17)
Comment: The receiving location of water draining from the decant lines should be discussed within the text. The potential for this discharge to contaminate additional soils and sediments should be discussed within the document.
Response: Agree that the disposition of water drained from Waste Pit 2 is pertinent. As indicated in Section 1.2.2.1, Waste Pit 1 was used as a clearwell for Waste Pit 2 in 1958 and 1959 (i.e. before Waste Pit 3 was constructed). After that, drainage in the waste pit area went to Waste Pit 3. This is all consistent with the location of the decant lines.
Action: The text on page 1-16, line 1, has been modified as follows: "As for Waste Pit 1, the decant lines were rarely used (NLO 1985). These lines discharged to Waste Pit 1 in 1958 and 1959, prior to installation of Waste Pit 3, and to Waste Pit 3 thereafter (NLO 1985)."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.2 Page #: 1-16 Line #: 24 Code: E
Original Comment #: 013 (OC 18)
Comment: Correct the depth of waste in Table 1-3. It should be 15 ft., not "15 1" ft.
Response: Agree. The correct depth should be 15 ± 1 feet (maximum).
Action: In Table 1-3, the depth has been corrected to read "15 ± 1."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.3 Page #: 1-16 Line #: 28-29 Code:
Original Comment #: 014 (OC 19)
Comment: How was the construction of Waste Pit 3 documented? What document/s contain this information?
Response: Construction and as-built drawings were primarily used to document construction. In some cases, engineering reports were also used.
Action: References have been added as follows: to line 28 on page 1-16 "(Stevenson 1971)"; to line 29 on page 1-16 "(H&R 1986)"; and to line 31 page 1-16 "(EF 1958)."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.3 Page #: 1-16 Line #: 32-33 Code:
Original Comment #: 015 (OC 20)
Comment: What is the source of this information and how was it documented?
Response: Construction and as-built drawings were primarily used to document construction. In some cases, engineering reports were also used.
Action: The following reference has been added to the last sentence of the paragraph: line 33 on page 1-16 "(Parsons 1993)."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.3 Page #: 1-19 Line #: 30 Code:C
Original Comment #: 016 (OC 21)
Comment: Is the 1 foot indicated approximate, maximum or minimum?
Response: The 1 foot depth of the low permeability liner for Waste Pit 3 is approximate.
Action: The word "approximate" has been added to Table 1-5.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.4 Page #: 1-20 Line #: 2-3 Code:
Original Comment #: 017 (OC 22)
Comment: What is the source of this information and how was it documented?
Response: Construction and as-built drawings were primarily used to document construction. In some cases, engineering reports were also used.
Action: The following reference has been added to the last sentence of the paragraph, line 8, page 1-20: "(Parsons 1993)."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.4 Page #: 1-20 Line #: 14-21 Code: C
Original Comment #: 018 (OC 23)
Comment: The section fails to provide sufficient detail concerning the basis for Pit 4 being defined as an HWMU. More detailed information is necessary to support the Feasibility Study with regard to waste treatment and classification following treatment. The RI should contain a better characterization of the basis for HWMU classification of Pit 4.
Response: Agree that the fact Waste Pit 4 is a HWMU is pertinent. As discussed in Section 1.2.2.4, Waste Pit 4 was declared a hazardous waste management unit in 1984 because, at that time, it was believed that Waste Pit 4 was used to dispose of barium chloride salts from May 1981 to April 1983. Records indicate that Waste Pit 4 received residues (floor sweepings, etc.) contaminated with barium chloride salts. The actual barium chloride heat treatment salts would have been stored in the RCRA Warehouse. Accordingly, there was a process knowledge determination that Waste Pit 4 contained characteristic barium waste.
Action: The following text has been added before line 10 on page 1-21: "Waste Pit 4 is classified as a HWMU under RCRA. Waste Pit 4 was declared by NLO/DOE a HWMU on a Part A Application in 1984 because, at that time, it was believed that Waste Pit 4 contained characteristic barium waste, as it was used to dispose of barium chloride salts from May 1981 to April 1983. As discussed in Section 1.2.2.4, records indicate that only materials contaminated with barium chloride (floor sweepings, etc.) were deposited in Waste Pit 4. Therefore, the barium chloride content is expected to be minimal."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.5 Page #: 1-22 Line #: 5-6 & 8 Code: C
Original Comment #: 019 (OC 24)

Comment: The section fails to provide sufficient detail concerning the basis for Pit 5 being defined as an HWMU. More detailed information is necessary to support the Feasibility Study with regard to waste treatment and classification following treatment. The RI should contain a better characterization of the basis for HWMU classification of Pit 5.

Response: Agree that more information regarding the HWMU status of Waste Pit 5 is warranted.

Action: Line 13 on page 1-22 has been revised and text has been added to explain the RCRA status of Waste Pit 5, as follows: "Waste Pit 5, for which a water cover is maintained, is classified as a HWMU under RCRA. It was declared an HWMU in 1991 because, at that time, it was believed that it had received wastewater that contained in excess of 25 ppm spent 1,1,1,-trichloroethane (TCA), an F-listed solvent. The basis for the HWMU status of Waste Pit 5 was reviewed resulting in a determination that concentrations of the discharged spent TCA were less than 25 ppm, qualifying Waste Pit 5 for the wastewater mixture exemption under State of Ohio regulations. The State of Ohio concurred with this finding for the listed waste. A separate determination of HWMU status for Waste Pit 5, however, was made concurrently, because it is a unit for management of characteristic wastes (sludge). Upon completion of sampling and analysis, a final determination of the RCRA classification of Waste Pit 5 will be made and the RCRA Permit Application will be updated. Until that time, Waste Pit 5 will remain classified as an HWMU (DOE 1993).

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.5 Page #: 1-22 Line #: 7-12 Code: C
Original Comment #: 020 (OC 25)

Comment: The text should include a discussion of the Pit 5 liner repair activities and the findings of this action. The findings of this activity reflect upon the integrity of the Pit 5 liner.

Response: Agree that a further discussion of Waste Pit 5 liner repair activities is warranted.

Action: The following has been added between the sentences on line 4 on page 1-22: "In 1991, an inspection of the Waste Pit 5 liner revealed 98 locations that required repair. These repairs were completed as a best management project by the FEMP maintenance department from October 15, 1991, through February 6, 1992. A Pit 5 Liner Repair Work Plan and a Pit 5 Liner Repair Final Report were submitted to EPA and OEPA for this project.

The first step in repairing the liner was to lower the water level in Waste Pit 5 and remove waste material and vegetation in the vicinity of the failure. The liner was then repaired using caulk, adhesive, and patches according to manufacturers' recommendations. Following curing of the repair, the repairs were inspected by a third party, Ralph M. Parsons Company, and the water level was returned to the normal elevation.

Repairs prior to this time were made in a similar manner. Any additional repairs required since have been and will continue to be completed in accordance with the approved Repair Work Plan.

The integrity of the Waste Pit 5 liner has been improved as a result of the liner repairs. It is important to note, however, that repairs are only made on visible failures (i.e. those which occur near the surface of the Waste Pit). The integrity of the remainder of the liner is unknown. The groundwater monitoring data presented and discussed in Section 4 is the best indication of the effect of Waste Pit 5 on the water quality in the Great Miami Aquifer.

A geotechnical evaluation of the berms around Waste Pit 5 was performed to evaluate the potential for slope failure (Parsons 1992). The method for the evaluation can be found in Section 2.2.3 and the results of the evaluation are discussed in Section 3.1.9."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.6 Page #: 23 Line #: 6-13 Code: C
Original Comment #: 021 (OC 26)

Comment: The document states that during Pit #6 construction, holes were cut into the liner to prevent it from floating on pooling water. Please describe how and with what materials the holes were patched. Were these patches somehow monitored to insure the structural integrity of the pit liner?

Response: Agree. As discussed in Section 1.2.1.6, the holes were patched by first welding an approximately 16- x 16-inch piece of ethylene propylene diene monomer (EPDM) liner material over the area where a hole was to be cut. A 3-inch diameter hole was cut in the piece of liner material before it was welded to the liner so that a plastic suction hose could be inserted. The piece was welded to the liner to strengthen it before the hole was cut. After the piece was welded to the liner, a matching 3-inch hole was cut in the liner. The pump suction was then inserted through the holes and the water was pumped out. Another EPDM patch was then welded over the first patch. Typically, welds on membrane material such as this are stronger than the material itself. There are no records of actual testing to determine the structural integrity of the patches. The flow of water into the pit would have been obvious, had the patches leaked.

Action: This paragraph, on page 1-23, lines 6 through 13, was revised as follows: "Preventing water from entering the waste pit during construction was difficult. The liner continued floating on water entering the waste pit, so holes were cut in the liner. Before cutting holes in the liner, a 16-inch by 16-inch (approximate) piece of EPDM liner material with a 3-inch diameter hole was welded over the area in the liner where the hole was to be cut to reinforce the liner. After the piece was welded to the liner, a matching 3-inch diameter hole was cut in the liner. The pump suction hose was then inserted through the matching 3-inch holes, and the water was pumped from beneath the liner. Another EPDM patch was then welded over the holes to the first patch. There are no records of tests being performed to determine the structural integrity of the patches."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.1.7 Page #: 1-24 Line #: 14 Code: C
Original Comment #: 022 (OC 27)

Comment: Where did the reference decant lines drain to?

Response: Agree that the disposition of water drained from these lines is pertinent. These are the same lines discussed in terms of Waste Pit 1. From Comment #009: There are no records indicating the disposition of the water drained from Waste Pit 1, other than, as referenced in the text, that they were rarely used. The "Chemical Traps" area in the southwest corner was a sump. The apparent use of this was to pump out of this sump to Manhole #175 during normal operation. Since it isn't known when the decant lines were constructed, it is impossible to determine where the discharge was routed. Since the Clearwell was not in operation during the life of Waste Pit 1, these lines were either installed while Waste Pit 1 was in operation, in which case it can only be assumed that the rare overflows went to the storm water drainage system. If they were installed after Waste Pit 1 was closed (i.e., to provide drainage for the cover), they discharged to the Clearwell.

Action: The first sentence of the paragraph line 13 on page 1-24 has been revised as follows: "As noted in Section 1.2.1.7, a series of three 8-inch pipes are located in the berm between Waste Pit 1 and the Clearwell, but these decant lines were rarely used."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.2 Page #: 1-26 Line #: 17 Code: C
Original Comment #: 023 (OC 28)
Comment: What is Zirnlo slurry?
Response: As indicated in the Glossary (Appendix F.4), the Zirconium cladding of fuel rods was dissolved in Plant 9 using hydrofluoric acid in a operation called the Zirnlo process. This bluish-colored residue was then neutralized and pumped directly to the waste pits as Zirnlo slurry.
Action: The following has been added after the second sentence of the first bullet on page 1-26: "The UAP filtrate and slag leach slurry waste streams are discussed further in Section 1.1.3.2. Zirnlo Slurry is a zirconium/hydrofluoric acid residue generated in the decladding operation in Plant 9. Heat treat quench water is the water used to cool uranium ingots following NuSal heat treating."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.2.1 Page #: 1-30 Line #: TABLE 1-12 Code: C
Original Comment #: 024 (OC 29)
Comment: Provide chemical names for listed constituents.
Response: Agree that addition of the chemical names to the chemical abbreviations will avoid confusion.
Action: The chemical names of all constituents have been added.

TABLE 1-12

SUMMARY OF OPERABLE UNIT 1 WASTE PIT CONSTITUENTS BASED ON PROCESS KNOWLEDGE

Constituent	Solids to Waste Pits (MT)[a]					
	Waste Pit 1	Waste Pit 2	Waste Pit 3	Waste Pit 4	Waste Pit 5	Waste Pit 6
Uranium (U)	1,075	171	284	2,203	100	1,432
Aluminum (Al)	9	55	687	0	706	0
Antimony (Sb)	0	0	0	0	0	0
Arsenic (As)	0	3	43	0	48	0
Barium (Ba)	0	1	15	0	16	0
Boron (B)	0	0	0	0	0	0
Bismuth (Bi)	0	0	0	0	0	0
Cadmium (Cd)	0	0	3	0	3	0
Calcium (Ca)	456	1,028	453	0	502	0
Lime [$Ca(OH)_2$ from neutralization]	3,776	2,308	37,939	0	40,645	0
Chloride (Cl)	0	2	26	0	29	0
Chromium (Cr)	0	0	2	0	3	0
Cobalt (Co)	0	0	1	0	1	0
Copper (Cu)	7	17	94	0	61	0
Dysprosium (Dy)	0	0	1	0	2	0
Erbrium (Er)	0	0	0	0	0	0
Europium (Eu)	0	0	0	0	0	0
Fluoride (F)	173	380	5	0	6	0
Gadolinium (Gd)	0	0	1	0	1	0
Holmium (Ho)	0	0	0	0	0	0
Iron (Fe)	48	135	1,056	0	886	0
Lead (Pb)	2	4	26	0	17	0
Lutetium (Lu)	0	0	0	0	0	0
Magnesium (Mg)	684	1,528	539	0	634	0
Manganese (Mn)	156	343	1,797	0	1,071	0
Molybdenum (Mo)	0	2	37	0	41	0
Nickel (Ni)	0	0	0	0	0	0

TABLE 1-12
(Continued)

Constituent	Solids to Waste Pits (MT)[a]					
	Waste Pit 1	Waste Pit 2	Waste Pit 3	Waste Pit 4	Waste Pit 5	Waste Pit 6
Samarium (Sm)	0	0	0	0	0	0
Sodium (Na)	0	38	655	0	726	0
Terbium (Tb)	0	0	0	0	0	0
Thorium (Th) - 230	0	4	65	0	76	0
Thorium (Th) - 232	0.4	0	0.4	73.8	5.0	0
Thulium (Tm)	0	0	0	0	0	0
Tin (Sn)	3	7	40	0	25	0
Vanadium (V)	0	16	270	0	299	0
Yttrium (Yt)	0	0	2	0	2	0
Ytterbium (Yb)	0	0	0	0	0	0
Zinc (Zn)	0	0	6	0	7	0
Ammonia (NH_3)	0	2	34	0	38	0
Carbonate (CO_3)	0	9	1,817	0	2,573	0
Magnesium Fluoride (MgF_2)	11,952	10,694	41,183	18,263	5,056	7,750
Phosphate (PO_4)	137	321	511	0	487	0
Lead Oxide (Pb_2O_5)	0	25	425	0	471	0
Filter Aid (SiO_2)	586	553	2,334	334	1,241	0
Sulfate (SO_4)	0	116	1,990	0	2,205	0
Vanadium Pentoxide (V_2O_5)	0	12	212	0	234	0
Nitrate (NO_3)	0	11	324	0	291	0
Hydroxide and Oxygen Ions (OH^-,$O^=$)	0	0	1,042	0	1,041	0
Dolomite (CaO=MgO)	11,953	3,592	0	0	0	0
Unaccounted[b]	9,037	4,452	27,641	3,241	35,710	753
Totals	40,054	25,829	121,083	24,115	95,259	9,935

[a] See Appendix F.6.11 for further details.
[b] Includes unidentified materials in individual waste streams, such as unknown prcipitated metals from the General Sump, non-uranium portions of the graphite/ceramics and depleted residues, and non-thorium portion of the thorium wastes.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.2.3 Page #: 1-31 Line #: 33-34 Code: C
Original Comment #: 025 (OC 30)
Comment: Explain why this material is not considered as waste.
Response: The cover of Waste Pit 3 was constructed by depositing a wide variety of "dry" materials on the edge and pushing them into the pit. These materials were mixed to varying degrees as the construction of the cover proceeded. Therefore, the top 14± feet of Waste Pit 3 is a mixture of dry material and considered cover, as opposed to the unstable, "soupy" condition of wastes. The cover versus waste designation is not intended to be an indication of the presence or lack of contamination.
Nearly 90% of the material described as cover is accounted for in Table 1-4. There are no records regarding the relative amounts of the other materials that were used.
Action: The following has been added after the last sentence of the paragraph ending on page 1-31, line 34: "This was done because the amount of these materials deposited was not documented and their consistency is different than that of the other wastes slurried into the waste pit."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.2.4 Page #: 1-33 Line #: Code: C
Original Comment #: 026 (OC 31)
Comment: Explain where DOE obtained the information to account for percentage differences.
Response: The percent accounted for is the volume based on process knowledge compared to that based on survey data (Parsons 1993).
Action: Text has been added to the description of each waste pit stating that the "accounted for" volume is based on process knowledge.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.2.8 Page #: 1-34 Line #: 28 Code: C
Original Comment #: 027 (OC 32)
Comment: Where did DOE dispose of this material after '68?
Response: After 1968, uncontaminated debris was deposited in the sanitary landfill. Before and after 1968, many of the oils were burned in the Oil Burner. However, some were used in the Burn Pit to ignite other combustibles. After 1968, most of the materials that had been previously burned in the Burn Pit to reduce their volume were deposited in Waste Pit 4.
Action: Lines 4-5 on page 1-33 have been revised as follows: "These materials included cans, laboratory glass and plastic, concrete, asbestos, construction rubble, and general trash (Parsons 1993), much of which was deposited in the Burn Pit prior to 1968." Also, the following has been added after the end of line 30 on page 1-34: "After 1968, much of the trash previously deposited in the Burn Pit was sent to Waste Pit 4 and some of the uncontaminated debris was sent to the sanitary landfill."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.2.2.9 Page #: 1-35 Line #: 23 Code: C
Original Comment #: 028 (OC 33)
Comment: Insert the word physical or visual before indications.
Response: Agree that clarification of the term "no indications" is warranted.
Action: The sentence beginning in line 23, page 1-35, has been changed as follows: "None of the excavated lines have evidenced significant deterioration so indications are that the piping is structurally sound."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.3.1 Page #: 1-36 Line #: 12-13 Code:
Original Comment #: 029 (OC 34)
Comment: What evidence is there that the waste pits have not penetrated into the sand and gravel aquifer? This bullet indicates that in 1960, DOE believed that the sand and gravel aquifer had been breached. It would be logical to believe that in 1960, the construction of the pits would still be fresh in the minds of those who were involved in the construction.
Response: Comment acknowledged. While the information in 1960 (Eye 1960) did state that the pits (1,2 and 3 were the only pits constructed) "extended below the somewhat impervious surface layers and in some of these pit excavations, lenses or deposits of pure sand and gravel were encountered", the report goes on to acknowledge that "The bottom and sides of these pits were sealed initially with a layer of clay but there is no assurance that the seal is still completely continuous and water tight." A review of old records and construction drawings confirms that clay was indeed placed in the bottom of Pits 1 and 2 and in the bottom of Waste Pit 3 was located a natural layer of low permeability material. The evaluaiton of recent borings performed in the waste pits showed that clay was encountered in one boring in each of the pits indicating that there is some nominal clay layer between the materials in the waste pits and the sand and gravel layer. There is no method of determining the depth of clay in the bottom of the pits (or its condition) without boring completely through the bottom of the pit and into the sand and gravel layer, thus providing a direct connection between the waste in the pits and the sand and gravel layer.
Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.5.2.2 Page #: 1-45 Line #: 4 Code: C
Original Comment #: 030 (OC 35)
Comment: Rephrase sentence. Lose the word support.
Response: Agree that the word "support" is misleading.
Action: The phrase "that will support the no-action alternative for the specific operable unit" has been replaced with "and the environment."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 1.5.4.1 Page #: 1-49 Line #: Code: C
Original Comment #: 031 (OC 36)

Comment: The section should include a discussion of the liner repair actions taken for Waste Pit 5 and the findings of those activities (e.g., liner separations continue below the water line weren't repaired, liner separations revealed gravel below the liner in places, etc.)

Response: Disagree. Since this section briefly describes OU1 removal actions and the repair of the Waste Pit 5 liner was not a removal action, the details of the liner repair activity and its implications are discussed in Section 1.2.1.5.

Action: None.

USEPA COMMENTS

SECTION 2

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.0 (GENERAL) Page #: ALL Line #: NA Code:
Original Comment #: 032 (OGC #5)

Comment: The discussion of the various studies used to support the Operable Unit 1 RI should clearly indicate which data were collected, analyzed, and validated under the approved quality assurance project plan (QAPjP).

Response: Agree. Discussion of studies used to support the Operable Unit 1 RI should indicate which data were collected, analyzed, and validated under the quality assurance project plan (QAPjP).

Action: Section 2.12, page 2-50, line 14, Data Validation states: "The criteria used to validate Operable Unit 1 data was established in the FEMP SCQ, approved by EPA on May 19, 1993. Through negotiations with EPA, it was decided that DOE would be proactive in implementing the SCQ prior to formal EPA approval. Thus, all validated Operable Unit 1 data sets were reassessed for consistency with SCQ procedures between April and June 1993."

In Section 2.11, Quality Assurance, page 2-47, line 25, the following text was added. "Previous efforts during the RI/FS Sampling and Analysis Program included internal work plan requirements for quality assurance/quality control in field sampling and laboratory analysis. These internal requirements were based on the Quality Assurance Project Plan (QAPP). The QAPP is the document by which the 1991 RI/FS Sampling and Analysis Program, the 1992 RI/FS Treatability Study Sampling and Analysis Program, the Waste Pit Area Stormwater Runoff Control Removal Action (WPASWRC), the Experimental Treatment Facility (ETF) Removal Action and the RCRA Groundwater Monitoring Program were executed. The QAPP provided quality objectives and requirements for field sampling, laboratory analysis and data validation."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.0 (GENERAL) Page #: ALL Line #: NA Code:
Original Comment #: 033 (OGC #8)

Comment: In the tables, values for Uranium-235 and Uranium-236 are sometimes presented separately and sometimes presented combined (as Uranium-235/236). U.S. DOE should state the rationale for the presentation of data in the two different formats.

Response: In general, the off-site analytical laboratories analyzed Uranium-235 and Uranium-236 by alpha spectrometry. Because the mass of U-236 with respect to U-235 is small, and because the corresponding energies for the alpha particles for each isotope are similar, separation for the resulting spectrograph peaks is considered impossible. Therefore Uranium-235 and Uranium-236 are reported together as U-235/U-236 by most laboratories. However, some historic data was reported as U-235, as was conventional at the time, but was actually indicative of both U-235/U-236. In this instance, DOE chose to present the data as it was reported from the laboratories, rather than presenting data inconsistent with the laboratory data packages.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.1.1 Page #: 2-2 Line #: 16 and 17 Code:
Original Comment #: 034 (OSC #3)

Comment: This bulleted item discusses regional environmental resources that could be impacted by the Fernald Environmental Management Project (FEMP) site; however, surface water is not included as an environmental resource. U.S. DOE should clearly explain why surface water is not considered an environmental resource in the region.

Response: Comment acknowledged. Line 16 provides examples of regional environmental resources, and was not intended to be a comprehensive list.

Action: Page 2-2, line 16 was revised to state, "Regional environmental resources that could be impacted (e.g., ambient air, groundwater, surface water, or wetlands)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.2.3 Page #: 2-6 Line #: 2 and 3 Code:
Original Comment #: 035 (OSC #4)

Comment: The text states that the structural integrity of the dikes around Waste Pits 3, 5, and the Clearwell was tested. However, it is unclear why the structural integrity of the dikes around the other waste pits was not tested. U.S. DOE should state why the dikes around the other waste pits were not investigated to determine their structural integrity.

Response: Agree that Figure 2-3 and corresponding text needs clarification. The dikes around Waste Pits 3, 5, and the Clearwell are the only remaining dikes within Operable Unit 1.

Action: Page 2-6, lines 3 and 4 have been revised to state, "Due to the regrading of the Waste Pit Area, these three waste pits are the only ones within Operable Unit 1 that are currently contained by elevated dikes. All others have been incorporated into the surrounding fill areas."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.3 Page #: 2-6 Line #: 2 and 3 Code:
Original Comment #: 036 (OSC #5)

Comment: The text identifies the pits in Operable Unit 1 that were sampled during the CIS and the RI. The sump area was not sampled during these investigations; however, it apparently receives liquids from other pits at Operable Unit 1. U.S. DOE should explain why the sump area was not sampled.

Response: Agree. The sump was not sampled during these investigations for three reasons: (1) the Storm Water Runoff Control Removal Action sump is an active system used for collection of storm water runoff; as an active system, it would not be required for inclusion in this CERCLA process; (2) the sump did not exist when the Remedial Investigation sampling was performed; and (3) the Storm Water Runoff Control Removal Action sump does not receive liquids from the waste pits, as is shown in Figure 1-8. The general sump, which does receive decant liquids from the waste pits, is located in Operable Unit 3.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.9.3 Page #: 2-43 Line #: 8 Code:
Original Comment #: 037 (OSC #6)

Comment: The text states that 1700-Series wells are located within the waste pits and were not sampled as part of the RI. Sampling these wells would provide important information about contaminants from each of the waste pits and should be included as part of the Operable Unit 1 RI.

Response: Agree. 1000-Series wells were installed around the waste pits to sample perched groundwater. Data from these wells are reported in Section 4.4, Groundwater Characterization. By contrast, 1700-Series wells are not groundwater monitoring wells, but were installed within the waste pits to sample pit leachate. Data from these wells are reported in Section 4.2, Sources.

Action: Page 2-43, lines 7 and 8 were modified to state, "In total, 50 groundwater monitoring wells within the Operable Unit 1 study area were sampled during the RI/FS program." Reference to the 1700-Series wells has been removed from Section 4.4.

OEPA COMMENTS

SECTION 2

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.0 (GENERAL) Page #: Line #: Code: C
Original Comment #: 038 (OC 1)

Comment: Overall, a significant number of samples were rejected due to time and/or sample preservation techniques. This failure not only greatly reduces the number of acceptable samples, but also calls into question the validity of the accepted samples. The inability of DOE to get quality data from the waste pit investigation has significantly reduced available data and wasted large quantities of time and money. Please describe the cause of sample failure and what is being done to improve the number of valid samples.

Response: Comment acknowledged. Historically, there have been difficulties in meeting both contractual and technical holding time requirements for the RI/FS sampling efforts at Fernald. In May 1993, the sitewide CERCLA Quality Assurance Project Plan (SCQ) was implemented at the Fernald site. The SCQ provides specific requirements for sampling, sample tracking, and QA monitoring of field and laboratory activities.

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.2.1 Page #: 2-5 Line #: 8 Code: C
Original Comment #: 039 (OC 37)

Comment: Why were 83 & 88 the only years reviewed in the 80's. DOE had four active pits at this time.

Response: Comment acknowledged. In the Site Analysis report; Feed Materials Production Center, Fernald, Ohio, 1988, photographs were selected by the U.S. EPA Environmental Photography Interpretation Center, Warrenton, Virginia, to be the best available photographs locating and describing past disposal practices.

Action: Lines 5-8 on page 2-5 were changed to read, "Available photographs were analyzed by stereoscopic viewing of back lit transparencies to create a three-dimensional effect. This allowed discernment of different physical features and environmental conditions."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.3 Page #: 2-7 Line #: 23 Code:
Original Comment #: 040 (OC 38)

Comment: Specifically, what is meant by the "bathtub effect"? What is the source of the water; groundwater from perched zones, surface infiltration, direct placement in the GMA?

Response: The term "bathtub effect" has been deleted from the text. "Bathtub effect" is a term used to describe a process by which water infiltrates an area of higher permeability to an area of lower permeability. In describing the process of Waste Pits 1, 2, and 4 becoming saturated with water, surface water flowed into the pits. Because of the differential in permeability inside and outside the waste pits, the surface water could not flow out of the pits.

Action: Lines 21 through 23, page 2-7, were revised to read, "This was done because, although waste disposed of in Waste Pits 1, 2, and 4 was dry at the time of disposal, the waste became saturated upon disposal due to the infiltration of surface water into the pit."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.3 Page #: 2-8 Line #: 27 Code: C
Original Comment #: 041 (OC 39)

Comment: Three samples were listed in the text for TCLP analysis, but the accompanying table shows that five samples were analyzed. Please provide the correct number of analyses conducted and include proper documentation.

Response: Comment Acknowledged. After thorough QA/QC of laboratory data packages, the number in the text and in Table 2-11 were found to be in error.

Action: Page 2-8, line 27 has been revised to read, "In addition, four samples were extracted by TCLP before analysis." Table 2-11 has been revised to show the correct number of TCLP samples.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.3.1.2 Page #: 2-12 Line #: 8-32 Code: E
Original Comment #: 042 (OC 40)

Comment: We concur that the sampling method reduced the detected VOC concentrations, where present. We anticipate that improved sample collection methods (e.g., use a spoon sleeve) will be utilized during any future Volatile Organic Chemical sample collection events that may occur.

Response: Comment acknowledged.

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.3.2.1 Page #: 2-15 Line #: 17 Code: C
Original Comment #: 043 (OC 41)

Comment: DOE seems to contradict itself as far as the liners for the wastes pits. The document earlier indicates that all of the pits have clay or synthetic liners. DOE indicates some uncertainties here.

Response: Agree. All pits do have clay or synthetic liners.

Action: Page 2-15, lines 17 and 18 were changed to read, "Because the waste pits were lined with either synthetic or clay liners, drilling was conducted in a cautious manner to prevent damage or penetration of the pit liner."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.3.2.1 Page #: 2-16 Line #: 21-25 Code: C
Original Comment #: 044 (OC 43)

Comment: The strategy used by DOE may have biased the results both negatively or positively. What if wood chips were used to absorb PCB's that were spilled and then disposed of in the pit. This could also impact the FS as to effectiveness of a technology.

Response: In order to make a judgement regarding the effect of removing wood chips from the pit material samples, which was done to facilitate mixing, several concepts must be considered-the amount of wood present, the adsorptive characteristics of the wood, and the amount of PCB oils in contact with the wood. The specific question regards wood chips used to absorb spilled oils, presumably including PCBs. Such wood material was necessarily relatively fine, like sawdust, for effective pickup of the oils to occur. Most of this material was classified as depleted residue, and discarded in Waste Pits 1, 2, 4 or 6. One would not expect wood fragments that were large enough to segregate effectively, in the field, from the remainder of a sample. It would be difficult, at best, to remove enough wood particles that were originally used to absorb oils, from the remainder sample. Also, the boring logs do not indicate wood fragments in Waste Pits 1, 4, or 6. Only Waste Pit 2 data might be affected by the removal of oil-contaminated wood. The wood fragments to which Section 2.3.2.1 refers were large pieces of pallets that were disposed of in Waste Pit 3 and the Burn Pit. The wood in these pallets was not used to absorb oils prior to disposal. Removal of these wood fragments from pit material samples caused positive bias to the results, just as did the removal of pieces of concrete. Such wood was wetted in the pits, and had diminished absorptive capacity.

Action: The sentence on page 2-16, lines 23-24, has been revised as follows: "This was necessary to reduce the analytical difficulties of their complex waste matrix. Although the removal of these potential sorbents could have biased the chemical and radiological analyses of these samples, this preparation method was judged to be conservative (positively biased) since these materials (packaging and backfill) generally have high mass with only surface contamination. An exception to this is porous organic matter (e.g., wood chips) where absorption of contaminant-bearing leachate may have occurred."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.5.1.1 Page #: 2-21 Line #: 26 Code: C
Original Comment #: 045 (OC 44)

Comment: DOE needs to qualify why these dates are representative of Paddys Run past history.

Response: Agree. The RI report documents current or baseline environmental conditions within the OU1 study area, not historic conditions. Accordingly, data sets from 1991 and 1992 were chosen as representative of baseline conditions (a complete 1993 data set was not available when the draft RI report was prepared).

Action: Line 26 on page 21 has been changed to read, "Because the objective is to represent current environmental conditions, only data collected from January 1991 to December 1992 were evaluated in Section 4.0, Nature and Extent of Contamination."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.5.1.2 Page #: 2-22 Line #: 15 Code: C
Original Comment #: 046 (OC 42)
Comment: Document indicates that only two one-time grab samples were taken for Best Management Plan Surface Water Sampling. Are only two grab samples adequate to insure statistically relevant results?
Response: Acknowledged. Statistics to determine relevancy of the Best Management Plan (BMP) surface water sampling were not performed. There were three surface water sampling events, in addition to the RI/FS study, discussed in Section 4.5 to determine the nature and extent of surface water contamination originating from Operable Unit 1. The two BMP samples within Operable Unit 1 serve to support results collected from the other three studies.
Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.5.2.1 Page #: 2-25 Line #: 10 Code: E
Original Comment #: 047 (OC 45)
Comment: Data in table does not match what is stated.
Response: Agree. The data presented in the table matches the text with the exception of a reference to Ra-225 in the text. This was a typographical error. The correct isotope of radium is Ra-226.
Action: Section 2.5.2.1, page 2-25, line 10 was revised to read, "These samples were analyzed for gross alpha, isotopic uranium, isotopic thorium, and radium-226."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.6 Page #: 2-28 Line #: Code: C
Original Comment #: 048 (OC 47)
Comment: Surface soil sampling was conducted as a part of the ETF removal action. These data should be discussed within this section.
Response: Agree. The Experimental Treatment Facility (ETF) removal action is now discussed in Section 2.3.2, RI/FS Waste Pit Sample Program. The characterization is included in Section 4.2.3.
Action: The ETF removal action has been introduced in Section 2.3.2 as follows:

"An Experimental Treatment Facility (ETF) was constructed over Waste Pit 3 in 1984. This facility was designed for research on treatment methods for slurried material removed from Waste Pit 5.

In February 1988, high winds blew down part of the facility, and a small amount of the Waste Pit 5 test material was spread to the adjacent area. The ETF Removal Action began in December 1991 and was completed in March 1992. Several samples were collected as part of the ETF removal action and are discussed in Section 2.3.2.3."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.6 Page #: 2-28 Line #: 8-10 Code: C
Original Comment #: 049 (OC 48)

Comment: It is unclear from the text where the data from well borings 0-24" deep are included. Additionally, it is unclear if these data were incorporated into the baseline risk assessment. DOE must clarify the locations of the samples and where the data have been incorporated.

Response: Agree. These data were included in the air pathway analysis of the baseline risk assessment.

Action: Lines 8 through 11 on page 2-28 have been revised to read, "Surface soil as defined in this report includes soil data from 0 to 24 inches deep. These data were used to assess the air pathway associated with the baseline risk assessment as discussed in Section 5.3.3. In addition, these data were used to determine the nature and extent of surface soil contamination as discussed in Section 4.3.1. The surface soil sampling locations are depicted in Figure 2-9."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.6.1 Page #: 2-28 Line #: 27-28 Code: C
Original Comment #: 050 (OC 46)

Comment: Figure 2-9 does not illustrate the CIS surface soil locations as suggested by the text. The text or figure should be corrected.

Response: Agree. Figure 2-9 does not illustrate the CIS surface soil locations as described in the text.

Action: CIS surface soil locations have been verified, and Figure 2-9 has been revised to include these locations.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.6.2 Page #: 2-29 Line #: 12-13 Code: C
Original Comment #: 051 (OC 49)

Comment: The text suggests 34 surface soil locations were sampled. Yet, only 7 surface soil locations were used in the baseline risk assessment. Additionally, Figure 2-9 does not show 34 RI/FS surface soil sampling locations. Table 2-16 and Appendix B.1.1.2 report only 14 RI/FS surface soil samples. The document does not clearly specify why such varying numbers of samples are used/reported. DOE should revise the document to be consistent or justify any inconsistencies.

Response: Agree. The number of surface soil samples was inconsistent between the text, Table 2-16, and Appendix B.1.1.2.

Action: Text on page 2-29, lines 12 and 13, was revised to read, "Of those samples, 14 surface soil samples (as defined by depth) were collected from within Operable Unit 1 because much of this area had been sampled during the CIS program." Table 2-16 and Appendix B.1.1.2 also report 14 samples.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.6.3 Page #: 2-31 Line #: 1-5 Code: C
Original Comment #: 052 (OC 50)

Comment: The text in this section suggests that a maximum of 9 surface soil sample locations were submitted for HSL analyses. Table 2-16 and Appendices 8.1.1.3 and 8.1.1.4 suggest this number is 16 or 17 depending on the analyses. The document does not clearly specify why such varying numbers of samples are used/reported. DOE should revise the document to be consistent or justify any inconsistencies.

Response: Agree. The number of surface soil samples discussed in the text, Table 2-16, and Appendices B.1.1.3 and B.1.1.4 was not consistent.

Action: Lines 1 through 5, page 2-31, have been revised to read, "Seventeen samples from the 0- to 24-inch interval were submitted to an off-site laboratory for HSL analyses. Analytical data are presented in Appendix B.1.1.4. The Waste Pit Area Storm Water Runoff Control Removal surface soil analytical data completeness is presented in Table 2-16."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.12 Page #: 2-52 Line #: 29 Code: C
Original Comment #: 053 (OC 51)

Comment: Please explain the minor changes.

Response: Agree. An explanation of minor changes in validation criteria was provided in Table 2-25.

Action: Lines 29 and 30 on page 2-52 were changed to read, "Minor changes in holding time criteria for semivolatiles, pesticides, and PCBs were implemented for the CIS, RI/FS 91, and RI/FS 92 data as summarized in Table 2-25."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2.13 Page #: 2-60 Line #: 27 Code: E
Original Comment #: 054 (OC 52)

Comment: Typographical error in the word "treat."

Response: Agree. The word "treat" was corrected to the word "threat."

Action: Lines 26 and 27 were corrected to read, "All data sets were evaluated in context with the proposed use of the information in a manner sufficient to (1) determine to what extent, a threat to human health or the environment exists and (2) develop and evaluate remedial action alternatives."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2 Page #: 2-72 Line #: TABLE 2-4 Code: C
Original Comment #: 055 (OC 53)

Comment: The table shows very low quality objectives (10%-30%). Quality of samples should be much higher. How can we be assured of the sample quality when the objectives are so low?

Response: Comment acknowledged. The values discussed in Table 2-4 were taken from the EPA Contract Laboratory Program Statement of Work for Organics and Inorganics Analyses (OLMO1.7, 7/91 and ILM2.1, 9/91), and as adopted by the FEMP RI/FS Quality Assurance Project Plan, Tables 4-1 through 4-3.

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2 Page #: 2-88 Line #: TABLE 2-13 Code: C
Original Comment #: 056 (OC 54)

Comment: How much money was spent on analytical costs for the 1992 RI/FS samples that were not usable? Who paid for the non-usable samples' analytical costs.

Response: As discussed in Section 2.3.2.2, the primary intent of the 1992 RI/FS Waste Pit Sampling was to collect bulk material from Waste Pits 5 and 6 and the Clearwell to be used in Treatability Studies. This objective was met. Materials from Waste Pit 5 and 6 and the Clearwell were collected using a clamshell crane. Material captured in the clamshell bucket was transferred to 55-gallon drums. The 55-gallon drums were sealed and sent to Building 71 to await sampling and ultimate transfer to GTS Duratek for treatability studies. The drums were stored for approximately six months prior to sampling and transfer. While the samples were representative of the drum contents at the time of sampling, the organic sample results were considered non-representative of the waste pit contents due to (1) the length of time between the removal of material from the pits and ultimate sampling of the drums and (2) differences in the degradation of organic materials in the drums versus the organic material present in the pits (due to differing environmental conditions). While organic results from these samples were considered non-representative, radiological and inorganic data were determined to be of sufficient quality to reduce uncertainty in the baseline risk assessment. The primary objective of the 1992 RI/FS Waste Pit Sampling was met. The data was not specifically intended for use in the baseline risk assessment, and the radiological and inorganic sample data, although not intended to, did provide additional information for the baseline risk assessment. DOE, therefore, considered the results of the sampling effort satisfactory and no attempt was made to resample.

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2 Page #: 2-94 Line #: TABLE 2-17 Code: C
Original Comment #: 057 (OC 55)

Comment: Documents supporting the analyses are not included in the report. Please provide proper documentation for the analyses.

Response: Agree. Table 2-17, which was referenced in Section 2.7.1, presents the RI/FS subsurface soil analytical data completeness statistics. Analytical data corresponding to the samples highlighted in the completeness table are presented in Appendix B.1.2.3. Thus, documents supporting the analyses are included in the RI report. Table 2-17 was in error, however, with respect to the number of surface soil samples submitted for radiological analyses. The correct number is 39, versus the total of 107 previously reported. Appendix B.1.2.3 presents the radiological data for these samples.

Action: Table 2-17 was revised to reflect that 39 subsurface soil samples were analyzed for radiological parameters. The percent validated and the percent usable were updated based upon the total number of samples reported.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 2 Page #: 2-96 Line #: TABLE 2-18 Code: E
Original Comment #: 058 (OC 56)
Comment: Typographical error. Well number MW-3001 lists depth as 8/59. This figure is also used as the completion date for the well.
Response: Agree.
Action: The completion date "8/59" has been removed from the depth column on Table 2-18. However, the completion depth is not known for MW-3001.

USEPA COMMENTS

SECTION 3

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.1.1 Page #: 3-2 Line #: 2 and 3 Code:
Original Comment #: 059 (OSC #7)

Comment: The text states that Waste Pit 1 is covered with 0.5 feet of clean fill and that the depth to saturation in the pit is approximately 3 feet. Figure 3-2, which shows a cross-section of Waste Pit 1, does not show 0.5 feet of clean fill in the pit and the depth of saturation in the pit appears to be about 7 feet below grade. U.S. DOE should resolve these discrepancies so the report is accurate and consistent.

Response: Agree that the text and figure appear inconsistent. The text references typical or "approximate" depth to saturation averaged over time whereas the cross-section shows the water level for two specific measurements. Therefore, the two can not be expected to exactly match. The water levels shown represent April 1993 levels and October 1993 levels. As shown, the water level during April was approximately 3 feet below grade while the October level was about 6 feet below grade, making the average of these approximately 4 feet.

Due to the scale of the figures, the 0.5 feet of clean fill cover was not differentiated, but is incorporated in the upper layer of clayey silt as drawn. Also, please note that all of the waste pit cross sections (Figures 3-2 through 3-6) have been revised in response to comment # 080.

Action: Page 3-2, Lines 2-3, have been revised to read: " Waste Pit 1 is covered with 0.5 feet of clean fill which is included in the upper layer of clay shown in Figure 3-2. The typical depth to saturation in Waste Pit 1 for the measurements shown is approximately 4 feet below grade."

The figure has been revised in response to comment # 080 and to show 1993 water level measurements.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.1.2 Page #: 3-2 Line #: 12 and 13 Code:
Original Comment #: 060 (OSC #8)

Comment: The text states that Waste Pit 2 is covered with 1 to 4 feet of clean fill and that the depth to saturation is approximately 1.5 feet. However, Figure 3-3, which shows a cross-section of Waste Pit 2, does not show 1 to 4 feet of clean fill and the depth of saturation in the pit appears to be about 3 feet below grade. U.S. DOE should resolve these discrepancies.

Response: Agree. The text may seem confusing. Cover material for the pit appears as the silty clay and silt. The thicknesses of these layers which are typical of the cover material are seen to vary in thickness from approximately one foot at Well 1768 to approximately 4 feet in the vicinity of Well 1769. The average of the water elevations shown is approximately 1.5 feet as stated.

Action: Page 3-2, Line 12, has been revised to read: "The coloration is consistent with that expected based on process knowledge of the contents. Waste Pit 2 is covered with 1 to 4 feet of clean fill which is included in the upper layer of clay shown in Figure 3-3. The typical depth to saturation in Waste Pit 2 is approximately 1.5 feet below grade."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.1.3 Page #: 3-2 Line #: 21 and 22 Code:
Original Comment #: 061 (OSC #9)

Comment: The text states that Waste Pit 3 is covered with 14 feet of clean fill. However, Figure 3-4, which shows a cross-section of Waste Pit 3, does not show 14 feet of clean fill. U.S. DOE should resolve these discrepancies. Furthermore, according to Section 1.2.2.3, the cover material on Waste Pit 3 is composed of filter cake, slag leach residue, lime sludge, flyash, and sludge removed from Waste Pit 5. U.S. DOE should provide sample results to support its claim that the fill material is not contaminated.

Response: Please see response to comment #59.

Action: Page 3-2, Lines 21 and 22, have been revised to read: " This coloration and consistency is expected since the major waste streams were deposited in slurry form. The maximum depth of the waste material is 27 feet. Waste Pit 3 is covered with a 14 foot mixture of slag leach, filter cakes, lime sludge, fly ash, coal fines, and soil. The typical depth to saturation in Waste Pit 3 is approximately 3 to 6 feet below grade.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.1.4 Page #: 3-2 Line #: 29 and 30 Code:
Original Comment #: 062 (OSC #10)

Comment: The text states that Waste Pit 4 is covered by an interim measure RCRA cap; however, Figure 3-5, which is a cross-section of the pit, does not show the cap. U.S. DOE should resolve these discrepancies so the report is accurate and consistent.

Response: Agree. Identificaiton of the liner was not clear. Also, more recent water level data has been incorporated into Figure 3-5.

Action: Page 3-2, Lines 29-31, have been revised to read: " Waste Pit 4 is covered by an interim measure RCRA cap. The typical depth to saturation in Waste Pit 4 varies between 8 and 11 feet below grade." The caption, "HPDE MEMBRANE LINER, (INTERIM CAP)" has been added to Figure 3-5 and Figure 4-21 to clarify this issue.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.1.5 Page #: 3-3 Line #: NA Code:
Original Comment #: 063 (OSC #11)

Comment: This section discusses sludge samples that were collected from Waste Pit 5; however, Waste Pit 5 holds sludge that is covered by water. Because of the surface conditions in Waste Pit 5, U.S. DOE should state what methods were used to collect the sludge samples.

Response: Section 2.3.1.2 describes the methodology used to collect samples from "Wet Pits."

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.1.7 Page #: 3-3 Line #: 24 Code:
Original Comment #: 064 (OSC #12)

Comment: The text states that the depth to saturation in the Burn Pit is approximately 3 feet; however, Figure 3-6, which is a cross-section of the pit, shows the depth to saturation to be about 14 feet. U.S. DOE should resolve these discrepancies so the report is accurate and consistent.

Response: Please see response to comment # 059. Measurements in Well 1078 (northwest edge of Burn Pit) are consistently 13 to 15 feet below grade. The Autumn 1991 water levels for Wells 1776 and 1777 were similarly low, but the wells had just been installed in late July 1991. Since that time the levels in Wells 1643, 1776, 1777, and 1022 which are located in the Burn Pit have been consistently 3 to 5 feet below grade and are considered more representative of the depth to saturation in the Burn Pit.

Action: Page 3-3, Line 24, have been revised to read: " The typical depth to saturation in the Burn Pit ranges from 3 to 5 feet below grade.

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 3.2.5.1 Page #: 3-7 Line #: NA Code: C
Original Comment #: 065 (OC #1)

Comment: Please comment on radon flux testing of Waste Pit 5, whether testing had ever been performed prior to submerging exposed material below the waterline.

Response: DOE was not required to test Waste Pit 5 for radon if Removal Action No. 18, Control of Exposed Material in Pit 5, was completed prior to the end of 1992. The Removal Action was completed in December 1992, so no radon sampling of Waste Pit 5 was conducted prior to submerging the exposed material.

Action: The following has been added after the last paragraph of Section 3.2.5.1 on page 3-8: "As acknowledged by EPA in a letter to the FEMP (EPA 1992j), radon flux testing was not necessary because Waste Pit 5 was covered with water and the radon flux readings were assumed to be zero or below the standard."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.2.1 Page #: 3-24 Line #: 24 Code:
Original Comment #: 066 (OSC #13)

Comment: The hydraulic permeabilities of the clay-rich tills is described as very low. However, there are several unconnected sand lenses which contain significant groundwater contamination indicating that the clay-rich till may possess enhanced secondary permeabilities. The characterization of the till should address such possibilities.

Response: Agree that the potential for enhanced secondary permeability of the glacial overburden due to the presence of sand lenses is pertinent to the discussion.

Action: The following has been added to Page 3-24, beginning at Line 25: " However, enhanced secondary permeability due to the presence of coarser grained sand lenses in the glacial overburden is indicated in some areas of OU1. In such areas the vertical permeability is likely to be greater than that indicated by the laboratory core tests. This is accounted for in fate and transport modeling (Section 5.3.2.3) by using a horizontal (1000-series wells slug test data) to vertical permeability factor of 10 which results in a vertical permeability range of 4.0×10^{-6} to 6.6×10^{-6} cm/sec (0.0114 to 0.0186 feet per day).

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.2.2 Page #: 3-26 Line #: NA Code:
Original Comment #: 067 (OSC #15)

Comment: The text discusses three different types of hydrogeologic environments of the GMA. U.S. DOE should indicate which of these hydrogeologic environments encompasses the site.

Response: Agree.

Action: The first sentence of the last paragraph of Section 3.4.2.2 (page 3-26) has been revised as follows: "The Type III hydrogeologic environment, which encompasses the area of the FEMP, is characterized by clayey glacial overburden overlying the Great Miami Aquifer."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.2.2 Page #: 3-26 Line #: 1 and 2 Code:
Original Comment #: 068 (OSC #14)

Comment: The text states that hydraulic gradients do not exist across the clay interbed and that no potential for flow across the interbed exists. However, according to Figures 3-43 and 3-45, there appears to be a slight downward gradient from the 2000- and 3000-series wells to the 4000-series wells. Furthermore, the gradient should be determined in areas where the clay interbed is absent. U.S. DOE should revise the text to state that there is a slight downward gradient across the clay interbed in the Great Miami Aquifer and determine what the gradients are in areas where the clay interbed is absent.

Response: Agree that Figures 3-43 and 3-45 do illustrate a slight potential across the clay interbed, as evidenced by a differential between the 2000- and 3000-series wells and the 4000-series wells at a few locations. Values for the vertical gradient have been inserted in the text in response to comment #069. It is possible that the observed gradient is induced by pumping beneath the interbed (i.e. site production wells).

Action: Page 3-26, lines 1-2 have been modified as follows: "The hydrographs show a small vertical hydraulic gradient across the clay interbed. Water levels are essentially the same on both sides of the clay interbed, so there is little potential for flow across the interbed. The small difference in water levels could be the result of pumping from beneath the clay interbed (site production wells are located beneath the clay interbed)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.2.3 Page #: 3-26 to 3-28 Line #: NA Code:
Original Comment #: 069 (OSC #16)

Comment: The text discusses the hydrogeology of the site; however, it does not include basic hydrogeologic information such as calculations of vertical and horizontal permeabilities, groundwater flow velocities, or gradients. U.S. DOE should include this information in the text.

Response: Agree that the requested hydrogeologic data should be incorporated into the text. Since well clusters do not occur in the glacial overburden vertical gradients could not be calculated. Also, since the water level contours in the glacial overburden represent potentiometric head and not a water table surface, a horizontal gradient was not calculated. However, the existence of well clusters in the Great Miami Aquifer (2000-, 3000-, and 4000-series wells) and the presence of a water table allowed for the calculation of vertical and horizontal gradients in the Great Miami Aquifer.

Vertical and horizontal permeabilities were addressed in Section 3.4.2.1 in the discussion of laboratory core testing and well slug testing.

Action: Page 3-24, Line 20, has been revised to read: "Core permeability tests (undisturbed sample tests), which represent vertical hydraulic conductivity, have been performed on 28 samples from soil borings."

Page 3-24, Lines 26-32 have been replaced with the following: "Table 3-5 lists the results of 31 slug tests which represent horizontal conductivity. The tests were performed in 1000-series wells located across the FEMP. All of the slug tests were performed in wells completed in glacial overburden materials that included at least a few feet of glaciofluvial sand or sandy silt. These values range from 2.5×10^{-6} to 3.1×10^{-3} cm/s. Additional slug tests performed during 1993 show results for nine wells in the Operable Unit 1 area that fall within the range of the values in Table 3-5. Although there are significant differences between the testing procedures of laboratory core tests and in-situ slug tests, the results show that the horizontal conductivities are as much as three orders of magnitude greater than vertical conductivities."

The following paragraphs have been added beginning on Page 3-26, Line 3: "Vertical hydraulic gradients were calculated for the Great Miami Aquifer during the months of April and October 1993. Only three well pairs could be used to calculate the gradients because several wells were plugged and abandoned in the OU1 area prior to or during 1993. Wells in the same cluster were paired for these calculations. Vertical gradients calculated between wells 2821 and 3821 (southeast of Waste Pit 2) ranged between 0.00054 (April 1993) and 0.0 (October 1993). The vertical gradient calculated between wells 3011 and 4011 (west of Waste Pit 5) was -0.0018 (May and October 1993). The vertical gradient between wells 2084 and 3084 (north edge of Waste Pit 4) for April 1993, was calculated to be -0.0007. (Negative values indicate upward gradient.) These calculations are representative of the small vertical gradients in the Operable Unit 1 area.

Horizontal gradients were calculated for both 2000- and 3000-series wells. Figures 3-37 through 3-40, groundwater elevation maps, were used in calculating the horizontal gradients for 2000-series wells in 1992. Wells 2027 and 2028 were chosen as

representative wells located perpendicular to the groundwater elevation contour lines. Horizontal groundwater gradients between wells 2027 and 2028 were calculated for January, April, July, and October, 1992 and April and October of 1993. The results ranged from 0.0007 to 0.0015. Wells 3001, 3003, 3004, 3011, 3019, 3084, and 3821 were used to calculate horizontal gradients for 3000-series wells in April of 1989, 1992, and 1993 (the only complete data sets available). Horizontal groundwater gradients ranged between 0.0008 (1993) to 0.0016 (1989 and 1992)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.0 Page #: 3-41 to 3-45 Line #: FIG. 3-2 - 3-6 Code:
Original Comment #: 070 (OSC #17)

Comment: Cross-sections for Waste Pits 1 through 4 and the Burn Pit are shown on pages 3-41 to 3-45. These cross-sections show the thicknesses of clay liners and glacial overburden material and also the elevation of the top of the Great Miami Aquifer; however, many of the wells in these cross-sections do not extend to the depths shown on the figures. It is not apparent, therefore, how liners for some of the pits can be documented. U.S. DOE should indicate how these elevations were determined or revise these figures to indicate that the thicknesses and elevations are only inferred or indicate that liners for some pits do not exist. Also, the depth of waste should be indicated on each cross-section.

Response: Information on pit liners came from construction as-built drawings and engineering records. In addition, at least one boring in each waste pit shown in the cross-sections extended to the depth of the clay bottom. However, since the full areal extent of the clay liners can not be directly documented by the borings, the figures are annotated to indicate that the liner positions and physical features are "approximate". The cross sections in Section 3 were designed to describe the pit contents based on the geotechnical information provided in the boring logs. With regards to the underlying glacial material and Great Miami Aquifer, many other site borings in close proximity to the waste pits allow for correlation of these units across the site (see Figures 3-23 through 3-32).

Please also note that the waste pit cross sections (Figures 3-2 through 3-6) have been revised in response to comment #080. Detailed information such as the depth, contents, and nature of contaminants in the waste pits is provided in Section 4.

Action: Figures 3-2 through 3-6 have been revised and annotated to indicate that the details on the clay liners are "approximate".

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.0 Page #: 3-64, 3-66, 3-69 Line #: Fig. 3-25, 3-27, 3-30 Code:
Original Comment #: 071 (OSC #18)

Comment: Figures 3-25, 3-27, and 3-30 show cross-sections of waste pits in Operable Unit 1. Figure 3-25 (cross-section B-B') and Figure 3-27 (cross-section D-D') both use well 1075; however, the water level for this well differs by about 10 feet in the cross-sections. Also, on Figures 3-25 and 3-27, well 1075 is shown within the boundaries of Waste Pit 3. However, on Figure 3-30 (cross-section G-G'), well 1075 is shown outside the boundaries of Waste Pit 3. U.S. DOE should resolve these discrepancies so the report accurately and consistently describes site conditions.

Response: Agree that some of the information presented on the figures appears inconsistent and some was incorrect. Well 1075 was projected onto cross-section B-B' for geologic interpretation therefore its water level elevation was not deemed appropriate (figure now revised with note referencing well projection). The water level line from B-B' therefore crossed the well at an elevation (approximately 578 feet) different from the true water elevation in the well. However, Well 1075 falls very close to cross-section D-D'and its true water level should have been plotted (see triangle symbol on figure by well) at an elevation of approximately 581 feet. However, all of the cross sections have been revised to reflect the April and October 1993 water levels now shown on the plan view maps (Figures 3-47 and 3-48) and text revisions made in response to comments # 72 and # 225. The revised cross-sections show the April and October 1993 water levels plotted at each well location where data was available. As discussed in comments #72 and # 225 the potentiometric head indicated by the water levels in the glacial overburden and waste pit wells should not be directly interpreted as a water table on the cross-sections.

Also, the confusion about the location of Well 1075 both inside and outside of different waste pits is a result of its projection onto the cross-section lines (see Figure 3-23). A note has been added to the appropriate cross-sections to inform the reader of the projection.

Action: Water levels on the cross-sections (Figures 3-24 through 3-31) have been revised and the water level for Well 1075 is consistent. A note has been added to the cross sections to indicate that the locations of some wells are projected onto the cross sections.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.0 Page #: 3-86 and 3-87 Line #: FIG. 3-47, 3-48 Code:
Original Comment #: 072 (OSC #19)

Comment: The perched water level maps shown in Figures 3-47 and 3-48 may be deceiving because the wells may be screened in different units and at different depths. U.S. DOE should state that the groundwater flow directions indicated on these maps may not be accurate since the wells may not be screened in the same geologic units.

Response: Agree that the figures may be misleading. The figures actually reflect FEMP-wide contour maps of groundwater elevations in glacial overburden, and hindsight says that they are not the best representation of the OU1 site-specific conditions. Also, at the time the draft of the report was prepared, the only seasonal data (high verses low) available was from Autumn 1991 and May 1993. (Water level data was not collected in the '1700' series pit leachate wells during 1992). However, at the time this response was prepared, monthly water level data (RCRA monitoring) for most of 1993 was available. Since the

original intent of the figures was to demonstrate seasonal variability at OU1, it was decided that seasonal high and low water level data (i.e. April and October) for 1993 would be more appropriate to describe the present site conditions. Therefore, Figures 3-47 and 3-48 have been completely revised, and a more site-specific interpretation has been applied to the water level contours.

Subsequently, the text in Section 3.4.2.3 has been extensively revised to reflect the new figures. In order to avoid confusion over the interpretation of the contour lines on these figures the term 'potentiometric head' has been introduced to describe the meaning of the water levels in the wells located in the waste pits and glacial overburden (actually an averaged potential due to the long screen lengths used). The revised text attempts to clarify that the meaning of the contours can not be assumed to imply that horizontal groundwater flow occurs or that a water table exists across the site.

Action: The text on Page 3-27, Lines 12-35 have been revised to read as follows: "Three graphic tools are used to interpret the groundwater regime in the OU1 area. First, groundwater elevation contour maps (Figures 3-37 through 3-40) are used to indicate the direction of lateral groundwater flow in the Great Miami Aquifer. Potentiometric contour maps (Figures 3-47 and 3-48) are used to visualize hydraulic head distribution within the glacial overburden. Second, water level elevations in glacial overburden and waste pit wells are shown on cross sections (Figures 3-24 to 3-31) with respect to surface topography, shallow geology, and the OU1 waste facilities. And third, the hydrographs in Figures 3-41 through 3-46 show the seasonal variability and difference in groundwater elevations for the glacial overburden and the upper, lower, and deep Great Miami Aquifer.

The groundwater elevation contours and hydrographs for the Great Miami Aquifer demonstrate that flow is essentially horizontal and that only small vertical and horizontal gradients exit in the aquifer. Therefore, groundwater flow may be expected to occur generally perpendicular to the elevation contour lines shown in Figures 3-37 through 3-40. The hydrographs also demonstrate that the seasonal changes in groundwater elevations are approximately synchronous with the seasonal pattern of precipitation at the FEMP.

Interpretation of the potentiometric head contours on the glacial overburden maps (Figures 3-47 and 3-48) is more speculative and the condition of horizontal flow likely does not apply, except to a limited extent within the coarse grained lenses. Based on the large differences in potentiometric head elevation between wells located inside and outside of the four waste pits (i.e., well 1770 vs. 1023, 1768 vs. 1838, surface water elevations above 580 feet in Pits 5 and 6 vs. wells 1080 and 1027), there is strong evidence that the clay and elastomeric membrane liners around Pits 1, 3, 5, and 6 are effective low conductivity zones which produce steep hydraulic gradients along the north, northeast, west, and southwest perimeter of OU1.

Conversely, the potentiometric head elevations in overburden wells to the east of Pits 2, 3, and 4 are more consistent with wells in these pits. In addition, the glacial overburden in the vicinity of Waste Pit 4 contains coarse grained (sand and gravel) lenses which have been correlated across the eastern portion of OU1. Cross sections A-A'(Figure 3-24), B-

B'(Figure 3-25), E-E'(Figure 3-28), and G-G'(Figure 3-30) and Figure 3-32 show the vertical and horizontal interpretation of the coarse grained lens. These observations indicate that more hydraulic continuity exists to the east (vs. the north, west, and south) and provides a mechanism for enhanced lateral groundwater flow to the east (away from Waste Pits 2, 3, 4, and the Burn Pit). However, the presence of a water table or potentiometric surface across the area cannot be assumed. As a result, only the relative, seasonal positions of the water levels in the wells are shown on the cross sections.

The vertical component of groundwater flow within the glacial overburden is difficult to access since well/piezometer clusters were not installed above the Great Miami Aquifer. Since the hydraulic conductivity of the glacial overburden is known to be much less than the underlying sand and gravel (see Section 5.3.2.3), equipotential lines may be expected to approach horizontal near the contact of the overburden with the underlying, unsaturated Great Miami Aquifer. Therefore, the predominant groundwater flow direction should have a strong vertical component. Exceptions may occur within the more conductive coarse grained interbeds within the glacial overburden which represent horizontal conduits (of limited areal extent in the vicinity of OU1). Although the specific discharge from the glacial overburden to the Great Miami Aquifer can not be accurately determined, the groundwater elevation contours in Figures 3-37 through 3-40 do not show any direct result (i.e., mounding) due to leakage of perched groundwater to the Great Miami Aquifer.

Comparisons of Figures 3-47 and 3-48 show that seasonal variation of potentiometric head typically ranges from 1 to 5 feet across the site. The cross sections in Figures 3-24 to 3-31 show that the April 1993 levels are consistently higher than the October 1993 levels, with the exception of wells located in Pit 4 and around the perimeter of Pit 5 (see sections B-B', C-C', and D-D'). A clear explanation for this anomaly is not apparent, but it may be related to several factors: enhanced infiltration of rainfall in the drainage ditch along the northern boundary of Pit 5; the liner under Waste Pit 5 and the RCRA cap over Waste Pit 4; and/or time lag in the 4-inch diameter wells following rainfall events which occurred just prior to water level measurements in the wells."

OEPA COMMENTS

SECTION 3

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 3.0 (GENERAL) Page #: Line #: Code: E
Original Comment #: 073 (OC 8)
Comment: Can the geophysical anomaly maps be refined to illustrate the different intensities within the anomalies (e.g., by use of limited contouring, hatching density, or other means)? Or are the degree of precision and/or value of providing refined graphics insufficient to warrant such illustration?

Response: We feel that the degree of precision of these surveys does not warrant additional refinement of the graphics. The surveys were performed to help establish boring locations during the CIS. The data collection was not intended to establish nature and extent of contamination or support risk assessment. A more complete description of the geophysical techniques employed and their intended purpose is presented in Section 2.0.
Action: No revision to the geophysical maps was performed.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 3.1.1 Page #: 3-1 Line #: 34 Code: C
Original Comment #: 074 (OC 57)
Comment: What material is DOE referencing the waste or the liner?
Response: Agree that the text may be misleading. The borings in all of the pits were stopped above the liners to avoid any potential for damage.
Action: Page 3-1, line 34, has been revised as follows: "The waste material encountered is very dark gray in color and is predominantly silt- and clay-size consistency."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 3.1.7 Page #: 3-3 Line #: 18 Code: C
Original Comment #: 075 (OC 58)
Comment: Why such a large volume of waste material if DOE states that material disposed of in the pit was liquids or burned?
Response: Agree that the volume of waste materials in the Burn Pit may be misleading based on its use. As indicated in Section 1.2.1.8, the Burn Pit was filled with a wide variety of waste materials during the construction of Waste Pit 5.
Action: The following sentence has been added on Page 3-3, line 20: "The Burn Pit was filled with cinders, concrete, ash, gravel, and soil during the construction of Waste Pit 5."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 3.1.9 Page #: 3-5 Line #: 13 Code: E
Original Comment #: 076 (OC 59)
Comment: Wrong date.
Response: Agree that the dated cited for release of the Operable Unit 1 Feasibility Study is incorrect.
Action: Page 3-5, lines 12-14, has been revised as follows: "A more comprehensive evaluation of the study's findings will appear in the Operable Unit 1 FS draft report scheduled for submittal to EPA for initial review and comment in March 1994."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 3.2.4 Page #: 3-7 Line #: 14-19 Code: C
Original Comment #: 077 (OC 60)

Comment: Is the area surrounding FEMP attainment or non-attainment for criteria air pollutants (particulate matter, sulfur dioxide, carbon monoxide, ozone)?

Response: Agree that the attainment status of the area surrounding the FEMP is pertinent.

Action: Page 3-7, lines 14-19 have been modified as follows: "Overall air quality in the vicinity of the FEMP is generally regarded as 'good' with respect to National Ambient Air Quality Standards (NAAQS). These nationally-adopted health-protective standards apply to six priority pollutants regulated under the CAA of 1990: inhalable particulates, carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, and lead. The FEMP is located in an attainment area for all criteria air pollutants but the Greater Cincinnati area is an ozone non-attainment area."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 3.2.5.2 Page #: 3-8 Line #: 10-21 Code: C
Original Comment #: 078 (OC 61)

Comment: Material is described as submerged below the water line. Is this standing water or is it somehow connected to the water table? Is there any chance of this water seeping into the water table or is it assured to be contained by the pit liner?

Response: As further discussed in Sections 1.5.4.3 and 1.5.4.5, a water cover is purposely maintained on Waste Pits 5 and 6 to control air borne particulate emissions. The purpose of Removal Action Nos. 6 and 18 was to redistribute solids within these waste pits such that no wastes were exposed.

Action: Page 3-8, line 12, has been revised to read: "This removal action involved redistributing the exposed material so that all solids were below water cover in Waste Pit 6 to reduce particulate emissions to the environment."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 3.4.1.3 Page #: 3-15 Line #: 26-27 Code:
Original Comment #: 079 (OC 62)

Comment: The 1812 New Madrid Earthquake was reported to have caused minor structural damage in Cincinnati.

Response: Agree that the text could be more complete in regard to earthquakes in the vicinity of the site.

Action: Page 3-15, lines 26-31, have been revised as follows: "Three earthquakes that occurred at New Madrid, Missouri, in 1811-1812 resulted in ground motions equivalent to intensity levels of VI and VII in the vicinity of the FEMP, which are the highest recorded accelerations recorded in the area. The closest reported earthquakes to the FEMP site occurred near Maysville, Kentucky, approximately 64 miles southeast, and at Cincinnati, Ohio. Four earthquakes have been reported in the Maysville area, two with an intensity level of V in 1928, one with an intensity level of V in 1933, and one with an intensity level of III in 1937.

Additionally, there were approximately 37 earthquakes in the Anna, Ohio area, 75 miles north of the FEMP, from 1928 to 1939. Two of these events had an intensity level of VII, one with an intensity level of VII-VIII, and one with an intensity level of VI+, and one with an intensity level of VI. (DOE 1990)."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 3.4.1.6 Page #: 3-18 Line #: Code:
Original Comment #: 080 (OC 63)

Comment: At the OU1 preview RI meeting held at the Greater Cincinnati Airport, DOE agreed to include three dimensional fence diagrams of OU1 in addition to cross sections. These diagrams should be included.

Response: Per DOE's agreement, the three-dimensional fence diagrams for the waste pits will be included.

Action: The waste pit cross sections (Figures 3-2 through 3-6 and 4-9, 4-17, 4-19, 4-21, and 4-23) have been reformatted to give a three-dimensional representation of the waste pits.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 3.4.1.6 Page #: 3-19 Line #: 8-9 Code: C
Original Comment #: 081 (OC 64)
Comment: Please indicate how the two lenses were correlated.
Response: Agree that additional information regarding the correlation of the two lenses is warranted. The two lenses were correlated by matching the general stratigraphy and the elevation of the sand and gravel between borings in the vicinity of the waste pits. Cross-sections A-A', B-B', C-C', E-E', and G-G' (Figures 3-24, 3-25, 3-26, 3-28, and 3-30, respectively) show the vertical distribution of the sand lenses.
Action: The text on page 3-19 lines 7-9 have been replaced by the following: "Two lenses were correlated in the OU1 area (Figure 3-32) by matching the general stratigraphy and the elevation of the sand and gravel between borings in the vicinity of the waste pits. Cross-sections A-A', B-B', C-C', E-E', and G-G' (Figures 3-24, 3-25, 3-26, 3-28, and 3-30, respectively) show the vertical distribution of the sand lenses." The description in the legend on Figure 3-32 has been changed to the following: " Location of sand and gravel lenses (prior to waste pit construction) based on correlation of data from borings. Refer to cross-sections A-A', B-B', C-C', E-E', and G-G' (Figures 3-24, 3-35, 3-26, 3-28, and 3-30, respectively)."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 3.4.2.1 Page #: 3-24 Line #: 7 Code:
Original Comment #: 082 (OC 65)
Comment: The word "more" should be deleted from this line.
Response: Agree that the word "more" is unnecessary.
Action: The word "more" has been deleted from the text on page 3-24, line 7.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 3.4.2.2 Page #: 3-25 Line #: 28-29 Code: e
Original Comment #: 083 (OC 66)
Comment: Note that the Winter and Spring months are the major recharge months. Recharge is pretty much finished by the beginning of summer due to heavy ET.
Response: Agree that the text could be clarified to indicate that the winter is included in the major recharge period.
Action: Page 3-25, lines 28-29, have been revised to read: "Major groundwater recharge usually occurs during the winter and spring, which results in maximum water table elevations during the spring and early summer months.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 3.4.2.2 Page #: 3-26 Line #: 1 Code: c
Original Comment #: 084 (OC 67)

Comment: The text on the bottom of page 3-25 and top of page 3-26 can be improved. Figure 3-44 shows hydrographs for Wells 2004 and 3004: it does not appear to show hydrographs of wells above and below (4000-series) the clay interbed as indicated. A consistent, small downward hydraulic gradient is illustrated in Figure 3-43. To state that "there is no potential for flow across the interbed" is a bit strong. Are there not production wells pumping from below the interbed?

Response: The text on Pages 3-25 and 3-26 have been improved in response to comment #068. Agree that Figures 3-43 and 3-45 do illustrate a slight potential across the clay interbed, as evidenced by a differential between the 2000- and 3000-series wells and the 4000-series wells at a few locations. This was also pointed out by US EPA (Comment 68 - OSC #14). It is possible that the observed gradient is induced by pumping beneath the interbed (i.e. site production wells). Also the action for comment #069 now provides gradient calculations.

Action: Please read actions for comments #068 and #069.

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 3.4.2.2 Page #: 3-26 Line #: 11 Code:
Original Comment #: 085 (OC 68)

Comment: Gallons per minute (GPM) is not a correct unit for specific yield. Specific yield is reported as a ratio or a percent.

Response: Agree.

Action: Page 3-26, line 11 has been revised to read "percent."

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 3.4.2.3 Page #: 3-27 Line #: 16-17 Code: C
Original Comment #: 086 (OC 69)

Comment: Groundwater flows laterally down the indicated water table line in the cross sections shown *only* if the cross sections are drawn parallel to the flow direction. Otherwise, groundwater flow is skew to the plotted water table elevation slope.

Response: Agree that the flow direction was misstated. However, the referenced statement in the text has been deleted and replaced with text revisions in response to comment #72. Since the water levels in the wells represent potentiometric head within the various glacial lithologies and inside waste pits, the water levels on the cross-sections can not be directly interpreted as a water table. Also the condition of true horizontal (lateral) flow is not supported.

Action: The referenced statement on Page 3-27, Line 16-17, has been deleted from the text.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 3.6.3.1 Page #: 3-33 Line #: 23-33 Code: C
Original Comment #: 087 (OC 70)

Comment: OU4 reported that questions concerning accuracy existed and that follow up surveys were being implemented. Has this information been incorporated in the OU1 RI. If not, why?

Response: A follow-up survey is scheduled for the summer of 1994. Therefore, no additional information has been incorporated into the Operable Unit 1 Remedial Investigation at this time.

Action: The following has been inserted on page 3-33, line 31: "However, there were some questions regarding the accuracy of the 1988 survey. Therefore, a follow-up survey will be conducted in the summer of 1994. The results of this survey will be provided in future RI/FS documents."

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 3.0 Page #: 3-59 Line #: FIG. 3-20 Code: E
Original Comment #: 088 (OC 71)

Comment: "Potentiometric surface" in the figure legend should be labeled "Bedrock surface."

Response: Agree that the figure legend is incorrect.

Action: The label "Potentiometric surface" has been changed to "Bedrock surface."

USEPA COMMENTS

SECTION 4

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.0 Page #: NA Line #: NA Code:
Original Comment #: 089 (OGC #1)

Comment: The levels of uncertainty associated with radiological ratios, particularly U-238/U-234 and U-238/U-235, are mentioned but not clearly discussed for the Waste Pits, the Burn Pit, and the Clearwell. The U.S. Department of Energy (U.S. DOE) should address this issue by discussing the levels of uncertainty associated with radiological ratios for these areas.

Response: Agree. U-238/U-234 and U-238/U-235 ratios provided for Waste Pits 1-6, the Burn Pit and the Clearwell were previously discussed in terms of the average ratios for each pit. Due to the heterogeneous nature of waste materials in the pits, the discussion of these ratios using average activity concentrations is inappropriate. Each of the referenced discussions has, therefor, been revised to address U-238/U-234 and U-238/U-235 ratios on a sample-by-sample basis.

The uncertainty limits were derived using the propagation of error calculation as described in Sample Calculation 38, Appendix F, based upon the laboratory reported uncertainty limits for the U-238, U-234, and U-235 analytical results. New tables (F.2.38.1 through F.2.38.8) provide the U-238/U-234 and U-238/U-235 ratios for each sample of waste pit material. The tables also show the two-sigma uncertainty limits calculated for each ratio. Based upon the calculated U-238/U-234 and U-238/U-235 ratios reported in columns 3 and 5 of the tables, professional judgement was used to determine if the sample represented natural, depleted, or enriched uranium or if the data was such that a reliable determination could not be made (i.e.; ambiguous). This determination is provided in column 7 of the tables.

The discussions on U-238/U-234 and U-238/U-235 ratios presented for Waste Pits 1-6, the Burn Pit and the Clearwell have been rewritten based upon the determination provided in column 7 of the table. Specific text changes are provided in the action item below.

Action: Sample Calculation 38 has been presented to show the method of calculation of the isotopic activity concentration ratios for uranium in the waste pit materials. Tables F.2.38.1 through F.2.38.8 present the results of the activity concentration ratio analysis. The entire text of the sample calculation and the associated tables are presented below.

SAMPLE CALCULATION 38

Title. **Propagation of 2-Sigma Error in Activity Ratio Calculations**

Explanation/Application:

Activity concentration ratios may be used as indicators of the degree of enrichment of uranium, and as a test of the plausibility of laboratory data values. Activity concentration ratios were used to argue points regarding whether uranium values indicated that the uranium in particular samples was depleted, natural or enriched. The natural value of the ratio of the activity concentrations of U-238 to U-234 is approximately one. If the ratio (U-238/U-234) is greater than one, then the sample is depleted. If the ratio (U-238/U-234) is less than one, then the sample is enriched. Similar comparisons may be made regarding the activity concentration ratios of (U-238/U-235).

Radiological data is expressed most frequently as activity concentrations, in the units pCi/g. Detected values include an expression of the uncertainty of the data, as two times the standard deviation. This error term is called the 2-sigma value. 2-Sigma values are typically 5% - 20% of the concentration value. When ratios are calculated, the error in the original laboratory results is propagated to affect the precision of the calculated ratio. A differential equation approach has been used to quantify the uncertainty of the calculated ratio. If the range of ratio values defined by the result +/- 2-sigma does not include the naturally occurring activity concentration ratio, then there is a 95% degree of confidence that the isotopic abundances which were found were not naturally occurring.

Units, Variables, Constants, and Conversion Factors:

C_i	=	activity concentration (pCi/g) for radionuclide **i**.
C_j	=	activity concentration (pCi/g) for radionuclide **j**.
$C_{(i/j)}$	=	activity concentration ratio (unitless)
$2\sigma_i$	=	2-sigma error (pCi/g) of result for radionuclide **i**.
$2\sigma_j$	=	2-sigma error (pCi/g) of result for radionuclide **j**.
$2\sigma_{(i/j)}$	=	2-sigma error of calculated ratio (unitless).

Related Sections:

Section 4.0

Collateral Equation Source References:

Knoll, G.,1989, Radiation Detection and Measurement, Second Edition, John Wiley & Sons, New York.

Formula:

$$C_{(i/j)} = C_i / C_j$$

where C_i = activity concentration for radionuclide **i**.

C_j	=	activity concentration for radionuclide **j**.
$C_{(i/j)}$	=	activity concentration ratio

$$2\sigma_{(i/j)} = \sqrt{\left(\frac{2\sigma_i}{C_j}\right)^2 + \left(\frac{(C_i)\,(2\sigma_j)}{C_j^2}\right)^2}$$

where	$2\sigma_{(i/j)}$	=	2-sigma error of calculated ratio
	$2\sigma_i$	=	2-sigma error of radionuclide **i**.
	$2\sigma_i$	=	2-sigma error of radionuclide **j**.

Calculation:

Waste Pit 1 pit materials, Sample 063112

Data: $(C_i) = (C_{U\text{-}238}) = 1342$ pCi/g; $(C_j) = (C_{U\text{-}234}) = 600$ pCi/g

$2\sigma_i = 2\sigma_{U\text{-}238} = 310$ pCi/g; $2\sigma_j = 2\sigma_{U\text{-}234} = 146$ pCi/g

$$C_{(i/j)} = \frac{1342 \text{ pCi/g}}{600 \text{ pCi/g}} = 2.24$$

$$2\sigma_{(U\text{-}238/U\text{-}234)} = \sqrt{\left(\frac{310\ pCi/g}{600\ pCi/g}\right)^2 + \left(\frac{(1342\ pCi/g)\,(146\ pCi/g)}{(600\ pCi/g)}\right)^2}$$

$$= 0.75$$

Notes: The results of this calculation are presented in tables F.2.38.1 to F.2.38.8.

Visual Aids/Diagrams:

Not Applicable.

TABLE F.2.38.1

URANIUM RADIONUCLIDE ACTIVITY CONCENTRATION RATIOS FOR WASTE PIT 1

Study	Sample	U-238/U-234 Ratio	2-Sig U-238/U-234	U-238/U-235 Ratio	2-Sig U-238/U-235	Depl/Nat Enr/Amb
CIS	PS-01-002	1.1	0.02	15.2	0.50	Natural
CIS	PS-01-017	1.5	0.02	22.5	1.43	Depl/Amb
CIS	PS-01-034	2.8	0.09	45.7	4.62	Depleted
CIS	PS-01-049	5.9	0.16	46.2	2.78	Depleted
CIS	PS-01-060	1.2	0.02	10.9	0.44	Depl/Amb
RI/FS	063017	-	-	-	-	-
RI/FS	063032	-	-	62.4	10.79	Depleted
RI/FS	063061	1.1	0.38	19.3	9.93	Natural
RI/FS	063071	1.4	0.35	9.7	3.08	Depl/Amb
RI/FS	063100	1.1	0.19	22.7	5.94	Natural
RI/FS	063112	2.2	0.75	37.7	19.81	Depleted

TABLE F.2.38.2

URANIUM RADIONUCLIDE ACTIVITY CONCENTRATION RATIOS FOR WASTE PIT 2

Study	Sample	U-238/U-234 Ratio	2-Sig U-238/U-234	U-238/U-235 Ratio	2-Sig U-238/U-235	Depl/Nat Enr/Amb
CIS	PS-02-002	1.0	0.02	20.4	3.49	Natural
CIS	PS-02-009	7.6	0.27	32.7	2.28	Depleted
CIS	PS-02-019	4.7	0.17	51.0	4.95	Depleted
CIS	PS-02-028	1.0	0.02	10.2	0.35	Nat/Amb
CIS	PS-02-040	1.5	0.14	30.0	10.61	Depleted
RI/FS	63536	-	-	-	-	-
RI/FS	63538	-	-	-	-	-
RI/FS	63630	1.1	0.39	14.3	5.87	Natural
RI/FS	63632	1.1	0.24	15.1	5.17	Natural

TABLE F.2.38.3

URANIUM RADIONUCLIDE ACTIVITY CONCENTRATION RATIOS FOR WASTE PIT 3

Study	Sample	U-238/U-234 Ratio	2-Sig U-238/U-234	U-238/U-235 Ratio	2-Sig U-238/U-235	Depl/Nat Enr/Amb
CIS	PS-03-002	5.0	0.21	53.6	8.66	Depleted
CIS	PS-03-009	1.1	0.03	24.8	2.40	Natural
CIS	PS-03-030	1.0	0.03	24.6	2.59	Natural
CIS	PS-03-053	1.0	0.05	21.7	3.68	Natural
CIS	PS-03-074	2.7	0.08	37.1	2.61	Depleted
CIS	PS-03-091	1.7	0.03	19.0	1.28	Depl/Amb
CIS	PS-03-111	8.3	0.46	98.6	14.15	Depleted
RI/FS	63308	4.3	1.42	28.1	14.58	Depleted
RI/FS	63310	3.7	0.91	35.8	12.01	Depleted
RI/FS	63390	-	-	-	-	N/A
RI/FS	63392	-	-	17.0	3.20	Natural
RI/FS	63474	0.9	0.26	9.9	3.35	Nat/Amb
RI/FS	63476	0.9	0.26	25.5	11.09	Natural

TABLE F.2.38.4

URANIUM RADIONUCLIDE ACTIVITY CONCENTRATION RATIOS FOR WASTE PIT 4

Study	Sample	U-238/U-234 Ratio	2-Sig U-238/U-234	U-238/U-235 Ratio	2-Sig U-238/U-235	Depl/Nat Enr/Amb
CIS	PS-04-003	2.0	0.03	8.8	0.22	Depl/Amb
CIS	PS-04-023	1.7	0.04	14.5	0.85	Depl/Amb
CIS	PS-04-040	10.3	0.50	23.9	1.89	Depleted
CIS	PS-04-063	6.8	0.28	37.1	3.35	Depleted
RI/FS	63709	1.4	0.27	17.0	2.27	Natural
RI/FS	63710	-	-	15.6	2.74	Natural
RI/FS	63782	-	-	-	-	-
RI/FS	63785	-	-	-	-	-
RI/FS	63850	10.2	2.21	44.9	13.94	Depleted
RI/FS	63852	9.1	2.01	61.8	22.95	Depleted

TABLE F.2.38.5

URANIUM RADIONUCLIDE ACTIVITY CONCENTRATION RATIOS FOR WASTE PIT 5

Study	Sample	U-238/U-234 Ratio	2-Sig U-238/U-234	U-238/U-235 Ratio	2-Sig U-238/U-235	Depl/Nat Enr/Amb
CIS	PS-05-002	1.1	0.04	25.6	3.83	Natural
CIS	PS-05-013	1.5	0.06	32.9	4.75	Depleted
CIS	PS-05-026	0.9	0.02	17.5	1.48	Natural
CIS	PS-05-046	0.9	0.02	20.9	1.81	Natural
CIS	PS-05-066	1.0	0.02	15.6	1.02	Natural
CIS	PS-05-078	0.9	0.01	14.9	0.59	Natural
RI/FS	100210	1.3	0.30	-	-	Natural
RI/FS	100211	1.2	0.26	31.3	10.28	Natural
RI/FS	100212	1.0	0.21	22.6	5.80	Natural
RI/FS	100213	1.1	0.21	21.5	5.75	Natural
RI/FS	100214	1.0	0.20	-	-	Natural
RI/FS	100215	1.1	0.19	27.4	7.77	Natural
RI/FS	100216	1.0	0.21	-	-	Natural
RI/FS	100217	1.0	0.20	-	-	Natural
RI/FS	100218	1.0	0.10	-	-	Natural
RI/FS	100219	1.9	0.36	47.8	11.18	Depleted

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TABLE F.2.38.6

URANIUM RADIONUCLIDE ACTIVITY CONCENTRATION RATIOS FOR WASTE PIT 6

Study	Sample	U-238/U-234 Ratio	2-Sig U-238/U-234	U-238/U-235 Ratio	2-Sig U-238/U-235	Depl/Nat Enr/Amb
CIS	PS-06-009	6.3	0.24	21.6	7.44	Depleted
CIS	PS-06-012	6.1	0.28	51.4	5.94	Depleted
CIS	PS-06-025	3.5	0.08	10.7	0.38	Depl/Amb
CIS	PS-06-028	5.5	0.14	12.6	0.44	Depl/Amb
RI/FS	100225	6.7	1.31	62.4	15.44	Depleted
RI/FS	100226	5.6	1.41	82.4	25.41	Depleted
RI/FS	100227	5.8	1.26	78.8	21.65	Depleted
RI/FS	100228	5.1	1.03	57.0	14.42	Depleted
RI/FS	100229	7.1	1.61	85.3	23.31	Depleted
RI/FS	100230	7.1	1.49	78.0	18.15	Depleted
RI/FS	100231	5.9	1.28	66.8	16.61	Depleted
RI/FS	100232	6.1	1.24	64.8	16.55	Depleted
RI/FS	100233	6.0	1.08	-	-	Depleted

TABLE F.2.38.7

URANIUM RADIONUCLIDE ACTIVITY CONCENTRATION RATIOS FOR THE BURN PIT

Study	Sample	U-238/U-234 Ratio	2-Sig U-238/U-234	U-238/U-235 Ratio	2-Sig U-238/U-235	Depl/Nat Enr/Amb
CIS	PS-07-005	2.2	0.14	44.0	9.02	Depleted
CIS	PS-07-015	1.3	0.03	22.1	1.44	Natural
CIS	PS-07-027	1.1	0.02	16.8	1.27	Natural
CIS	PS-07-035	2.7	0.08	34.8	2.95	Depleted
CIS	PS-07-063	1.2	0.03	24.3	2.04	Natural
CIS	PS-07-073	1.1	0.02	20.6	1.57	Natural
RI/FS	63160	3.0	0.57	32.1	11.51	Depleted
RI/FS	63162	1.3	0.33	12.2	4.37	Natural
RI/FS	63201	1.1	0.31	11.5	4.57	Natural
RI/FS	63203	1.2	0.35	19.6	7.25	Natural

TABLE F.2.38.8

URANIUM RADIONUCLIDE ACTIVITY CONCENTRATION RATIOS FOR THE CLEAR WELL

Study	Sample	U-238/U-234 Ratio	2-Sig U-238/U-234	U-238/U-235 Ratio	2-Sig U-238/U-235	Depl/Nat Enr/Amb
CIS	PS-08-001	2.6	0.06	22.6	1.64	Depl/Amb
CIS	PS-08-003	2.6	0.05	26.4	1.14	Depl/Amb
CIS	PS-08-005	1.5	0.03	14.1	0.74	Depl/Amb
CIS	PS-08-008	2.2	0.04	13.7	0.58	Depl/Amb
RI/FS	98526	1.9	0.36	31.3	6.23	Depleted
RI/FS	98527	2.5	0.48	38.2	7.79	Depleted
RI/FS	98528	2.9	0.56	53.9	11.56	Depleted
RI/FS	98529	2.2	0.55	4.4	1.10	Depl/Amb
RI/FS	98530	2.0	0.49	3.6	0.88	Depl/Amb
RI/FS	98531	1.2	0.28	3.4	0.81	Nat/Amb

Ten revisions to the text were made to correct the discussions of radiological ratios for Waste Pits 1-6, the Burn Pit, and the Clearwell. Specific changes are presented below as revisions 1 through 10.

Revision 1 - Section 4.2.1.4, Page 4-18, Lines 26-31 have been revised to read, "The results of the CIS and RI/FS both reveal that the U-238/U-234 activity concentration ratios vary from 1.1 to 5.9. The U-238/U-235 ratios vary from 9.7 to 62.4. Evaluation of the ratios for each sample indicate that the uranium disposed of in Waste Pit 1 varied from depleted to natural uranium. The activity concentration ratio analysis is presented in Table F.2.38.1."

Revision 2 - Section 4.2.2.4, Page 4-28, Lines 12-15 have been revised to read, "Analytical results from the CIS yielded U-238/U-234 and U-238/U-235 activity concentration ratios in the ranges of depleted or natural uranium. RI/FS analytical data yielded U-238/U-234 and U-238/U-235 activity concentration ratios in common with natural uranium, indicating that uranium contamination in Waste Pit 2 varies from depleted to natural. Differences in CIS and RI/FS analytical results may be attributed to the heterogeneous nature of the waste pit contents combined with differences in sample locations. As noted in Section 2.3, while the CIS boreholes were placed randomly after geophysical anomalies had been avoided, the 1991 RI/FS Waste Pit Study boreholes were intended to be placed near the deepest portion of each pit. The activity concentration ratio analysis is presented in Table F.2.38.2."

Revision 3 - Section 4.2.3.4, Page 4-38, Lines 23-26 have been revised to read, "The results of the CIS and RI/FS investigations reveal that the U-238/U-234 activity concentration ratios vary from 0.9 to 8.3. The U-238/U-235 ratios vary from 9.9 to 98.6. Evaluation of the ratios for each sample indicate that uranium disposed of in Waste Pit 3 varies from depleted to natural uranium. The activity concentration ratio analysis has been presented in Table F.2.38.3."

Revision 4 - Section 4.2.4.4, Page 4-47, Lines 11-13 have been revised to read, "The U-238/U-234 and U-238/U-235 uranium ratios calculated from the CIS data are inconsistent and do not allow a reliable determination regarding whether uranium in the waste pit is depleted, natural, or enriched. Results of the RI/FS, however, reveal that the U-238/U-234 activity concentration ratios vary from 1.4 to 10.2. The U-238/U-235 ratios vary from 15.6 to 61.8. Evaluation of the ratios for each sample indicate that uranium disposed of in Waste Pit 4 varies from depleted to natural uranium. The activity concentration ratio analysis has been presented in Table F.2.38.4."

Revision 5 - Section 4.2.5.4, Page 4-54, Lines 31-34 have been revised to read, "The results of the CIS and RI/FS both reveal that the U-238/U-234 activity concentration ratios vary from 0.9 to 1.9. The U-238/U-235 ratios vary from 14.9 to 47.8. Evaluation of the ratios for each sample indicate that uranium disposed of in Waste Pit 5 is predominantly natural uranium. Of the 16 samples, 14 indicated natural uranium and only two indicated depleted uranium. The activity concentration ratio analysis has been presented in Table F.2.38.5."

Revision 6 - Section 4.2.6.4, Page 4-59, Lines 17-20 have been revised to read, "The results of the CIS and RI/FS both reveal that the U-238/U-234 activity

concentration ratios vary from 3.5 to 7.1. The U-238/U-235 ratios vary from 10.7 to 85.3. Evaluation of the ratios for each sample indicate that uranium disposed of in Waste Pit 6 is depleted uranium. None of the samples evaluated revealed uranium activity ratios consistent with either natural or enriched uranium. The activity concentration ratio analysis has been presented in Table F.2.38.6."

Revision 7 - Section 4.2.7.4, Page 4-64, Lines 5-10 have been revised to read, "The results of the CIS and RI/FS both reveal that the U-238/U-234 activity concentration ratios vary from 1.1 to 3.0. The U-238/U-235 ratios vary from 11.5 to 44.0. Evaluation of the ratios for each sample indicate that uranium disposed of in the Burn Pit varies from depleted to natural uranium. The activity concentration ratio analysis has been presented in Table F.2.38.7."

Revision 8 - Section 4.2.8.4, Page 4-70, Lines 34-35 have been revised to read, "The U-238/U-234 and U-238/U-235 activity concentration ratios calculated from the CIS data are inconsistent and do not allow a reliable determination regarding whether uranium in the Clearwell is depleted, except for natural, or enriched. Results of the RI/FS, however, reveal that the U-238/U-234 activity concentration ratios vary from 1.2 to 2.9. The U-238/U-235 ratios vary from 3.4 to 53.9. Evaluation of the U-238/U-234 ratios for each sample indicates that the uranium contained in the Clearwell is depleted, except for one RI/FS sample which was natural. The activity concentration ratio analysis has been presented in Table F.2.38.8."

Revision 9 - Section 4.0, page 4-2, line 7 was amended by inserting the following text into the break between sentences:

"Enriched uranium, containing higher than natural proportions of U-235 relative to U-238, was not a major component of Operable Unit 1 waste streams. Examination of the uranium isotope activity concentration ratios for the pit materials provided a means of verifying the presence of depleted, natural or enriched uranium in the waste pits. The activity concentration ratio for U-238/U-234 is a more accurate indicator of the presence of natural or unnatural uranium than is the ratio for U-238/U-235 because the low U-235 levels usually found are more difficult to measure. The presence of unnatural proportions of the uranium isotopes in the source units may be related to the presence of unnatural proportions of uranium isotopes in the environmental media."

Revision 10 - Section 4.0, page 4-2, lines 13-15, were amended to read: "Analytical results for the radiological constituents were also compared to background concentrations (Table 4-2, Section 4.1) to determine the presence of radionuclide concentrations which were above background concentrations. Chemical analyses were also performed to evaluate the concentrations of organic and inorganic chemical constituents."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.2 Page #: 4-6 Line #: NA Code: C
Original Comment #: 090 (OC #2)

Comment: In this section covering source characterization it would seem appropriate that, for each waste unit, discussion be provided on the possible nature of contaminant migration from the waste units to the Great Miami Aquifer. This discussion could utilize information on the source characteristics and local geologic conditions, providing clear insight into the likelihood of contaminant transfer to the aquifer.

Response: Disagree. As required by EPA guidance documents, the physical characteristics of the waste pits and the geologic conditions within operable Unit 1 are discussed in Section 3.0. Moreover, the mechanisms for migration of contaminants to the Great Miami Aquifer and the techniques used to model this pathway are addressed in Section 5.0. Section 4.0 was limited to the study findings relative to the nature and extent of contamination.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.4 Page #: 4-12 Line #: 27 and 28 Code:
Original Comment #: 091 (OSC #20)

Comment: The text states that U-238, U-234, Th-230, and Ra-226 were the principal radiological constituents detected in the waste pits. However, on page 4-18, line #24 and #25, Th-228 and Th-232 were also listed as principal constituents in the pits, and Ra-226 was not list as a principal constituent of the pits. U.S. DOE should resolve these discrepancies to accurately and consistently describe site conditions.

Response: Agree. Findings must be consistent.

Action: Section 4.2.1.4, Radiological Characterization of Waste Pit 1, was revised to express the observed constituent distribution in terms of the uranium series and/or the thorium decay series, consistent with the description of the general contamination of the waste pits given in Section 4.2.0.4. This approach is consistent with the approach used in describing the radiological constituents of the other pits, and is supported by the presentation of the data in Table 4.1. Replaced lines 24-26, page 4-18, with the following text: "The predominant radiological constituents of Waste Pit 1 include members of the uranium decay series: U-238, U-234, Th-230 and Ra-226, consistent with process knowledge." Line 14, page 4-19, is preceded by the following statement: "Small amounts of fission products (Tc-99, Sr-90, and Cs-137) also were found in Waste Pit 1."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.4 Page #: 4-12 Line #: 31 and 32 Code:
Original Comment #: 092 (OSC #21)

Comment: The text states that the highest uranium concentrations were found in Waste Pit 6. However, according to Table 4-5 on page 4-173, the highest U-238 concentrations were detected in Waste Pit 4. U.S. DOE should revise the text to address this discrepancy.

Response: Agree. The statement which identifies Waste Pit 6 as containing the highest uranium concentrations is incorrect, based upon a review of Table 4-1 and Table 4-5, which are consistent. The highest uranium concentrations are found in Waste Pit 4.

Action: Revise lines 31-32, page 4-12, to replace the enclosed sentence with the following: "The highest average activity concentration of U-238 (19,000 pCi/g) was found in Waste Pit 4."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.4 Page #: 4-13 Line #: 1 Code:
Original Comment #: 093 (OSC #22)

Comment: The text states that Waste Pits 3 and 5 have elevated Th-230 activity concentrations. However, according to Table 4-5, Th-230 concentrations also appear to be elevated in Waste Pits 1, 2, 4, 6, the Burn Pit, and the Clearwell as well. U.S. DOE should review the Th-230 data to determine if the Th-230 concentrations are also elevated in Waste Pits 1, 2, 4, 6, the Burn Pit, and the Clearwell.

Response: Agree. All Th-230 average concentrations were above background. However, there was a wide range of values, from 6 pCi/g to 18,400 pCi/g, when both CIS and RI/FS data are considered. The highest total amounts of Th-230, based on average concentration values and pit volumes were obtained for Waste Pits 3 and 5. These data are presented in Table 4-1. The highest average concentration of Th-230 was reported for Waste Pit 2 (10,500 pCi/g). These findings are consistent with site history as described in Section 4.2.0.4.

Action: Insert before line 1, page 4-19: "All of the waste pits contained Th-230 concentrations above background levels." Insert between sentences in line 2, page 4-19: "The highest average value for Th-230, 10,500 pCi/g, was reported for Waste Pit 2."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.2.0.4 Page #: 4-13 Line #: 5 Code: C
Original Comment #: 094 (OC #3)

Comment: It is stated that approximately 2500 55-gallon drums of cold-metal oxides were placed in Waste Pit 2; please clarify whether these are actual drums of material or uncontainerized drum volume equivalents.

Response: Agree. This point must be clarified.

Action: The text on page 4-13, line 4-5, has been revised as follows: "Operational records also show that the drum-equivalent volume of approximately 2500 55-gallon drums of cold metal oxides from another AEC facility were placed into Waste Pit 2."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.2.0.4 Page #: 4-13 Line #: 17 Code: C
Original Comment #: 095 (OC #4)

Comment: It is stated that fission products (Tc-99, Sr-90, Cs-137) were noted in lower concentrations, primarily in Waste Pit 5 and the Clearwell. This general statement is inappropriate and in error when considering the Waste Pit 5, where the average Tc-99 concentration (1490 pCi/g) is not only higher than the average cumulative uranium concentration (1,164 pCi/g), but is the highest single radionuclide concentration present; please revise this statement.

Response: Agree. The term "lower concentrations" used in line 17, p. 4-13, compares the concentrations of the fission products to the concentrations of previously discussed constituents, especially the uranium and thorium series constituents. Waste Pit 5 and the Clearwell are identified as the primary locations of the fission product constituents.

Action: Lines 17-19, page 4-13, have been replaced with the following: "Fission products (Tc-99, Sr-90, Cs-137) were found in the pit materials at concentrations that were generally lower than those of the uranium or thorium series radionuclides. High concentrations of technetium were found in Waste Pit 5 and the Clearwell, which received overflow from Waste Pit 5. The average activity concentrations of Tc-99 found during the RI/FS studies for Waste Pit 5 and the Clearwell were 1490 pCi/g and 358 pCi/g, respectively. The presence of fission products in these pits was the result of the reprocessing of irradiated materials, which occurred in the latter years of the operation of the FEMP."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.4 Page #: 4-13 Line #: 17 and 18 Code:
Original Comment #: 096 (OSC #23)

Comment: The text states that Tc-99, Sr-90, and Cs-137 are in low concentrations in Waste Pit 5 and the Clearwell. However, according to Table 4-4 and 4-5, it appears that these constituents are not low in Waste Pit 5 and the Clearwell; in fact, the constituents appear high in these pits. U.S. DOE should review the data and address these discrepancies.

Response: Agree. The term "lower concentrations" used in line 17, p. 4-13, compares the concentrations of the fission products to the concentrations of previously discussed constituents, especially the uranium and thorium series constituents. Waste Pit 5 and the Clearwell are identified as the primary locations of the fission product constituents.

Action: Lines 17-19, page 4-13, have been replaced with the following: "Fission products (Tc-99, Sr-90, Cs-137) were found in the pit materials at concentrations that were generally lower than those of the uranium or thorium series radionuclides. High concentrations of Technetium were found in Waste Pit 5 and the Clearwell, which received overflow from Waste Pit 5. The average activity concentrations of Tc-99 found during the RI/FS studies for Waste Pit 5 and the Clearwell were 1490 pCi/g and 358 pCi/g, respectively. The presence of fission products in these pits was the result of the reprocessing of irradiated materials, which occurred in the latter years of the operation of the FEMP."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.4 Page #: 4-13 Line #: 18 and 19 Code:
Original Comment #: 097 (OSC #24)

Comment: The text states that Tc-99 was detected at an average activity concentration of 1,300 picoCuries per gram (pCi/g) in Waste Pit 5 and 300 pCi/g in the Clearwell. However, according to Table 4-5, page 4-174, Tc-99 was detected at 1,500 pCi/g in Waste Pit 5 and 360 pCi/g in the Clearwell. U.S. DOE should review the data and address these discrepancies.

Response: Agree. The values shown in Table 4-1 and Table 4-5 are as the commentor described.

Action: The text has been revised to show Tc-99 average values of 1500 pCi/g and 360 pCi/g for Waste Pit 5 and the Clearwell, respectively. The text of lines 17-19, page 4-13 have been revised to read, "Fission products (Tc-99, Sr-90, Cs-137) were found in the pit materials at concentrations which were generally lower than those of the uranium or thorium series radionuclides. High concentrations of technetium were found in Waste Pit 5 and the Clearwell, which received overflow from Waste Pit 5. The average activity concentrations of Tc-99 found during the RI/FS studies for Waste Pit 5 and the Clearwell were 1490 pCi/g and 358 pCi/g, respectively. The presence of fission products in these pits was the result of the reprocessing of irradiated materials, which occurred in the latter years of the operation of the FEMP."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.5 Page #: 4-14 Line #: 1 Code:
Original Comment #: 098 (OSC #25)

Comment: The text discusses elevated detection limits for semivolatile organic constituents in the "wet" pits. The text does not state whether these detection limits are for data generated during the CIS or RI/FS. U.S. DOE should state to which data the detection limits refer.

Response: Agree. Lines 1-3, page 4-14 do not contain a reference to the study during which the semi-volatile data for Waste Pits 5 and 6 and the Clearwell were obtained. The data are from the CIS study. The RI/FS data were not used for the characterization of nature and extent of contamination because the samples did not represent the contents of the pit materials at the time of the original sampling.

Action: Section 4.2.0.5, page 4-14, lines 1-3, have been revised to read, "Detection limits of the CIS data for semivolatile organic constituents of the wet pits (Pits 5 and 6 and the Clearwell) were elevated because the moisture content of the samples was very high. The 1992 RI/FS treatability study organics data were not used to determine the nature and extent of contamination; therefore, a comparison of CIS and RI/FS results for the wet pits could not be made."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.5 Page #: 4-14 Line #: 9 Code:
Original Comment #: 099 (OSC #26)

Comment: The text states that the results of metals analysis performed on samples taken from the pits are consistent between the CIS and RI/FS data sets. While the same metals were detected in each data set, the concentrations at times vary by one to two orders of magnitude. U.S. DOE should state what is meant by the term "consistent."

Response: Agree. The concentration of some inorganic contaminants is consistent between the two studies. However, the identity of the inorganic contaminants is consistent between the data sets. The concentrations of major inorganic constituents of the waste pits are surprisingly consistent between data sets, considering the heterogeneous nature of the pits. Those contaminants where low concentrations have been reported show the widest variation. This variation was caused by increased variance in deposition for the rare constituents, which caused sampling heterogeneity to be more apparent.

Action: Insert the following text between line 1 and line 2, page 4-14 of the RI Report: "The concentrations of major inorganic constituents of the waste pits were very consistent between data sets. The concentrations of minor inorganic constituents of the waste pits vary because inconsistent disposal of these minor constituents of the waste streams led to variations in the distribution of these constituents in the pits. Variations in physical distribution of minor constituents led to sample heterogeneity and corresponding variability in the results for these constituents between data sets. Several consistent general trends in the data are noted."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.5 Page #: 4-14 Line #: 27 and 28 Code:
Original Comment #: 100 (OSC #27)

Comment: The text cites Tables 4-8 and 4-9. However, it appears the tables that should be referred to are Tables 4-9 and 4-10. U.S. DOE should review the text and tables and cite the correct tables.

Response: Agree.

Action: Text has been revised by replacing references to Tables 4-8 and 4-9 with references to Tables 4-9 and 4-10, respectively.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.5 Page #: 4-15 Line #: 35 and 36 Code:
Original Comment #: 101 (OSC #28)

Comment: The text states that the constituents "acetone; 2-butanone; methylene chloride; di-n-butyl phthalate; di-n-octyl phthalate; and bis-(2-ethylhexyl)phthalate" detected in the pits are common laboratory contaminants. However, the phthalate compounds detected are common plasticizers, but the text states that they are also laboratory contaminants. U.S. DOE should state why the plasticizers are considered laboratory contaminants.

Response: Disagree. The plasticizers are considered common laboratory contaminants because they are cited as such in the U.S. EPA National Functional Guidelines for Data Review and treated accordingly during data validation. This reference is cited in the text to support this statement.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.0.5 Page #: 4-16 Line #: 7 and 8 Code:
Original Comment #: 102 (OSC #29)

Comment: The text states that volatile organic compounds (VOC) detected in the waste pits that have not been documented as being used at the site may be due to the result of degradation from parent compounds. U.S. DOE should state for which this is true and possibly what some of the parent compounds may have been.

Response: Agree. The text was abbreviated, and the topic of parent/progeny relationships possibly present in OU1 was not discussed in detail. It is not possible to discuss in exact detail the degradation of on-site chemicals to form every historically undocumented volatile constituent. There are too many possible pathways to define the formation of particular constituents. Degradation pathways vary depending on the microbes present and the chemical environment of the matrix. The general concept of degradation processes that link historically documented site maintenance solvents to the presence of potential degradation products has been introduced in this section. Of particular interest is the presence of vinyl chloride in some pit leachates, although its use as a site chemical is not documented. Because tetrachloroethane and trichloroethene may be parents of vinyl chloride, the possible connection between them is of general interest. The possible link between 1,1,1-trichloroethane and 1,1-dichloroethane also has been discussed.

Action: Lines 8-10, page 4-16, have been revised as follows: "For instance, tetrachloroethene degrades by reductive dehalogenation under anaerobic conditions to form trichloroethene (Baugh, Fathepure, Barrio-Lage). The dehalogenation process continues, forming as many as three isomers of dichloroethene, which then form vinyl chloride. Also, 1,1,1-trichloroethane can dehalogenate to form 1,1-dichloroethane, which then may form chloroethane. The end result of these processes often is methane."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.1 Page #: 4-16 Line #: 7 and 8 Code:
Original Comment #: 103 (OSC #30)

Comment: The text states that metals in the uranium ore may enter the waste streams to the waste pits through the general sump. However, the text does not state exactly what metals may be entering the waste stream in this manner. U.S. DOE should provide information to support the fact that other metals may be entering the waste streams via the general sump. Information such as analyses of the uranium ore prior to refining would be helpful in determining if this statement is true.

Response: Appendix F.6.2 provides chemical results for a composite of approximately 700 different uranium ore samples from multiple mines.

Action: The following text has been inserted between sentences, line 23, page 4-16: "The composition of ore concentrates was analyzed during the operational history of the FEMP, and a summary of the available data is given in Appendix F.6.2. The impurities given in Table F.6.2-1 include arsenic, calcium, iron, magnesium, molybdenum, sodium, thorium, and vanadium as components of the ore concentrate which exhibited average concentrations greater than 0.1 percent. Also, several oxides (carbonate, phosphate, phosphorous pentoxide, silicon dioxide, sulfate, and vanadium pentoxide) were reported in ore concentrations

greater than 0.3 percent. Process knowledge, including the composition of ore concentrates, was used to calculate the chemical and radiological constituents of the wastes for each pit."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.1.3 Page #: 4-18 Line #: 2, 3, and 4 Code:
Original Comment #: 104 (OSC #31)

Comment: The text states that electromagnetic (EM) readings were detected in Area C on Figure 4-10; however, this is not indicated on the figure. U.S. DOE should revise the figure and text so they accurately and consistently represent conditions at the site.

Response: Agree. In the process of revising the drawings to provide a better resolution of the Pit outline, the shading that provides the viewer with differentiation between different geophysical readings was lost.

Action: Figure 4-10 has been revised to provide resolution to distinguish the difference between the various geophysical readings.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.1.3 Page #: 4-18 Line #: 5 and 6 Code:
Original Comment #: 105 (OSC #32)

Comment: The text states that Areas A, B, and C contain a high density of buried objects. However, Figure 4-10 indicates that Area D also contains buried objects. U.S. DOE should revise the figure and text so they accurately and consistently represent conditions at the site.

Response: Agree. In the process of revising the drawings to provide a better resolution of the Pit outline, the shading to provide the viewer with differentiation between different geophysical readings was lost.

Action: Figure 4-10 has been revised to provide resolution to distinguish the difference between the various geophysical readings.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.1.4 Page #: 4-18 Line #: 24 and 25 Code:
Original Comment #: 106 (OSC #33)

Comment: The text states that the predominant radiological constituents detected, in terms of activity concentrations, are U-238, U-234, Th-228, Th-230, and Th-232. It appears from Tables 4-4 and 4-5 that Cs-137 and Sr-90 and Tc-99 were also detected. U.S. DOE should also discuss these constituents, especially since Sr-90 and Tc-99 are indicative of fission materials brought to FEMP from the Hanford site.

Response: Agree. The text was written to highlight the main attributes of contamination and not provide a complete list of pit contents. Additional information was provided when a reported average was the highest observed throughout the Waste Pit Area.

Action: The text on page 4-18, commencing with line 23, has been revised to read as follows: "Other radionuclides with elevated activity concentrations determined during the CIS study were Cs-137, Tc-99, and U-235. Elevated concentrations reported from the RI/FS study were Ra-226, Ra-228, and Sr-90."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.1.6 Page #: 4-24 Line #: 30 and 31 Code:
Original Comment #: 107 (OSC #34)

Comment: The text states that U-238, U-234, Th-230, and Ra-226 are the predominant radiological constituents in Waste Pit 1. However, this conflicts with the statement on page 4-18 that U-238, U-234, Th-228, Th-230, and Th-232 are the predominant radiological constituents of concern at Waste Pit 1. U.S. DOE should resolve this discrepancy. Also, U.S. DOE should discuss Cs-137, Sr-90, and Tc-99 concentrations in Waste Pit 1, especially since Sr-90, and Tc-99 concentrations in Waste Pit 1, especially since Sr-90 and Tc-99 are indicative of fission materials brought to FEMP from the Hanford site.

Response: Agree. The summary found on page 4-24 does not reflect the initial discussion identically, resulting in a slight discrepancy in the text.

Action: The following text has been modified to read: "U-234, U-238 and Th-230 are the predominant radiological constituents found in Waste Pit 1. Th-228, Th-232, U-235/236, Ra-228, and Ra-226 were found at concentrations elevated above background. Additionally, Sr-90 was reported at low levels in five of the six RI/FS samples, Cs-137 was reported at the detection limit in one CIS sample and Tc-99 was reported in one CIS sample at an elevated concentration (15 pCi/g) and in one RI/FS sample at slightly above the detection limit (1.1 pCi/g)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.1.6 Page #: 4-24 Line #: 37 & 38 Code:
Original Comment #: 108 (OGC #4)

Comment: On page 4-24, line 37 and 38, it is stated that results obtained for waste material from Waste Pit 1 during the RI are different from the Characterization Investigation Study (CIS) because of different sampling methods. U.S. DOE should state what the different sampling methods were, how they affected the data, and if the different sampling methods were approved by the U.S. Environmental Protection Agency (U.S. EPA). Also, U.S. DOE should state if these different sampling methods affected data from other waste pits.

Response: Agree. A detailed discussion of waste pit sampling techniques is presented in Section 2.3. As stated in that section, the RI/FS sampling program was approved by EPA. A discussion of the effects of these sampling techniques on data comparability appears in Section 2.13.

Action: Insert the following text on page 4-24, line 39, deleting the last sentence: "The differences between the two sampling programs were attributable to both different sample locations and the differing depths to which the programs' borings were drilled. A complete explanation of the sampling protocols can be found in Section 2.3."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.2.2.2 Page #: 4-26 Line #: 34 and 36 Code:E
Original Comment #: 109 (OC #5)

Comment: Field radiation measurements are cited in the 20,000 and 30,000 cpm ranges; please explain the type of radiation measured and the relation of these measurements to local background for these field instruments.

Response: Agree.

Action: The following text has been added to line 35, page 4-26. "The radiation measurements were made with an HP-210T hand-held instrument. This detector is sensitive to gamma rays, and most beta particles (excluding soft radiation such as C-14 and tritium). The background level can be inferred from the fact that drilling cores of the top soil covering read 200 cpm for this core and 100-200 cpm for other cores from this area."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.2.3 Page #: 4-28 Line #: 12 to 15 Code:
Original Comment #: 110 (OSC #35)

Comment: The text states that the U-238/U-234 and U-238/U-235 activity concentration ratios for Waste Pit 2 are approximately 1:1 and 1:20, respectively. However, the activity concentration ratios for U-238/U-234 and U-238/U-235 are based on average activity concentrations. It would seem that the high and low ratios for U-238/U-234 and U-238/U-235 should also be 1:1 and 1:20, respectively, regardless of activity concentration. For example, it would seem that the highest U-238 activity concentration would have the highest U-234 activity concentration and presumably at a 1:1 ratio. U.S. DOE should examine the data to determine if the high and low activity U-238/U-234 and U-238/ U-235 concentration ratios are 1:1 and 1:20, respectively. In addition, the report states that the RI/FS data show a U-238 to U-235/U-236 ratio of approximately 20 for Waste Pit 2. However, the CIS U-238/U-235 data reveal a ratio of about 39 indicating that the source of uranium isotopes is not natural. U.S. DOE should discuss why the CIS data is not comparable to the RI/FS data for Waste Pit 2.

Response: Agree. The U-238/U-234 and U-238/U-235 ratios have been evaluated on a sample-by-sample basis. When this is complete (see table that follows this paragraph), the most that can be said is that the uranium enrichment level in Pit 2 ranges from depleted to natural (i.e. no samples containing enriched material were found). The laws of physics require that the U-238/U-234 and the U-238/U-235 ratios vary in proportion to one another, regardless of enrichment level. That is, there is no physical or chemical method, short of advanced laser isotope separation, which will allow one to raise or lower the U-238/U-235 ratio without raising or lowering the U-238/U-234 ratio by a proportional amount. For this reason, two of the five CIS samples were found to yield uranium ratios that are not physically possible and therefore non-conclusive with regard to whether the sample is depleted or natural. One possible cause for the differences between CIS and RI/FS analytical data may be the heterogeneous nature of the pit contents combined with differences in sample locations. As noted in Section 2.3, while the CIS placed boreholes randomly after geophysical anomalies had been avoided, the 1992 RI/FS Waste Pit Study attempted to place boreholes near the deepest portion of each pit sampled. As discussed in the response to

Comment 089, the calculated isotopic activity concentration ratios for Waste Pit 2 have been calculated and are presented in Table F.2.38.2.

As discussed in the response to Comment 089, the calculated isotopic activity concentration ratios for Waste Pit 2 have been calculated and are presented in Table F.2.38.2. Sample Calculation 38 has been added to Appendix F.2 of the RI Report, as well as Table F.2.38.2. These items are presented as actions to Comment 089.

Action: Section 4.2.2.4, page 4-28, lines 12-15, have been revised to read, "Analytical results from the CIS yielded U-238/U-234 and U-238/U-235 activity concentration ratios in the ranges of depleted or natural uranium. RI/FS analytical data yielded U-238/U-234 and U-238/U-235 activity concentration ratios in common with natural uranium, indicating that uranium contamination in Waste Pit 2 varies from depleted to natural. Differences in CIS and RI/FS analytical results may be attributed to the heterogeneous nature of the waste pit contents combined with differences in sample locations. As noted in Section 2.3, while the CIS boreholes were placed randomly after geophysical anomalies had been avoided, the 1991 RI/FS Waste Pit Study boreholes were intended to be placed near the deepest portion of each pit sampled. The activity concentration ratio analysis is presented in Table F.2.38.2."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.2.4 Page #: 4-28 Line #: 27 and 28 Code:
Original Comment #: 111 (OSC #36)

Comment: The text states that sometime during the late 1950s or early 1960s, several thousand drums of mixed oxide raffinate were buried in Waste Pit 2. However, this seemingly large quantity of drums may not have been detected using GPR.

Response: The contents of the drums, but not the drums themselves, were buried in Waste Pit 2; consequently, the ground-penetrating radar detected no drums.

Action: Lines 27 and 28, page 4-28, have been revised to read as follows: "Process knowledge indicates that sometime in the late 1950s or early 1960s, the contents of several thousand drums of mixed oxide raffinate ("cold raffinate") were buried in Waste Pit 2. The drums were not buried in the pit."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.2.4 Page #: 4-28 Line #: 33 and 34 Code:
Original Comment #: 112 (OSC #37)

Comment: The text states that Th-232 and Ra-228 activity concentrations from Table 4-4 and Table 4-5 are within the limits of uncertainty. However, Table 4-4 lists CIS data and Ra-228 was not a radiological constituent analyzed for under the CIS. Furthermore, the phrase "limits of uncertainty" is unclear. U.S. DOE should discuss how Ra-228 concentrations were determined from Table 4-4 and define the phrase "limits of uncertainty."

Response: Agree. Table 4-4 was cited in error. The text will be revised to cite Table 4-5 only. With regard to the Th-232 and Ra-228, their activity concentrations should be approximately equal if they are in secular equilibrium. A review of the raw analytical data shows that their activity concentrations are essentially equal at the 95 percent confidence interval based upon the limits of uncertainty of the analytical techniques utilized. Since the raw analytical results and limits of uncertainty are not presented in Table 4-5, the text has been revised to delete any reference to "limits of uncertainty."

Action: "Table 4-4" and reference to "limits of uncertainty" have been deleted from the discussion. Line 33 has been revised to read, "As shown in Table 4-5, Th-232 and Ra-228 are in secular equilibrium."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.2.2.4 Page #: 4-28 Line #: 37 Code: C
Original Comment #: 113 (OC #6)

Comment: It is stated that the concentration value for Th-228 listed in Table 4-5 is considered to be an anomalous analytical result, since Th-228 should be in secular equilibrium with its Th-232 and Ra-228 parents. Nonetheless, both the CIS and RI/FS radiological data indicate an excess average concentration of Th-228, with Th-228/Th-232 concentrations ratios of 1.5 (CIS) and 3 (RI/FS); radium data is not available from the CIS, so a Th-228/Ra-228 ratio comparison is not possible. This is a consistent indication that within Waste Pit 2, Th-228 is present in higher concentrations than its Th-232 "parent," for whatever reason. While viewed as an anomaly, this data should still be accepted as true and usable, provided it's validated data.

Response: Four of five CIS samples had activity concentration ratios for Th-228/ Th-232 which were near unity. The remaining CIS results had a radio of 3.8. The only RI/FS data point for which both Th-228 and Th-232 were detected, was found to have an activity concentration ratio for Th-228/Th-232 of 2.0 +/- 3.95 when the 2-sigma error was considered. The conclusion that must be made from these data is that the Th-228 is in secular equilibrium with Th-232 within error limits. The Th-228 results are not anomalous.

Action: The paragraph was modified by deletion of the reference to the anomalous results. The remaining portion of the paragraph on lines 33-38 were deleted starting with "As shown.....".

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.2.4 Page #: 4-29 Line #: 15 and 16 Code:
Original Comment #: 114 (OSC #38)

Comment: The text states that Tc-99 was not detected in any of the samples collected from the waste pits during the RI/FS; however, according to Table 4-5, Tc-99 was detected at low concentrations (up to 1.6 pCi/g) above background in Waste Pit 2. U.S. DOE should revise the text accordingly.

Response: Agree. Tc-99 was detected in one pit material sample during the RI/FS study, and in three pit material samples during the CIS study.

Action: Line 3, page 4-29, was revised to read as follows: "The results from one of five RI/FS samples from the two boreholes in Waste Pit 2 indicated a trace (1.6 pCi/g) of Tc-99 in the pit materials." Lines 15-18, page 4-29, were revised to read as follows: "Tc-99 was detected in the leachate from Boring 1769 at a concentration of 67.6 pCi/L. The migration of Tc-99 in the leachate to boreholes which did not have detectable amounts of Tc-99 in the pit materials is consistent with known chemistry regarding the solubility of Tc-99 (tendency to be in solution rather than incorporated in the solid phase materials)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.2.5 Page #: 4-30 Line #: 8 to 17 Code:
Original Comment #: 115 (OSC #39)

Comment: The text discusses the heavy metals that are present in Waste Pit 2 material. According to Table 4-8, antimony, boron, cadmium, mercury, molybdenum, and selenium appear elevated in the pit material; however, these metals are not discussed in the text. U.S. DOE should review the data and discuss why these metals are found at elevated levels.

Response: Agree. Generally, the discussions about waste pit material contents centered around the elements which were reported at the highest average concentration. The list of elements discussed has now been expanded to include other contaminants.

Action: The following text has been added to the end of the second paragraph on page 4-30, line 17: "Selenium was reported in Pit 2 at the highest reported average concentration (46 mg/kg) in any of the waste pit during RI/FS testing. Concentration values that exceed those for background soils were reported for antimony, barium, beryllium, boron, cadmium, mercury, molybdenum, and vanadium (for Waste Pit 2)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.2.5 Page #: 4-32 Line #: 19 and 20 Code:
Original Comment #: 116 (OSC #40)

Comment: The text states that neutralized raffinate cake is a potential source of phenols. U.S. DOE should provide evidence supporting this statement.

Response: Agree. References should be cited to defend this statement, or it should be removed from the text. Phenols are oxidation products and may be formed by reactions of alkyl benzenes (e.g., cumene) with oxygen in the presence of water (Morrison, 1966). It is likely that phenols were formed during the combustion process and entered the waste streams as components of ash. Furthermore, coal was produced by heating and pressurizing oils over millions of years. The

resulting mixture is comprised of polynuclear aromatic hydrocarbons and phenols, among the principle constituents. Since it is known that pyrolysis, which occurs through the heating and pressurization of organic material, produces polynuclear aromatic compounds, it is logical that phenols may also be formed. The hypothesis has been presented in this document that calcining raffinate wastes which contained kerosene residues produced large amounts of polynuclear aromatic compounds. This theory accounts for the unique nature of Waste Pit 2. It is possible that phenolic compounds may also have resulted from the calcining process.

Action: The text given in lines 18-20, page 4-32 has been revised to read as follows: "Phenols are often combustion products and are found in ash (Roy 1984). This is supported by basic organic chemistry because alkyl benzenes (eg., cumene) may form phenols when oxidized by air in the presence of water (Morrison 1966). It is likely that phenols may have entered the pits as components of ash, or of raffinate derived from the processing of ash. It is also possible that the raffinate calcining process which is suspected to be the source of extremely high concentrations of polynuclear aromatic compounds may leave generated phenols as well. Coal was produced in nature, where hydrocarbons were heated under pressure. Coal is primarily a mixture of polynuclear aromatic hydrocarbons and phenols. It is likely that the calcining process produced phenols as well as PAHs by processes similar to natural production of coal. Therefore, neutralized raffinate cake and ash are considered to be possible sources of phenols in Waste Pit 2."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.2.5 Page #: 4-33 Line #: 20 and 21 Code:
Original Comment #: 117 (OSC #41)

Comment: The text states that the inorganic constituents detected in the Waste Pit 2 materials are not very soluble; however, EM data indicate that over 70 percent of the pit may contain dissolved solids. U.S. DOE should address this apparent discrepancy.

Response: Acknowledged. Since the leachate from Waste Pit 2 is lower in inorganic substances than the leachates from other Waste Pits, it becomes clear that the reason for the increased EM readings over 70 percent of the pit is due to highly conductive material present in Waste Pit 2.

Action: The text on page 4-27, third paragraph, after the fourth sentence, line 16, has been rewritten as follows: "Since the inorganic constituents within the Waste Pit 2 leachate are lower in concentration than in other pits, the primary responsible source for elevated EM readings is probably due to the presence of highly conductive material.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.2.6 Page #: 4-34 Line #: 26 and 27 Code:
Original Comment #: 118 (OSC #42)

Comment: The text states that both the CIS and RI/FS reveal that the enrichment level of uranium disposed of in Waste Pit 2 was, on average, consistent with natural uranium. However, Original Specific Comment 32 raises the question that the CIS data may indicate that the uranium is not natural. U.S. DOE should address this issue in conjunction with Original Specific Comment 32.

Response: See response to Comment 089 (OGC #1).

Action: Section 4.2.2.6, page 4-34, lines 26-27, have been revised to read, "Results of the CIS and RI/FS indicate that the enrichment level of uranium disposed of in Waste Pit 2 varied from depleted to natural uranium."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.3.3 Page #: 4-37 Line #: 17 and 18 Code:
Original Comment #: 119 (OSC #43)

Comment: The text refers to Figure 4-12. However, based on the discussion in the text, it appears the figure that should be cited is Figure 4-20. U.S. DOE should determine if the correct figure is referenced.

Response: Agree. The incorrect figure was referenced.

Action: The text has been revised to cite Figure 4-20.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.3.3 Page #: 4-37 Line #: 22, 23, and 24 Code:
Original Comment #: 120 (OSC #44)

Comment: The text states that (electrical) conductivities increase towards the center of Waste Pit 3 possibly as a result of flyash, high dissolved solids in the pit leachate, or both. U.S. DOE should provide evidence to support that flyash, dissolved solids in the leachate, or both increase in the leachate near the center of Waste Pit 3.

Response: Partially agree. The text reports what was determined from the EM conductivity test, and the flyash/dissolved solids are two possible explanations for the increase toward the center of the pit. The boring logs indicate that flyash is present is the waste pit contents, but there are no borings from the RI/FS study that are in the center of the pit that can be used for comparison.

Action: Modified the text on page 4-37, line 24, prior to the last sentence, as follows: "The boring logs for the CIS sampling location #7 (PS-03-109, in the center of the pit) indicate that black fly ash/black material was described as being present in each of the first three 2-ft sections (down to a depth of 6 feet). EM readings are more affected by the constituents of this top section."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.3.3 Page #: 4-38 Line #: 34 Code:
Original Comment #: 121 (OSC #45)

Comment: The text states that neither thorium or radium were reported for the RI/FS leachate samples from Waste Pit 3. U.S. DOE should state why the results were not reported. In addition, Sr-90 was the highest in Waste Pit 3 leachate; however, it is not discussed in the text. U.S. DOE should review the Sr-90 data and discuss its relevance.

Response: Agree. Three pit leachate samples were analyzed. Radium and thorium values were not reported by the laboratory because matrix effects (either interference from uranium or poor radionuclide recovery) rendered the data unusable. The Sr-90 data for the single sample from which Sr-90 data was obtained was the highest Sr-90 data noted in leachate from any of the pit samples. Because Tc-99 was also highest in Waste Pit 3 samples, it is clear that Waste Pit 3 received the major portion of raffinate from the refining of irradiated uranium bearing materials received from Hanford.

Action: Lines 32-36, page 4-38, have been revised to read as follows: "Three leachate samples were collected under the RI/FS program and analyzed for selected radionuclides. The samples contained high amounts of dissolved solids, especially magnesium and calcium ions. This resulted in precipitation of the corresponding sulfates when the radiological samples were prepared which caused recovery problems for several radionuclides. Pu-238, Pu-239/240, Ra-226, Ra-228, Sr-90, Th-228, Th-230, Th-232, and total thorium were requested for analysis for all three Waste Pit 3 leachate samples. However, the matrix interference caused by the dissolved solids was so severe that Pu-238, Pu-239/240, and Sr-90 for only one sample, and no radium or thorium determination was possible due to matrix effects. The Sr-90 value (106 pCi/L) obtained for the one successful leachate sample from Waste Pit 3 was the highest obtained for any leachate from the pits. Technetium was reported for each of three leachate samples and the average activity concentration (227 pCi/L) was the highest for all pit leachate samples determined. The occurrence of high values for Sr-90 and Tc-99 in the Waste Pit 3 leachate indicates that this pit received a major portion of the raffinate from the refining of irradiated uranium-bearing materials received from the Hanford site. The U-238/U-234 activity ratio is approximately 1 and the U-238/U-235 activity ratio is approximately 20, indicating that the uranium found in the leachate from Waste Pit 3 was, on average, natural uranium. This is consistent with the activities presented for the waste material. The data are presented in Table 4-6."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.3.5 Page #: 4-39 Line #: 10 Code:
Original Comment #: 122 (OSC #46)

Comment: The text states that chromium and thallium were detected at their highest concentrations in Waste Pit 3 waste material; however, Table 4-7 indicates that chromium and thallium were highest in the waste material from Waste Pit 5. U.S. DOE should review the data and address this discrepancy.

Response: Agree. Chromium and thallium were not reported at the highest average amounts in Waste Pit 3. Beryllium and selenium should have been presented as being reported in Waste Pit 3 at the highest CIS reported concentrations instead.

Action: The text on page 4-39, lines 9-17 have been replaced as follows: "The average CIS results for arsenic, lead, manganese, and selenium are the highest average concentration values reported for the CIS. The high levels of arsenic (1021 mg/kg), lead (194 mg/kg), and vanadium (2650 mg/kg) are from the neutralized raffinate consisting of both the water soluble nitrates and the insoluble metal species. An additional source of the arsenic in Waste Pit 3 could be the ash from the coal-fired furnace which was deposited into the waste pit during the time period during which the pit was being filled. Nickel (137 mg/kg), copper (912 mg/kg), barium (4146 mg/kg), and thallium (3.2 mg/kg) were reported during the CIS investigation at the second highest reported concentration of each listed parameter for all CIS waste pit determinations. Antimony, chromium, mercury, silver, and zinc were reported at concentrations exceeding those of the background soil."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.3.5 Page #: 4-42 Line #: 2 and 3 Code:
Original Comment #: 123 (OSC #47)

Comment: The text states that tributyl phosphate may have degraded with time in the environment. U.S. DOE should state what the degradation products of tributyl phosphate may be and if they were found in the Waste Pit 3 waste material.

Response: Agree. The statement that tributyl phosphate may have degraded was not supported by clear evidence. This statement was inappropriate.

Action: The phrase, "or the tributyl phosphate was degraded with time in the environment," has been deleted from lines 2-3, page 4-42.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.3.5 Page #: 4-42 Line #: 8, 9, and 10 Code:
Original Comment #: 124 (OSC #48)

Comment: The text lists the metals (arsenic, boron, cadmium, molybdenum, selenium, and vanadium) that were reported as the highest leachate concentrations for all the RI/FS leachate samples. According to Table 4-11, copper, cyanide, lead, mercury, and thallium were detected at high concentrations and should therefore be included in this list. U.S. DOE should review the data and address this comment.

Response: Agree. In an effort to provide the information in an efficient manner, the discussion was intended to be a "shopping list" of the materials found in the pits. The discussion was centered around the worst case scenario providing the highest average concentrations reported.

Action: The text on page 4-42, line 8 to the end of the paragraph has been modified as follows: "Arsenic (427 μg/L), boron (5360 μg/L), cadmium (344 μg/L), copper (457 μg/L), cyanide (433 μg/L), magnesium (3,600,000 μg/L), mercury (33.2 μg/L), molybdenum (2457 μg/L), selenium (60.6 μg/L), thallium (106 μg/L), and vanadium (576 μg/L) were reported at the highest leachate concentrations for all the RI/FS leachate samples. In addition, chloride (23000 μg/L) and sulfate (4500 μg/L) were also the highest concentrations reported. The constituents reported for the leachate were consistent with those found in the waste pit material, meaning most of the raffinate waste was water soluble"

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.3.6 Page #: 4-43 Line #: 1 and 2 Code:
Original Comment #: 125 (OSC #49)
Comment: See Original Specific Comment 43.
Response: Acknowledged. However, there is no figure reference in Section 4.2.3.6.
Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.4.5 Page #: 4-48 Line #: 22 and 23 Code:
Original Comment #: 126 (OSC # 50)
Comment: The text states that the significant analytes reported at elevated concentrations were identical by both CIS and RI/FS sampling programs, thus indicating comparable data. However, the RI/FS data indicate that antimony and molybdenum were also detected during analysis. U.S. DOE should review the data and address this discrepancy.
Response: Partially agree. Antimony and molybdenum were reported as positive concentrations during the RI/FS sampling effort. Antimony was not detected during the CIS, and molybdenum was not one of the required elements, so it is not possible to completely overwrite the comparability of the two sets of data on the basis of the lack of antimony "hits" and no molybdenum data.
Action: The following additional text has been added to page 4-48 commencing with line 23. "The only minor exceptions to the comparability issue revolve around antimony and molybdenum. Molybdenum was not determined during the CIS study making it impossible to compare to the RI/FS data and antimony was reported at higher detected concentrations during the RI/FS study than during the CIS."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.4.6 Page #: 4-52 Line #: 3 and 4 Code:
Original Comment #: 127 (OSC #51)

Comment: The text lists metals that were detected above subsurface soil background levels. However, beryllium, chromium, cobalt, copper, nickel, vanadium, and zinc were also detected above background levels, but were not discussed as such in the text. U.S. DOE should review the data and address this discrepancy.

Response: Acknowledged. In an effort to present the text efficiently, the discussion was generally limited to the main contaminants which were determined at the highest or near the highest average concentrations reported for a particular study.

Action: The text on page 4-52, line 3 through the end of the paragraph, has been rewritten as follows: "The CIS study reported barium, beryllium, cadmium, calcium, chromium, copper, lead, manganese, silver, and vanadium at levels which were greater than 2X above the subsurface background soils level. Furthermore, the RI/FS data revealed antimony, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, molybdenum, nickel, and silver above subsurface background soil concentrations."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.4.6 Page #: 4-52 Line #: 30 Code:
Original Comment #: 128 (OSC #52)

Comment: The text discusses background levels for leachate samples. U.S. DOE should discuss what constitutes a background concentration for leachate and why.

Response: Agree. There is no defined background level for a pit leachate sample. It is clear, however, that pit leachates whose contamination concentrations are below native perched groundwater concentration levels cannot contribute to the contamination of native perched groundwater. It is appropriate, therefore, to compare the concentration of particular analytes in pit leachates to native perched groundwater that naturally occurs at the same strata. If a pit leachate that is lower in the concentrations of a particular constituent than perched groundwater were mixed with that groundwater, the result would be to dilute the naturally occurring groundwater with respect to that constituent.

Action: The text on page 4-52, line 29-30, has been revised to read as follows: "The inorganic analyses showed antimony, barium, beryllium, boron, calcium, chromium, cobalt, copper, mercury, nickel, manganese, molybdenum, silver, tin, vanadium, chloride, and sulfate at concentration levels that were above naturally occurring perched groundwater levels." Insert between lines 14 and 16, page 4-14, the following paragraph: "All material disposed of in the waste pits is considered to be unnatural because it was placed into the pits by man. However, some inorganic chemical parameters which resided in the pits occurred at concentrations which were below the background levels of environmental media from similar strata. If a particular constituent, such as calcium, was found to be resident in a waste pit at a concentration lower than the subsurface soil background level, it was considered benign. Extensive discussions of waste pit materials or pit leachate that occurred at concentrations below subsurface soil levels or perched groundwater levels, respectively, were not considered germane to discussion of the waste pit materials in sources of environmental contamination."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.2.5.1 Page #: 4-53 Line #: 5 Code: C
Original Comment #: 129 (OC #7)

Comment: It is stated here that two borings were completed as part of the 1992 RI/FS treatability study program; please indicate which figure depicts these borings and which table(s) would indicate their analysis results. Also, briefly describe the nature of the 8 sampling locations (1992 RI/FS) shown in Figure 4-6.

Response: The 8 sampling locations indicated in Figure 4-6 are the locations sampled for the 1992 RI/FS study. The sampling of these locations is discussed in Section 2.3.2.2.

Action: Lines 5-7, page 4-53, has been revised to read: "Six borings were completed in Waste Pit 5 as part of the CIS program (Figure 4-4) and eight borings were completed in Waste Pit 5 as part of the 1992 RI/FS treatability study program (Figure 4-6). The sampling procedures which were used to obtain the 1992 RI/FS treatability study samples were discussed in Section 2.3.2.2."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.5.4 Page #: 4-54 Line #: 26 and 27 Code:
Original Comment #: 130 (OSC #53)

Comment: The text discusses Ra-226 as both a predominant RI/FS radiological constituent and as a constituent that is elevated, but presumably not predominant. U.S. DOE should review the data and resolve this discrepancy.

Response: Agree. The statement was revised to improve clarity.

Action: The paragraph on page 4-54, commencing on line 25 has been revised as follows: "Predominant RI/FS radiological constituents, in terms of activity concentrations include U-238, U-234, Th-230 and Ra-226. The reported concentration for Ra-226 (84 pCi/g) was the third highest Ra-226 RI/FS result reported for the Waste Pit Area. However, even though uranium and thorium were predominant constituents, the total thorium was the lowest reported concentration (21.1 μg/g) and total uranium was the third lowest concentration (2137 μg/g) reported for the RI/FS waste pit study."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.5.4 Page #: 4-55 Line #: 5 and 6 Code:
Original Comment #: 131 (OSC #54)

Comment: The text discusses elevated levels of radionuclides detected in the Waste Pit 5 waste material. The radionuclides Np-237, Sr-90, and Tc-99 were also detected in the Waste Pit 5 waste material but are not included in the discussion. U.S. DOE should discuss the relevance of these radionuclides since they are indicative of fission material transported from the Hanford site and deposited at FEMP.

Response: Comment acknowledged. A discussion of fission products is included in the paragraph preceding this paragraph (lines 1, 2, and 3).

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.5.4 Page #: 4-55 Line #: 11 and 12 Code:
Original Comment #: 132 (OSC #55)

Comment: The text refers to Table 4-13, which is supposed to summarize both CIS and RI/FS treatability study surface water results. The table, however, only contains CIS data. U.S. DOE should revise the table to include the RI/FS data.

Response: Agree. The text was in error in that there were no RI/FS samples of surface water taken for analysis.

Action: The first sentence of the third paragraph on page 4-55, commencing on line 10 has been rewritten as follows: "Two samples of surface water were collected in support of the radiological characterization during the CIS survey, and no samples were taken of surface water during the 1992 RI/FS treatability study investigation."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.5.5 Page #: 4-56 Line #: NA Code:
Original Comment #: 133 (OSC #57)

Comment: The discussion of surface water contamination does not include the radiological data included in Table 4-13. U.S. DOE should include this data as part of the discussion of surface water contamination for Waste Pit 5.

Response: Disagree. The radiological discussion of the surface water contamination is included in the radiological section (Section 4.2.5.4) on page 4-55, lines 10 through 18. The discussion on page 4-56 is concerned with chemical characterization.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.5.5 Page #: 4-56 Line #: 9, 10, and 11 Code:
Original Comment #: 134 (OSC #56)

Comment: The text states that it is unlikely that materials containing dioxins or furans were placed in Waste Pit 5. However, in the following paragraph, the presence of polychlorinated biphenyls (PCB) in Waste Pit 5 is discussed. PCBs are discussed earlier in the text as a source of dioxins and furans; therefore, dioxins and furans may exist in Waste Pit 5 material. U.S. DOE should review the data and address the possible presence of dioxins and furans in Waste Pit 5.

Response: The primary source of CDD/CDF in the waste pits has been hypothesized in Section 4.2.0.5 to be the disposal of solid waste incinerator ash and raffinate, which was the byproduct of refining mixtures of ore concentrates and incinerator ash. Such ash- contaminated raffinates might be expected to contain concentrations of various combustion related byproducts. The potential products of combustion that have been hypothesized in the referenced section include CDD/CDFs, PAHs and phenols. Data that include the PAHs and phenols were obtained during the CIS.

Raffinate slurry disposal is reported for both Waste Pit 3 and Waste Pit 5 in FEMP operational records. Neither pit was used for incinerator ash disposal, but Waste Pit 3 received large amounts of flyash from off-site, coal-fired boilers. Table 1-11 lists approximately 30,000 MT of raffinates that were disposed of in

Waste Pit 5. Similarly, 32,800 MT of raffinates were disposed of in Waste Pit 3. If the combustion product content of the raffinate slurries disposed in Waste Pit 5 were approximately equal to the combustion product content of the raffinate disposed of in Waste Pit 3, then the total quantity of CDD/CDF predicted to reside in Waste Pit 5 might be approximately equal to that residing in Waste Pit 3. In order to compare the organic content of the raffinates disposed of in Waste Pit 5 relative to Waste Pit 3, one may compare the total estimated mass of the constituents reported in Table 4-1.

Organic Constituent Mass in Waste Pits 3 and 5 (per Table 4-1)

Analytes	Estimated Quantity (kg)	
	Waste Pit 3	Waste Pit 5
PAHs	1,011	U
PCBs	534	216
Pentachlorophenol	287	U

All of the tabulated constituents may be related to products of combustion. Although there were PCBs detected in Waste Pit 5, it is clear that the total content of analytes possibly related to combustion in Waste Pit 5 was much less than that in Waste Pit 3. This suggests that it is unlikely that CDD/CDF content from known sources in Waste Pit 5 was greater than the CDD/CDF content in Waste Pit 3. The known organic content of Waste Pit 5 was very low, and this suggests that the CDD/CDF content of Waste Pit 5 was also very low.

Action: Section 4.2.5.5 has been revised by adding the following statements to the end of line 14, page 4-56: "The relationship of PCB content in Waste Pit 5 to the potential for CDD/CDF residence in the pit has been considered in depth. The overall organic chemical content of Waste Pit 5 was very low, with no PAHs or pentachlorophenol detected for this pit. Although raffinate disposal in Waste Pit 5 was roughly equivalent in mass to raffinate disposal in Waste Pit 3, the organic content of the raffinate disposed of in Waste Pit 5 was much lower than that of Waste Pit 3. CDD/CDFs have been hypothesized to have originated in the Waste Storage Area from the disposal of incinerator ash and from the raffinate byproducts of the refining of incinerator ash. PAHs and pentachlorophenol, which also may have introduced into the pits in the same manner as CDD/CDFs, were present in very low amounts in Waste Pit 5. This suggests that the CDD/CDF content of Waste Pit 5 was also very low. The detection of PCBs in Waste Pit 5 does not, alone, provide an indication that PCB contamination exists in concentrations that were similar to those found in Waste Pit 3."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.6.5 Page #: 4-60 Line #: 8 to 11 Code:
Original Comment #: 135 (OSC #58)

Comment: The text discusses metals that were detected at elevated concentrations in the Waste Pit 6 waste material collected during the CIS. However, Table 4-7, which lists concentrations for waste material samples collected during the CIS, shows that beryllium, cadmium, and copper concentrations were elevated but were not included in the text discussion. U.S. DOE should review the data and discuss in the text and in the summary section all metals that were detected at elevated concentrations.

Response: Agree in part. In an effort to present the text efficiently, the discussion was generally limited to the main contaminants which were determined at the highest or near the highest average concentrations reported for a particular study.

Action: The first paragraph on page 4-60, commencing with line 8, has been revised as follows: "Results indicate that none of the average inorganic chemical concentration values represent the highest average values reported for pit materials in Operable Unit 1 during the CIS. The value reported for cobalt (26 mg/kg) was the second highest average cobalt concentration reported for the CIS study. The concentrations of beryllium, cadmium, copper, lead, nickel, silver and vanadium exceeded the reported background soil concentrations."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.6.5 Page #: 4-60 Line #: 14 Code:
Original Comment #: 136 (OSC #59)

Comment: The text states that selenium was detected in the Waste Pit 6 waste material. However, according to Table 4-8, selenium was undetected in the waste material. U.S. DOE should review the data and address this discrepancy.

Response: Agree.

Action: The second paragraph on page 4-60 has been rewritten as follows: "Results of the 1992 RI/FS treatability study data set (Table 4-8 and Figure 4-14) reveal that the average concentration for thallium (48.8 mg/kg) is the highest thallium concentration reported for all the waste pits in Operable Unit 1. Average concentrations of arsenic, beryllium, cadmium, lead, mercury, and silver exceeded the reported average background soil concentrations."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.2.7.4 Page #: 4-63 Line #: 25 and 36 Code:C
Original Comment #: 137 (OC #8)

Comment: It is stated that two borings were completed in the Burn Pit as part of the RI/FS (line 25), Figure 4-5 only shows one soil boring location. Also, it is stated that RI/FS samples were taken closer to the center of the Burn Pit area (line 36), Figure 4-5 does not indicate this. Please revise the text or modify Figure 4-5 as appropriate.

Response: Acknowledged. Two borings, numbered 1776 and 1777 were drilled as part of the RI/FS study. They are marked and identified on Figure 4-5 as stated. Furthermore, since three of the four CIS borings related to the Burn Pit have been depicted to reside outside of the area currently believed to define the

location of the Burn Pit, the RI/FS borings are closer to the center of the pit by virtue of the fact that they reside within the boundaries of the pit.

Action: No action.

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.2.7.4 Page #: 4-64 Line #: 21-28 Code: C
Original Comment #: 138 (OC #9)

Comment: This paragraph describing leachate sampling has multiple errors consisting of unit misuse and confusing context, "Leachate 1776 was reported at 1 U μg/L..." for example. Please review and revise this paragraph.

Response: Agree. The above referenced statement was meant to indicate that the result for leachate 1776 was reported at the detection limit as undetected

Action: The text has been revised, and lines 23-38, page 4-64, have been replaced following "Table 4-6" to read as follows: "Radionuclide activity concentration ratios in the Burn Pit leachate are consistent with natural uranium. The two leachate samples varied widely in concentrations of constituents, as the value for boring 1777 were much higher than the values for boring 1776. The total uranium concentration for boring 1777 was 2870 μg/L, but total uranium was undetected in boring 1776. There were very low activity concentrations of the uranium isotopes reported for boring 1776. Radium-226 was detected only in the leachate from boring 1777 at an activity concentration of 72.5 μg/L. The highest radionuclide concentrations in the associated pit materials were reported for boring 1776. This reflected the fact that the leachate results were influenced by the pit materials from a larger volume of soil and pit contents than were the pit material samples."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.7.5 Page #: 4-64 Line #: 37 and 38 Code:
Original Comment #: 139 (OSC #60)

Comment: The text discusses "normal abundance levels" for cadmium and lead. U.S. DOE should define what "normal abundance levels" are and if any other metals exceed these levels. Apparently, barium, beryllium, and silver are elevated, but the text does not discuss whether they are above "normal abundance levels."

Response: Agree. What should have been indicated in the text was background soil concentrations.

Action: The fifth sentence in the last paragraph on page 4-64, commencing with line 37, has been revised to read as follows: "Average results from the CIS study indicate that the reported average cadmium concentration (6.0 mg/kg) was the second highest cadmium value reported for all the waste pits during the CIS investigation. Concentration averages for barium, beryllium, cadmium, copper, and silver were greater than 2X higher than the background soil concentrations. Average concentrations from the RI/FS investigation for arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, and silver were greater than 2 times the average background soil concentrations."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.7.6 Page #: 4-68 Line #: 20 and 21 Code:
Original Comment #: 140 (OSC #61)

Comment: The text lists metals that exceeded "normal abundance levels" in the Burn Pit. Calcium, magnesium, arsenic, and silver are included in the summary but not in earlier text where the metals exceeding the "normal abundance levels" are originally discussed. Also, barium and beryllium are elevated and may exceed "normal abundance levels." U.S. DOE should review the data and resolve the discrepancy over what metals are elevated and exceed "normal abundance levels."

Response: Agree. Normal abundance has not been defined for pit materials. However, concentrations of inorganic chemical parameters in the waste pit materials which occurred at levels which were below those of background subsurface soils may be considered benign. Clearly, a potential source of contamination must contain more of the constituent of interest than does the environmental medium which is subject to contamination. Text has been added to Section 4.2.0.4 to lead in to comparisons of this type.

Action: The sentence on page 4-68 commencing with line 20 has been rewritten as follows: "Barium, beryllium, cadmium, copper and silver were the inorganic metal constituents which exceeded the background soil concentrations during both sampling programs." Insert between lines 14 and 16, page 4-14, the following paragraph: "All material disposed of in the waste pits is considered to be unnatural because it was placed into the pits by man. However, some inorganic chemical parameters which resided in the pits occurred at concentrations which were below the background levels of environmental media from similar strata. If a particular constituent, such as calcium, was found to be resident in a waste pit at a concentration that was lower than the subsurface soil background level, it was considered benign. Extensive discussions of waste pit materials or pit leachate that occurred at concentrations below subsurface soil levels or perched groundwater levels, respectively, were not considered germane to discussion of the waste pit materials in sources of environmental contamination."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.8.4 Page #: 4-70 Line #: 34 and 35 Code:
Original Comment #: 141 (OSC #62)

Comment: The text states that the enrichment level of uranium in the Clearwell is consistent with unenriched uranium that has been mixed with processed or recycled material. This comparison is unclear. U.S. DOE should elaborate on how this enrichment level of uranium mixed with recycled material is differentiated from normal uranium enrichment.

Response: Agree. The statement has been revised to clarify the original meaning.

Action: Section 4.2.8.4, page 4-70, lines 34-35, have been revised to read. "The U-238/U-234 and U-238/U-235 uranium ratios calculated from the CIS data are inconsistent and do not allow a reliable determination regarding whether uranium in the Clearwell is depleted, natural or enriched. Results of the RI/FS, however, reveal that the U-238/U-234 activity concentration ratios vary from 3.4 to 53.9. Evaluation of the U-288/U-234 ratios for each sample indicates that the uranium contained in the Clearwell is depleted, except for one sample which showed a

natural isotopic ratio. Moreover, the presence of Cs-137, Sr-90, and Tc-99 indicate that at least some of the waste is the result of processing uranium materials which were recycled following their use in a production reactor at Hanford."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.8.5 Page #: 4-71 Line #: 31 and 32 Code:
Original Comment #: 142 (OSC #63)

Comment: The text discusses elevated metals found in samples collected from the Clearwell waste material during the RI/FS. According to Table 4-8, barium, cadmium, copper, cyanide, manganese, mercury, and nickel are also elevated in these samples. U.S. DOE should review the data and discuss these additional metals in the text or explain why they are not discussed.

Response: Comment noted. The definition of "elevated concentrations" is not universal. Average concentrations of barium, cadmium, copper, cyanide, manganese, mercury, and nickel were higher than background soil concentrations and could be considered to be elevated concentrations.

Action: Lines 31-34, page 4-71, have been revised to read as follows: "1992 RI/FS treatability study pit material samples from the Clearwell showed elevated levels of the major constituents barium, copper, and manganese relative to subsurface soil background concentrations (Table 4-2). The major constituents aluminum, calcium, iron, and magnesium were found in concentrations lower than those of subsurface soil background values. The minor constituents arsenic, cadmium, chromium, cyanide, lead, mercury, molybdenum, nickel, potassium, sodium, vanadium, and zinc were found in average concentrations that were above background concentration levels. Lead is the end product of the uranium decay series. The inorganic constituents of the Clearwell were consistent with process knowledge, including ore composition (Appendix F.6.2) and the waste streams disposed of in the Clearwell (Section 4.2.8.1)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.8.5 Page #: 4-73 Line #: 1 and 2 Code:
Original Comment #: 143 (OSC #64)

Comment: The text discusses metals that were detected above background levels in surface water collected from the Clearwell. However, barium and lead, discussed as being above background, do not appear to be above background in Table 4-14. U.S. DOE should review the data and determine if barium and lead were detected at concentrations above background.

Response: Agree. Barium and lead were not detected above background levels according to Table 4-14.

Action: Lines 1-2, page 4-73, have been revised to read as follows: "Clearwell average concentrations of arsenic, calcium, copper, magnesium, manganese, and molybdenum were above average background abundance levels."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2.8.6 Page #: 4-73 Line #: 25, 26, and 27 Code:
Original Comment #: 144 (OSC #65)
Comment: See Original Specific Comment 59.
Response: Acknowledged. Original Specific Comment #59 refers to an error in the text which occurred on line 14 of page 4-60. Original Specific Comment #65 refers the author to OSC #59, and reference lines 25-27, page 4-73. This section of text discusses the enrichment levels of uranium in Waste Pit 6. The statement has been revised.
Action: The sentence which began in line 25, page 4-73, and ended in line 27 has been replaced with the following text: "The activity concentration ratios for uranium which were obtained from the CIS were ambiguous and did not allow a determination regarding the enrichment level of the uranium contained in Waste Pit 6. The RI/FS results, however, were consistent with depleted uranium."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.3.1 Page #: 4-74 Line #: 30 Code: E
Original Comment #: 145 (OC #10)
Comment: Geiger-Müeller detectors are used for exposure rate measurements, not dose rate measurements as stated.
Response: Acknowledged. Geiger-Müeller detectors can be and were used for dose rate measurements. The beta-gamma dose rate measurements were made with an Eberline Model HP-210T probe that housed a pancake-type thin window Geiger-Müeller (GM) detector. This detector was coupled to an Eberline Model ESP-1 ratemeter/scaler. The GM tube used in this probe has a fragile window with a thickness of approximately 1.4 to 2.0 mg/cm^2. For protection of the window and to reduce the detector's sensitivity to alpha particles, a double layer of aluminized mylar was placed between the GM tube and the protective wire grid that covers the 15 cm^2 probe window. The upper hemisphere of the HP-210T probe includes tungsten metal to shield the detector from nearby radiation. The ESP-1 was operated with a high voltage of approximately 900 volts. Beta-gamma dose rate measurements were made systematically at each 50 foot grid node. The measurements were qualitative in that no correlation was made with the U-238 activity concentration. The measurements were used to provide supplemental radiation data to verify the presence of anomalous radiation as determined during the FIDLER grid measurements. In addition, the HP-210T provided verification data of anomalous radioactivity at locations where air-scattered gamma rays caused an increased bias in the FIDLER measurements. The beta-gamma dose rate measurements were made by setting the probe on the ground surface and making a 1-minute count. The counts were recorded in the beta-gamma measurement field notebook form. The count rate was then converted to dose rate (mrad/hr) using the correction factor supplied by TMA/Eberline.
Action: The following text has been added to line 31, page 4-74: "The beta-gamma dose rate measurements were made with an Eberline HP-210T probe. Count rates were obtained by placing the probe on the ground and making a one minute count. The count rate was converted to dose rate using a correction factor which was supplied by TMA/Eberline."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.1.1 Page #: 4-75 Line #: NA Code:
Original Comment #: 146 (OSC #66)

Comment: The text discusses the field instrument for detection of low energy radiation (FIDLER) field screening results for Operable Unit 1. U.S. DOE should provide background FIDLER readings and locations so that they may be compared to Operable Unit 1 readings.

Response: Comment acknowledged. The FIDLER surveys were used during the CIS to provide a screening mechanism for the distribution of surface deposits of radioactivity. Background radiation measurements also were performed by FIDLER at 15 locations. The text has been revised to provide locations and results of FIDLER measurements for background radiation.

Action: After second paragraph on page 4-75, line 17, add the following paragraph: "Background radiation measurements were performed by FIDLER at 15 remote locations upwind from the FEMP. Readings at the 15 background locations ranged from 7,359 counts per minute (cpm) to 10,069 cpm. The statistical mean of the background FIDLER readings was 8,641 cpm with a standard deviation of 672 cpm. Descriptions of the background FIDLER measurement locations and readings are presented in Table 4-25."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.1.2 Page #: 4-76 Line #: 25 Code:
Original Comment #: 147 (OSC #67)

Comment: The text states that Figure 2-8 shows soil sampling points; however, Figure 2-8 shows sediment sampling locations. U.S. DOE should reference the correct figure showing soil sampling points.

Response: Agree. CIS surface soil on-site gamma spectrometry sampling locations were actually shown on Figure 2-10. Locations of the CIS surface soil sampling points for off-site radio-chemistry analysis have been added to Figure 2-9.

Action: The figure number for on-site gamma spectrometry sampling locations has been changed to Figure 2-10 in line 25 on page 4-76. In addition, CIS surface soil sampling locations have been added to Figure 2-9.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.1.3 Page #: 4-79 Line #: 23 and 24 Code:
Original Comment #: 148 (OSC #68)

Comment: The text references surface soil results in Tables 4-18 and 4-19. U.S. DOE should also cite a figure that identifies sample locations for the sample results.

Response: Agree. The surface soil sampling locations are shown on Figure 2-9.

Action: The text has been modified to include a citation of figure that identifies sample locations for the sample results. The following sentence has been added to line 23 on page 4-79 as second sentence in the paragraph: "Locations of the surface soil samples are shown on Figure 2-9."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.1.3 Page #: 4-79 Line #: 27 and 33 Code:
Original Comment #: 149 (OSC #69)

Comment: The text lists samples from Tables 4-18 and 4-19 that contained elevated metal concentrations. However, the text does not list all the samples that had elevated readings. U.S. DOE should review the tables and include all the samples that contained elevated metal concentrations.

Response: Agree. Table 4-18 summarizes the elevated metal concentrations that were detected in the surface soil samples during the WPA Storm Water Runoff Control Removal Action. The text has been updated to include all the samples that contained elevated metal concentrations.

Action: The table has been reviewed and the text has been updated to address all the results that indicate elevated metal concentrations in the surface soil samples. The following paragraphs have been prepared to replace the paragraph in lines 27-33 on page 4-79:

"A review of the inorganic data (Table 4-18) indicated that concentrations of antimony, beryllium, cadmium, calcium, copper, magnesium, molybdenum, nickel, silver, and sodium exceed the background levels (Table 4-2) for nearly all surface soil samples analyzed under the Storm Water Runoff Control Removal Action. At some sampling locations, concentrations of magnesium and calcium significantly exceeded the background levels by a factor of 10 or more. Of the aforementioned inorganic analytes, cadmium and silver, which are considered toxic heavy metals, were reported to be approximately 4 to 9 times and 2 to 4 times, respectively, the background levels. Several inorganic analytes, including aluminum, arsenic, barium, chromium, cobalt, iron, potassium, thallium, vanadium, zinc, and cyanide, were detected in some of the surface soil samples at elevated concentrations that exceed the background levels by up to approximately 3 times. Calcium and magnesium were principle inorganic elements used in the uranium refinement process. The composition of other metallic constituents in surface soils is consistent with the contents of pit materials. The inorganic contaminants possibly were introduced to the surface soils either by spills during waste disposition and/or other transport mechanisms, such as surface runoff."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.1.3 Page #: 4-79 Line #: 35 and 36 Code:
Original Comment #: 150 (OSC #70)

Comment: The text states that volatile organic and semivolatile organic results from the Waste Pit Area-Storm Water Runoff Control Removal Action program were not available for evaluation. U.S. DOE should state why the data was not available.

Response: Comment acknowledged. The organic data in surface soil under WPA Storm Water Runoff Control Removal Action became available shortly before completion of the RI report. The data, as presented in Appendix B.1.1.4, includes volatile organics, semi-volatile organics, and pesticides/PCBs. They have been evaluated for nature and extent of contamination in the surface soil media.

Action: The text has been revised to address the nature and extent of organic contamination in the surface soil media. The text from line 35, page 4-79 to line 8 on page 4-80, has been replaced with the following paragraphs:

"Analyses of volatile and semivolatile organics were performed for the surface soil samples during the Waste Pit Area Storm Water Runoff Control Removal Action program. The analytical results are presented in Appendix B. As summarized in Table 4-19, trace amounts of organic compounds were detected. These organic compounds included polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), plasticizers (e.g., bis-2-ethylhexyl-phthalate), solvents (e.g., 2-butanone, methylene chloride, 4-methyl-2-pentanone), phenol, benzoic acid, and toluene. All these organic constituents were presented in the pit materials as indicated in the characterization of waste pits. A number of PAH compounds were identified in sample WPA-38 (north-east corner of the Operable Unit 1 area), while in sample WPA-4 only pyrene was found. Bis-2-ethylhexyl-phthalate, which is a common plasticizer, was found in most surface soil samples. Phenol was found in samples WPA-8, WPA-12, and WPA-38. Benzoic acid was detected only in samples WPA-4, WPA-6, and WPA-8, which are located west of the Waste Pit Area. Methylene chloride, 2-butanone, and 4-methyl-2-pentanone were found in samples WPA-8, WPA-12, and WPA-43, respectively. In addition, toluene was found in samples WPA-5 and WPA-14, which are located west and south of the waste pit area, respectively.

Since the aforementioned organic constituents were present in the waste pit materials, it is likely that they were routed to the surface soils by spills during waste disposition and/or other transport mechanisms, such as surface runoff, during active periods for these pits. The possible sources of organic compounds in the waste pit materials were discussed in the characterization of waste pits. It is noted that these organic compounds were found only in the samples at a depth of 1.5 to 2.0 feet. No organic compounds were found in the samples 0 - 0.5 feet. This may be attributed to the disturbance of the entire Waste Pit Area during the construction and closure of these pits.

No pesticides are detected in the surface soil samples collected under the Waste Pit Area Storm Water Runoff Control Removal Action program, despite the reported application of pesticides/herbicides in the Waste Pit Area for control of insects and weeds. PCBs, in the form of Aroclor 1254, were detected in surface soil (0-6 inches deep) samples WPA-4, WPA-7, WPA-38, and WPA-43 at concentrations ranging from 53 μg/kg to 1400 μg/kg. These sampling locations are located east and west of the Operable Unit 1 area. No PCBs were detected in the southern portion of the Waste Pit Area. PCBs in the surface soils may be attributed to indirect transport mechanisms, e.g., surface runoff, or contamined borrow fill.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.2.1 Page #: 4-80 Line #: 26 Code:
Original Comment #: 151 (OSC #71)

Comment: The text references results of RI/FS subsurface soil samples in Table 4-20; however, a map is needed to show the sample locations. U.S. DOE should include a map that shows the sample locations.

Response: Comment acknowledged. All subsurface soil sampling locations are shown on Figure 2-12.

Action: The figure number in line 20 on page 4-80 has been modified to read "Figure 2-12."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.2.1 Page #: 4-80 Line #: 36 to 41 Code:
Original Comment #: 152 (OSC #72)

Comment: The text discusses Zones 3 and 4, which describe the geology underlying Operable Unit 1. However, it is not apparent from the text what distinguishes these zones from one another. U.S. DOE should clarify how the two zones are distinguished.

Response: Agree. In order to eliminate confusion, the zone designation has been removed from the RI report. The geologic units are referred as glacial overburden, upper saturated sand and gravel layer, lower saturated sand and gravel layer, and deep sand and gravel layer. As described in the boring logs of Borings 3004 and 3084 (Appendix B.1.2.1), the lower sand and gravel layer (previously called Zone 3) primarily is a layer of wet, dense, grayish-brown, fine sand with gravel. The deep sand and gravel layer (previously called Zone 4), as evidenced in Boring 4011, is a layer of wet, very dense, dark gray, well-graded sand with trace gravel and silt. They are two distinguished geologic zones by visual classification. These descriptions have been incorporated into the text.

Action: The text in Section 4.3.2.1 has been modified to incorporate the geologic descriptions of the lower saturated sand and gravel layer and deep sand and gravel layer. The text in lines 31 to 41 on page 4-80 has been revised to read:

"<u>Glacial overburden</u> - Dry, stiff-hard, yellowish/grayish brown clay with trace of gravel and/or sand; low blow count; USCS symbol: CL

<u>Upper saturated sand and gravel layer</u> - Wet, dense, yellowish brown sand with trace of gravel; medium blow count; USCS symbol: SP-SM-SW

<u>Lower saturated sand and gravel layer</u> - Wet, dense, dark gray sand with fine gravel; medium blow count; USCS symbol: SW-GW

<u>Deep saturated sand and gravel layer</u> - Wet, very dense, dark gray, well graded sand with fine to coarse gravel and silt; high blow count; USCS symbol: SW."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.2.1 Page #: 4-81 Line #: 1, 2, and 3 Code:
Original Comment #: 153 (OSC #73)

Comment: The text discusses the development of zones based on hydrogeologic characteristics and also on soil classification. U.S. DOE should clarify which criteria the zones are based on.

Response: Agree. The development of these geologic units was made based on the descriptions of geology and groundwater hydrology as presented in Section 3.4. Soil boring logs in Appendix B.1.2.1 also provided the information required for distinguishing these units. The criteria to distinguish these units have been incorporated into the text.

Action: The text in Section 4.3.2.1 has been expanded to include the criteria for the development of these units. The text in lines 1 to 3 on Pg. 4-81 has been revised to read:

"These units were developed based on the geology and groundwater hydrology of the area as described in Section 3.4 of this document. The FEMP area is located on an eroded glacial overburden plain left by the Wisconsin Glaciation. As shown in Figure 3-15, the area primarily is a valley carved into shale bedrock, filled with outwash sand and gravel, and capped by clay/silt dominated glacial overburden. Designation of the subsurface geologic units is made based on the visual classification of borehole samples. Specific geologic characteristics of the Operable Unit 1 area are provided in the soil boring logs in Appendix B.1.2.1."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.2.1 Page #: 4-81 Line #: 22 and 23 Code:
Original Comment #: 154 (OSC #74)

Comment: The text states that the soils found in Zones 2, 3, and 4 have negligible amounts of uranium to be plotted. However, fewer samples were collected from Zones 2, 3, and 4, as compared to Zone 1. The fewer number of samples collected from Zones 2, 3, and 4 may have resulted in U.S. DOE's not detecting areas of elevated concentrations of contaminants in Zones 2, 3, and 4. U.S. DOE should discuss if the amount of uranium detected in each zone is a result of the limited number of samples collected from Zones 2, 3, and 4, as compared to the number of samples collected from Zone 1.

Response: Agree. The subsurface soil samples were first screened by a SPA-3 and the sample with the highest reading within each geologic unit was selected for radiological laboratory analysis. Often the samples from the lower geologic units were not getting any readings from the SPA-3. Only the deeper borings would collect samples from the lower units and the number of samples became fewer as the borings were drilled into lower units; so, a limited number of samples from the lower geologic units were analyzed for radiological constituents, compared to the number of samples collected from the glacial overburden.

Action: The text in Section 4.3.2.1 has been expanded to address uranium contamination in the subsurface soil, based on the results in samples from the lower geologic units. The second sentence in lines 22 and 23 on Pg. 4-81 has been deleted. The following paragraph has been inserted to line 32 on Pg. 4-81:

"There were seven subsurface soil samples from the upper saturated sand and gravel layer and two soil samples from the lower saturated sand and gravel layer. Only one subsurface soil sample was collected from the deep saturated sand layer. The soil samples from each borehole were initially screened by a scintillation detector (SPA-3), and the sample with the highest radiation reading within each geologic horizon was selected for radiochemical laboratory analysis. As shown in Table 4-20, slightly elevated uranium concentrations (U-234 and U-238) were detected in two subsurface soil samples from Boring 3004 and Boring 2028, both located west of Waste Pit 3 in the upper saturated sand and gravel layer at depths of 35.0 feet and 66.5 feet, respectively. Thorium (Th-230) was detected in Boring 3084 at a depth of 61.5 feet. No other samples at further depth or deeper unit showed uranium or thorium activity concentration."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.2.1 Page #: 4-81 Line #: 34, 35, and 36 Code:
Original Comment #: 155 (OSC #75)

Comment: The text discusses that the U-238 and U-234 activity concentrations (presumably for borings listed in Table 4-20) represent the highest concentrations in each boring. U.S. DOE should state if the vertical extent of contamination was determined for each boring.

Response: Agree. The detected U-238 and U-234 activity concentrations, as shown in Table 4-20, represent the highest concentrations in each boring. In addition, U-238 activity concentrations are shown on Figure 4-29. The subsurface soil samples collected at 5-foot intervals were first screened by a large volume scintillation detector (SPA-3), and the sample with the highest reading within each geologic horizon was selected for radiological laboratory analysis; so, the vertical extent of radiological contamination could be determined qualitatively by the sample collection scheme.

Action: The text in Section 4.3.2.1 has been modified to qualitatively present the vertical extent of radiological contamination in subsurface soil. The last sentence in lines 36-37 on page 4-81 has been replaced by the following sentences: "Although the SPA-3 screening was essentially utilized for selection of laboratory samples, the vertical extent of radiological contamination in the subsurface soils may be qualitatively determined by using the SPA-3 screening results. The SPA-3 screening results are presented in Appendix B.1.2. The vertical extent of radiological contamination in the subsurface soils in Operable Unit 1 area is primarily located in the glacial overburden at depths up to 30 feet below ground surface. Similar to the laboratory results, the majority of the subsurface soil radiological contamination is present in the area surrounding Waste Pit 4."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.2.1 Page #: 4-82 Line #: 6, 7, and 8 Code:
Original Comment #: 156 (OSC #76)

Comment: The text states that the different distribution of Th-232 compared to U-238 and U-234 may be attributed to the "characteristics of the radiological constituents." U.S. DOE should state what these characteristics are and how they affect the distribution.

Response: Agree. The text indicated that the distribution of Th-232 and U-238/U-234 are different due to the characteristics of the radiological constituents. This statement was based on the knowledge of decay processes for these radiological constituents and the source of contamination. These factors have been incorporated into the text in Section 4.3.2.1.

Action: The text in Section 4.3.2.1 has been modified to address the factors that may affect the distribution of Th-232 and U-238/U-234 concentrations in the subsurface soil. The following sentences have been added to the end of first paragraph, line 8 on Pg. 4-82: "Th-232 is in the thorium decay series, while U-238 and U-234 are in the uranium decay series. As indicated in Section 4.2 of this document, the highest uranium activity concentrations were found in Waste Pit 6 and the lowest average concentrations for uranium were found in Waste Pits 3 and 5. Elevated thorium activity concentrations were detected in Waste Pits 3 and 5, due to the disposal of raffinate from the FEMP Refinery. The results of U-238/U-234 and Th-232 in the subsurface soils indicate that migration of these radiological constituents occurred in the areas adjacent to the specific pits."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.2.1 Page #: 4-82 Line #: 25 Code:
Original Comment #: 157 (OSC # 77)

Comment: The text states that contamination was detected at a depth of 35.0 feet in Zone 2; however, 35 feet is indicated as Zone 1 on Table 4-20. U.S. DOE should resolve this discrepancy.

Response: Agree. The layer between the glacial overburden and the upper saturated sand and gravel layer is a transition from glacial overburden to sand and gravel. This interface occurs at a depth between 31.5 and 37.5 feet below grade. Boring logs show that the reported sample was obtained from sands and gravel at a depth of 35 feet below grade, making it a sample in the upper saturated sand and gravel layer. However the zone on Table 4-20 has been eliminated.

Action: Table 4-20, page 2, line 2 has been revised to indicate 35 feet depth, column in Boring 3004, Sample 007932, and results.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.2.1 Page #: 4-82 Line #: 35 and 36 Code:
Original Comment #: 158 (OSC #78)

Comment: The text states that no contamination exists in Zones 3 and 4; however, Figure 4-29 shows contamination in Boring 3004, which, according to Table 4-20, is in Zone 3. U.S. DOE should resolve this discrepancy.

Response: Partially agree. Figure 4-29 shows uranium concentrations in the glacial overburden. Table 4-20 shows three samples from Boring 3004; one each from the glacial overburden, the upper saturated sand and gravel layer, and the lower saturated sand and gravel layer. The contamination shown for Boring 3004 in Figure 4-29 was detected at the interface between the glacial overburden and the upper saturated sand and gravel layer, and is discussed in the text as a sample of the upper saturated sand and gravel layer. Figure 4-29 has been revised to remove Boring 3004 data since it is not in the glacial overburden.

Action: The "(4)" has been removed from beneath "3004" in Figure 4-29.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.3 Page #: 4-83 Line #: 28 Code:
Original Comment #: 159 (OSC #79)

Comment: The text references Figure 4-16; however, the text should reference Figure 4-28. U.S. DOE should modify the text to reference the correct figure.

Response: Agree. However, due to renumbering, this is now Figure 4-29.

Action: The text has been revised to reference Figure 4-29.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.4 Page #: 4-87 Line #: 4 and 5 Code:
Original Comment #: 160 (OSC #80)

Comment: Metals (including radionuclides) are the primary contaminants of concern in Operable Unit 1. The discussions of the various groundwater sampling activities conducted to support the RI should clearly indicate, for each study (and sample if applicable), whether groundwater samples were filtered or unfiltered prior to analysis. This information should also be provided in the data tables presented in Section 4.0

Response: Agree.

Action: Data summary Tables 4-21, 4-22, 4-23, 4-24, 4-27, 4-28, 4-29, 4-30, and 4-31 were modified to differentiate results for filtered and unfiltered samples. Section 4.4, page 4-85, lines 5-6, was revised to read as follows:
"Metals analyses were performed on both filtered (dissolved) and unfiltered samples during the RI/FS investigation and RCRA groundwater monitoring programs. Radionuclide analyses were limited to unfiltered samples under both programs. The data summary tables introduced in the following sections present the groundwater data for radiological, inorganic, and organic analytes and indicate averages for dissolved analytes separately from results for analytes in samples that were analyzed as received."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.4 Page #: 4-85 Line #: 4 and 5 Code:
Original Comment #: 161 (OSC #81)

Comment: The text states that 3000-Series wells monitor the middle zone of the regional aquifer below the clay layer; however, according to Figure 2-18, the 3000-Series wells are screened above the clay layer. U.S. DOE should resolve this discrepancy.

Response: Agree.

Action: The text has been revised to replace "below the clay layer" with "above the clay layer" on page 4-85, Lines 4-5.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.4.1.1 Page #: 4-87 Line #: 23 and 25 Code:
Original Comment #: 162 (OSC #82)

Comment: The text refers to groundwater samples from Wells 1021 and 1019; however, these wells are not included in Table 4-21, which should contain the data for these wells. U.S. DOE should include the data for these wells in Table 4-21.

Response: Agree.

Action: The radionuclide data from Wells 1019 and 1021 have been added to Table 4-21.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.4.1.1 Page #: 4-90 Line #: 22 to 25 Code:
Original Comment #: 163 (OSC #83)

Comment: The text implies that Waste Pit 3 is the source of vanadium contamination in four downgradient wells; however, these wells are also downgradient of Waste Pits 4, 5,and 6. Also, vanadium was not detected in well 1021, which is downgradient and between Waste Pit 3 and the four wells. U.S. DOE should provide additional evidence that Waste Pits 3 is the source of vanadium contamination.

Response: Agree that the evidence should be reevaluated. Tables 1-12 and 4-1.1.B through 4-1.8.B show that Waste Pits 3, 4, and 5 are consistently higher in metals content than the other OU1 facilities. Based on a collection of evidence (presented below), the point being made in the text (i.e., which pits are sources for inorganics) seems to be better stated by discussing the overall evidence and not the concentrations of one analyte (such as vanadium) in specific wells. While vanadium is a good example of the distribution of inorganics, it does not specifically support the conclusion that the primary source is Waste Pit 3.

Action: Page 4-90, Lines 13-25 have been revised to read: "A review of Tables 1-12 and 4-1.1.B through 4-1.8.B shows that Waste Pits 3, 4, and 5 are consistently higher in inorganic content than the other OU1 facilities. The RI/FS inorganic data (Table 4-23) show that most of the prominent inorganics (antimony, barium, beryllium, cadmium, calcium, cobalt, copper, chromium, iron, manganese, molybdenum, mercury, and vanadium) were detected at their highest concentrations in Wells 1073, 1075, 1644, 1643, 1081, and 1031. These wells are centrally located (north-south) through OU1 in the glacial overburden. This indicates that Waste Pits 3, and 4, and the Burn Pit may be the major sources of these contaminants, and is supported by the following:

- the presence of elastomeric liners at Waste Pits 5 and 6 has reduced leakage,

- high potential gradients around Waste Pits 5 and 6 indicate minimal leakage is occurring,

- the similarity of potentiometric head between waste pit wells and glacial overburden wells around Waste Pits 3, 4, and the Burn Pit (Figures 4-32 and 4-33) indicates relatively more hydraulic continuity between these waste pits and glacial overburden when compared to areas of high hydraulic gradient, and

- the location of one or more coarse grained sand lenses in the glacial overburden (Figure 3-32) in the vicinity of Waste Pit 4 and the Burn Pit which may facilitate contaminant migration.

Page 4-90, lines 18-25 have been deleted.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.4.2.2 Page #: 4-97 Line #: 22 and 23 Code:
Original Comment #: 164 (OSC #84)
Comment: The text states that, with the exception of uranium, no radionuclides were found above background conditions. However, according to page 4-98, lines 2 and 3, the background concentration for total thorium was exceeded in well 3004. U.S. DOE should resolve this discrepancy.
Response: Agree.
Action: Page 4-97, lines 22-23 have been revised to read as follows: "With the exception of uranium, only thorium (Well 3004) was found to exceed background concentrations."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.4.2.2 Page #: 4-100 Line #: 10 and 11 Code:
Original Comment #: 165 (OSC #85)
Comment: The text discusses the occurrence of acetone, benzene, and toluene in the 3000-series wells. U.S. DOE should explain why these contaminants, with densities less than water, were found at depth in the aquifer.
Response: These compounds exist in the aquifer at very low concentrations in the dissolved phase, not in the free phase, so that the densities of these compounds do not affect contaminant flow direction or occurrence.
Action: Page 4-100, line 9 has been revised to read, "While some of these constituents are less dense than water, these contaminants are present in the dissolved phase. Their presence in the deeper wells is not density dependent, but the result of advection and dispersion in groundwater.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.4.2.3 Page #: 4-101 Line #: 33 and 34 Code:
Original Comment #: 166 (OSC #86)

Comment: The text states that only four inorganic constituents (barium, molybdenum, silver, and zinc) were detected in the 4000-series wells. However, selenium, a fifth contaminant, was also detected above background in well 4001. U.S. DOE should discuss the occurrence of selenium in the 4000-series well.

Response: Agree.

Action: Page 4-101, lines 33-35 have been revised to read, "These analytes are barium (146 μg/L), molybdenum (17 μg/L), selenium (27 μg/L), and silver (235 μg/L) in Well 4001.

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4.4.3 Page #: 4-105 Line #: 5 Code: M
Original Comment #: 167 (OC #11)

Comment: Please clarify whether use of the term "waste pits" includes the Burn Pit and Clearwell. It is generally stated that the waste pits are contributing radiological contaminants to the regional aquifer in the vicinity of Operable Unit 1, without specifically citing the sources. While Waste Pit 4 has been mentioned as being a significant contributor, little has been said on contaminant contribution from the other sources. Please provide a summary on what sources are potential contributors and which sources may be removed from consideration, or whether there is even enough data available to make such an assessment.

Response: The original intent of the term "Waste Pits" was to include Pits 4, 5, 6, and the Burn Pit. However, non-specific use of the phrase "waste pits" has been removed from the reference text.

A summary of potential sources for groundwater contamination in OU1 based on process knowledge, analyses of pit materials, and analyses of pit leachate (groundwater) is best provided by Tables 4-1.1.A through 4-1.8.A and Tables 4-5 and 4-6. Sources are discussed in Section 4.2.

Page 4-103, Lines 21-24, essentially sum up the interpretation for the source of groundwater contamination for glacial overburden. Page 4-104, Lines 17-23 (as revised per comment #240) sum up the interpretation for the upper Great Miami aquifer. In reality, none of the OU1 sources are in direct contact with the lower portions of the Great Miami Aquifer (3000- or 4000-series wells).

The lines referenced in this comment, Page 4-105, Line 5, will be revised to reflect that concentrations of radiological contaminants in the lower Great Miami Aquifer are higher in wells to the southeast of OU1 than in wells within OU1. Also, Page 4-105, Lines 6-18, and Page 4-101, Lines 19-23, have been revised to present the 4000-series RI/FS and RCRA radiological data more clearly.

Action: Page 4-105, Lines 5-18, have been revised to read: "Data from wells to the southeast (4008, 4101, 4102, 4103) demonstrate higher concentrations and a greater number of radiological constituents than the 4000-series wells within Operable Unit 1 (4001 and 4011). The only contaminant found above background in wells within Operable Unit 1 was total uranium with a maximum

concentration of 5.3 ug/L in Well 4011 (Table 4-28). The 4000-series wells outside of Operable Unit 1 show several radiological contaminants, including total uranium that exceeded background. Wells 4101 and 4102 showed maximum concentrations of Th-228 (1.64 pCi/L), Ra-226 (1.77 pCi/L), Sr-90 (0.26 pCi/L), total thorium (13.8 ug/L), and total uranium (6.4 ug/L).

Page 4-101, Lines 19-23, have been revised to read: "Other radionuclides detected above background concentrations were predominantly found in Wells 4101 and 4102 located to the southeast of OU1. They include Strontium-90 (0.26 pCi/L), Ra-226 (1.77 pCi/L), Th-228 (1.64 pCi/L), and total thorium (13.8 pCi/L). The data show that most radiological contaminants were found at their highest concentrations in the wells located southeast of OU1 and not directly beneath OU1 in the lower Great Miami Aquifer.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5 Page #: 4-107 Line #: NA Code:
Original Comment #: 168 (OSC 87)
Comment: Metals, including radionuclides, are the primary contaminants of concern at Operable Unit 1. Discussions about the various surface water sampling activities conducted to support the RI should clearly indicate, for each study (and sample if applicable), whether surface water samples were filtered or unfiltered prior to analysis. This information should also be provided in the data tables presented in Section 4.0.
Response: Agree.
Action: The tables have been revised to indicate filtered (dissolved) analytical results for inorganics where appropriate.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5 Page #: 4-108 Line #: 13 and 14 Code:
Original Comment #: 169 (OSC #88)
Comment: The text states that surface runoff from Operable Unit 1 has been directed away from Paddys Run to a catchment basin. U.S. DOE should discuss how effective the surface runoff control system for Operable Unit 1 has been in preventing contaminants from entering Paddys Run. U.S. DOE should also indicate on a figure where the catchment basin for the surface runoff control system is located.
Response: Agree
Action: The following text was inserted in the sentence break in line 18, page 4-108: "By diverting contaminated surface waters to the BSL and the effluent treatment system as described in Section 1.5.4.2, the contaminant loading to Paddys Run has been reduced. Information has shown that low levels of uranium are currently diverted to the effluent treatment system where the stormwater runoff from Operable Unit 1 is treated prior to release to the Great Miami River. Other potential impacts to Paddys Run may exist under current site conditions, but to the extent that the majority of the surface water impacts discussed in the EE/CA (ASI/IT 1990) have been eliminated by the engineering design of the stormwater collection and treatment system, contaminant loading to Paddys Run has been reduced."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.0 Page #: NA Line #: NA Code:
Original Comment #: 170 (OGC #3)

Comment: The Waste Pit Area Runoff Collection Sump reportedly received surface water runoff from Operable Unit 1; however, this sump was not included in the contaminant investigation of Operable Unit 1. U.S. DOE should discuss why the sump was not included in the contaminant investigation.

Response: Agree. The Waste Pit Area Runoff Collection sump has been receiving surface water runoff from Operable Unit 1 since June 1992. Because it is anticipated that this structure will continue to operate at least until after a ROD for Operable Unit 1 has been issued in November 1994, it would be premature to sample at this time. Concrete sampling will occur prior to dismantling the structure.

Action: Have added the following sentences after line 15, page 4-108 which say, "Because the sump is anticipated to remain in operation until at least after the Operable Unit 1 ROD has been issued, the structure was not sampled as part of the RI. Concrete sampling will occur prior to dismantling of the structure.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5 Page #: 4-108 Line #: 17 and 18 Code:
Original Comment #: 171 (OSC #89)

Comment: The text states that contaminant loading from Operable Unit 1 runoff to Paddys Run has been reduced. U.S. DOE should provide analytical evidence supporting this statement.

Response: Agree.

Action: See action for Comment 98, (OSC #88).

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.0 Page #: NA Line #: NA Code:
Original Comment #: 172 (OGC #2)

Comment: The surface water runoff control system has reportedly eliminated all potential surface water contamination of Paddys Run via surface water runoff from Operable Unit 1; however, U.S. DOE does not fully discuss this system. U.S. DOE should expand on the discussion of this system since it would also decrease the amount of aquifer contamination since Paddys Run is in direct contact with the Great Miami Aquifer south of Operable Unit 1.

Response: Agree. Section 4.5 states that, "The implementation of the removal action in June 1992 reduced contaminant loading from Operable Unit 1. Section 1.5.4.2 provides an explanation of the removal action and states '...the potential for release of contaminants to the environment has been reduced.' " The DOE has not reported that the potential for surface water runoff to Paddys Run from Operable Unit 1 has been completely eliminated by the WPA SWRCA.

Action: The following text has been inserted in the sentence break in line 18, page 4-108: "By diverting contaminated surface waters to the BSL and the effluent treatment system as described in Section 1.5.4.2, the contaminant loading to Paddys Run has been reduced. Semi-quantitative information has shown that low levels of uranium are currently diverted to the effluent treatment system where the stormwater runoff from Operable Unit 1 is treated prior to release to the Great Miami River. Other potential impacts to Paddys Run may exist under current

site conditions, but to the extent that the majority of the surface water impacts discussed in the EE/CA (ASI/IT 1990) have been eliminated by the engineering design of the stormwater collection and treatment system, contaminant loading to Paddys Run has been reduced."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.1.1 Page #: 4-109 Line #: 2 and 3 Code:

Original Comment #: 173 (OSC #90)
Comment: The text states that two surface water sample results are summarized in Table 4-33 and references Figure 2-7 for the sample locations. Figure 2-7 does not indicate the sample locations. U.S. DOE should state from what surface water body these samples were collected and provide a figure showing the sample locations.
Response: Agree. The reference to Figure 2-7 in the text was incorrect.
Action: On page 4-109, line 3, the reference to Figure 2-7 has been deleted and replaced by "Figures 2-5 and 4-36" for the locations of the surface water samples.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.1.1 Page #: 4-109 Line #: 3 Code:
Original Comment #: 174 (OSC #91)
Comment: It appears that the figure cited in this line is incorrect. U.S. DOE should review the text and reference the correct figure (apparently it is Figure 2-5). Also, the location of Paddys Run should be indicated on this figure.
Response: Agree with initial segment of comment. The reference to the figure is incorrect. Disagree with the second portion of the comment regarding the inclusion of Paddys Run in the figure. Inclusion of the creek will require a detrimental reduction in the features the figure is intended to highlight.
Action: The text on page 4-109, line 3 has been revised to reference Figure 2-5 for the location of two surface water samples labeled DD07 and DD09. The majority of the figures provided in the RI report include only Operable Unit 1 area. Figure 2-1 provides the Operable Unit 1 area and local surroundings, including Paddys Run.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.1.1 Page #: 4-109 Line #: 11 Code:
Original Comment #: 175 (OSC #92)
Comment: The text refers to sediment samples collected from the waste storage area; however, the results of the sediment samples are not discussed. U.S. DOE should either discuss the analytical results obtained from these sediment samples or state why the results are not discussed.
Response: Agree. The original text was in error. No sediment samples were collected as part of the 1984 Groundwater Study.
Action: Revise Section 4.5.1.1, page 4-109, lines 10-11 to read, "To meet this objective, several samples of surface water runoff were collected from the Waste Storage Area."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.1.1 Page #: 4-109 Line #: 14 and 22 Code:
Original Comment #: 176 (OSC #93)

Comment: According to the text, sample sites RO8 and RO6 contain uranium; however, Figure 4-35 does not indicate that these sites exhibit elevated uranium concentrations. U.S. DOE should either include these areas on Figure 4-35 or explain this discrepancy.

Response: Acknowledged. Page 4-109, line 14 states, "The highest concentration was from location R08, south of Waste Pit 2 and east of Waste Pit 1." Sample location R0-8 is shown on Figure 4-36 (formerly Figure 4-35) at the cited location. Page 4-109, line 22 states, "...from location R06, between Waste Pit 3 and the Clearwell..." Sample location R0-6 is shown on Figure 4-36 at the cited location.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.1.1 Page #: 4-109 Line #: 23 Code:
Original Comment #: 177 (OSC #94)

Comment: The text incorrectly cites Figure 2-7. U.S. DOE should review the text and reference the correct figure.

Response: Agree with comment.

Action: The text on page 4-109, line 23, has been revised to read as follows: "The reported results of the two samples were similar. RO9, located between Waste Pits 3 and 5, reported 3 mg/L and RO6, located between Waste Pit 3 and the Clearwell, reported 4.6 mg/L. The sampling locations can be found on Figures 2-5 and 4-36."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.1.1 Page #: 4-109 Line #: 29 Code:
Original Comment #: 178 (OSC #95)

Comment: See Original Specific Comment 94.

Response: Agree with Original Specific Comment 94

Action: The text on page 4-109, line 29, has been revised to state, "Figure 2-5 shows the relative position of each RI/FS surface water sampling location."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.1.1 Page #: 4-110 Line #: 21 Code:
Original Comment #: 179 (OSC #96)

Comment: According to the criteria noted on Figure 4-35, sample locations ASIT-18, ASIT-19, and ASIT-22 should be included on Figure 4-35 as areas of elevated total uranium contamination. U.S. DOE should review the data for these sample locations and make the necessary corrections.

Response: Acknowledged. Each of the noted sample locations (ASIT-18, ASIT-19, and ASIT-22) is shown on Figure 4-36 (formerly Figure 4-35). ASIT-18 is located just south of the railroad tracks (at the east end). ASIT-19 is located in a trench between Pit 5 and the railroad tracks. ASIT-22 is located along a trench just north of the railroad tracks.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.1.1 Page #: 4-110 Line #: 29 Code:
Original Comment #: 180 (OSC #97)

Comment: The text discusses Great Miami River UTLs, but does not state what they are or how they were calculated. U.S. DOE should include this information in the text.

Response: Agree. Statistically speaking, an Upper Threshold Limit (UTL) is the 95 percent confidence interval on the 95th percentile. The English translation is that the user is 95 percent confident that the actual number will be less than or equal to the UTL 95 percent of the time. The text should reference Table 4-2 which provides UTLs for background concentrations of radiological and inorganic constituents in surface soil, subsurface soil, perched groundwater and Great Miami Aquifer groundwater. Table 4-2 is revised to include UTLs for the Great Miami River.

Action: Page 4-110, lines 28-30, have been revised to read as follows: "Ra-226 and Ra-228 were detected at levels that were at or slightly elevated above Great Miami River background Upper Threshold Limits (UTLs) for those contaminants (Table 4-2), indicating that the level of contamination is only slightly above background. The UTL is the 95 percent confidence interval of the 95th percentile." Section 4.1, page 4-3, lines 11 and 12 were revised to read as follows, "Table 4-2 presents the UTLs for background concentrations of radiological constituents in surface soil, subsurface soil, perched groundwater, Great Miami Aquifer groundwater, and Great Miami River water." Section 4.1, page 4-3, lines 15 and 16 were revised to read, "The values presented for groundwater and Great Miami River water were taken from the Characterization of Background Water Quality for Streams and Groundwater (US DOE 1993)." Table 4-2, page 4-165 was revised to include a section for UTLs of contaminants in Great Miami River water (copy attached).

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.1.2 Page #: 4-111 Line #: 4 Code:
Original Comment #: 181 (OSC #98)

Comment: The text incorrectly cites Figure 2-5. It appears that the correctly referenced figure should be Figure 2-6. Furthermore, the text states that samples listed in Table 4-36 were analyzed for Ra-226 and Ra-228. However, according to Table 4-36, the samples were also analyzed for total uranium. U.S. DOE should review the referenced figure and Table 4-36 and make the necessary corrections.

Response: Partially agree. The correct citing is Figure 2-6. This has been revised in the text. With regard to sample analyses, Table 4-36 reports weekly grab sample results for uranium and bi-monthly composite sample results for Ra-226 and Ra-228 as explained in the first two sentences of Section 4.5.1.2.

Action: Page 4-111, line 4: "(Figure 2-5)" changed to "(Figure 2-6)."

TABLE 4-2
BACKGROUND CONCENTRATIONS FOR SOILS AND GROUNDWATER

	Background Concentrations[a]				
	Soils		Groundwater		Riverwater
Analyte	Surface (0-6 inches)	Subsurface (48-54 inches)	Perched [b]	Shandon Tributary[c]	Great Miami River
			(Filtered)	(Filtered)	(Filtered)
Radionuclides	(pCi/g)	(pCi/g)	(pCi/L)	(pCi/L)	(pCi/g)
Actinium-227	0.15[d]	0.13 [d]	0.0[e]	0.0[e]	NA
Bismuth-210	1.33[f]	0.7 [f]	0.0 [e]	0.0[e]	NA
Bismuth-214	1.33 [f]	0.7 [f]	0.0[e]	0.0[e]	NA
Cesium-137[g]	0.71	0.0 [e]	0.0 [e]	0.0 [e]	NA
Lead-210	1.33	0.70	0.0 [e]	0.0 [e]	NA
Neptunium-237	0.0[e]	0.0 [e]	<1 [h]	<1 [h]	1 [h]
Plutonium-238	0.0 [e]	0.0[e]	<1 [h]	<1 [h]	1 [h]
Plutonium-239	0.0 [e]	0.0 [e]	<1 [h]	<1 [h]	1 [h]
Plutonium-240	0.0 [e]	0.0 [e]	<1 [h]	<1 [h]	1 [h]
Polonium-210	1.33[f]	0.7 [f]	0.0 [e]	0.0[e]	NA
Protactinium-231	0.15 [f]	0.13 [f]	0.0 [e]	0.0 [e]	NA
Radium-224	0.90	0.96	0.0 [e]	0.0 [e]	NA
Radium-226	1.45	1.27	1 [i]	1.77	1 [h]
Radium-228	1.19	1.25	4.57	4.8	3 [h]
Ruthenium-106[g]	<0.07	<0.06	0.0 [e]	0.0[e]	NA
Strontium-90[g]	<0.5	<0.5	0.0 [e]	0.0 [e]	5
Technetium-99[g]	<0.9	<0.9	0.0 [e]	0.0 [e]	30
Thorium-228	1.43	1.25	1.6 [i]	1.6 [i]	1 [h]
Thorium-230	1.97	1.85	2 [i]	2.5 [i]	1 [h]
Thorium-232	1.36	1.24	<1 [h]	<1 [h]	1 [h]
Total Thorium	12.4 mg/kg [j]	13.3 mg/kg[j]	3µg/L [i]	2.47µg/L [i]	NA
Uranium-234	1.24	0.94	1.88	2.43	1.1
Uranium-235/236	0.15	0.13	<1 [j]	<1 [j]	1 [h]
Uranium-238	1.22	0.92	1.5 [i]	4.4 [i]	1 [h]
Total Uranium	3.17 mg/kg [j]	3.68 mg/kg[j]	1.23 µg/L[j]	2.92 µg/L[j]	1 µg/L

TABLE 4-2
BACKGROUND CONCENTRATIONS FOR SOILS AND GROUNDWATER

	Background Concentrations[a]				
	Soils		Groundwater		Riverwater
Analyte	Surface (0-6 inches)	Subsurface (48-54 inches)	Perched [b]	Shandon Tributary[c]	Great Miami River
			(Filtered)	(Filtered)	(Filtered)
Metals(mg/kg)	(mg/kg)	(mg/kg)	(mg/L)	(mg/L)	(mg/L)
Aluminum	11,880	14,700	0.123	0.188	NA
Antimony	7.7[h]	6.7[h]	0.0[e]	0.038[i]	NA
Arsenic	8.45	8.79	0.058[m]	0.088[m]	0.002
Barium	91.3	99.2	0.477	.077	0.1
Beryllium	0.60[i]	0.62	0.002	0.002	NA
Boron	21.8[k]	42.7	0.0[e]	0.0[e]	NA
Cadmium	0.82	0.59[i]	0.006	0.006	0.0098
Calcium	4340	145,000	124,000	142,000	77
Chromium	15.5	19	0.034	0.067[m]	0.02
Cobalt	15.2	15.7	<0.01[h]	<0.01[h]	NA
Copper	14.1	16.3	0.029	0.022	0.01
Cyanide	0.25	0.11[h]	0.0[e]	0.0[e]	NA
Iron	22,300	28,000	9.22	4.67[m]	0.22
Lead	25.6	13.4	0.021[m]	0.028[m]	0.01
Magnesium	3350	43,100	48.5	40.7	34.9
Manganese	1770	922	0.15[m]	0.514[m]	0.02
Mercury	0.3[i]	0.29[i]	0.004[m]	0.0004	0.0095[m]
Molybdenum	2.6[h]	2.7[i]	0.028[i]	0.02	0.02
Nickel	20.9	28.5	0.026	0.026	0.0105
Potassium	1230	2100	27	4.31	6.2
Selenium	0.7[i]	0.6[h]	<0.003[h]	0.006[i]	0.002
Silicon	1760	1700	0.0[e]	0.0 e	NA
Silver	2.6[h]	2.2[h]	0.038	0.014	0.1
Sodium	51.1	198	57.6	52.9	77.2
Thallium	0.58[i]	0.43[h]	0.0[e]	<0.012[h]	NA
Vanadium	30.4	36.9	0.002	0.026	NA
Zinc	62.2	59	0.032[i]	0.48	NA

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TABLE 4-2
BACKGROUND CONCENTRATIONS FOR SOILS AND GROUNDWATER

Analyte	Background Concentrations[a]				
	Soils		Groundwater		Riverwater
	Surface (0-6 inches)	Subsurface (48-54 inches)	Perched [b]	Shandon Tributary[c]	Great Miami River
			(Filtered)	(Filtered)	(Filtered)
All Organic Compounds	0.0 [c]	0.0 [c]	0.0 [c]	0.0 [c]	0.0 [c]
General Water Chemistry	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Ammonia	NA [l]	NA	4.58	18.2	1.2
Chloride	NA	NA	97	83.5	325
Fluoride	NA	NA	1.3	1.24	0.9
Nitrate	NA	NA	0.286	1.25	6.58
Total Phosphorus	NA	NA	0.208	0.979	101
Sulfate	NA	NA	138	346[m]	4310 [m]

a Source: DOE 1993b (soils), DOE 1993a (Groundwater). Background concentrations are based on the 95th percentile of the data distribution from site-specific background data except as noted.

b Wells used to evaluate the perched groundwater background concentrations include 1040, 1059, and 1060.

c Wells used to evaluate the Shandon Tributary background concentrations include 2043, 2050, 2056, 2066, 2383, 3024, 3043, and 4011.

d Because of poor SQL values, this nuclide was assumed to be in secular equilibrium with its present, U-235.

e Value assumed to be zero.

f Value assumed based on secular equilibrium for radioactive decay chain.

g This radionuclide is a fission product, and its presence in the environment is due only to atmospheric releases of radiation (e.g., weapons testing). This radionuclide is not naturally occurring and is only expected to be present at or near detectable activities in the surface soil.

h All of the values in the data set were not detectable. The average SQL was substituted as the best representatives value for the 95th percentile.

i Less than or equal to 10 percent of measured concentrations were above the SQL. The maximum detected value was substituted as the 95th percentile.

j Individual activity concentrations of the three isotopes for uranium and thorium were converted to mass concentrations. The three isotope mass concentrations were added to obtain the total thorium or uranium mass concentration.

k The calculated standard deviation was greater than 2.00. This was caused by the combination of only 12 values out of 30 above SQL and the maximum concentration of 1140 µg/g. Summary statistics for 0 to 6 inches without suspected outliers were used as the representative statistics for this data set.

l NA - Not applicable

m UTLs which exceed the Federal Maximum Contaminant Levels:

Arsenic 0.05 mg/L	Manganese 0.05 mg/L
Chromium 0.05 mg/L	Mercury 0.002 mg/L
Iron 0.3 mg/L	Sulfate 300 mg/L
Lead 0.015 mg/L	

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.2.1 Page #: 4-111 Line #: NA Code:
Original Comment #: 182 (OSC #99)

Comment: U.S. DOE should include a sample location map for the samples cited in Table 4-37.

Response: Agree. The sample locations were at 100-meter intervals above and below the confluence of the Storm Sewer Outfall Ditch with Paddys Run. Section 4.5.2.1 was revised to cross-reference Section 2.5.2.2 which explains the sampling program and describes the sample locations.

Action: Page 4-111, Section 4.5.2.1, line 24 revised to read, "Samples were collected at 100- meter intervals above and below the confluence of Paddys Run and the Storm Water Outfall Ditch. Details of the sampling program, including sampling methods and locations, are presented in Section 2.5.2.2."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.2.1 Page #: 4-111 Line #: 26 Code:
Original Comment #: 183 (OSC #100)

Comment: The text cites background sediments samples listed in Table 4-2; however, Table 4-2 does not contain background sediment concentrations, and therefore, comparison of the investigative sediment sample results to background concentrations is not possible. U.S. DOE should review the table. U.S. DOE should also discuss in the text how the degree of sediment contamination is determined if there are no background sediment samples.

Response: Agree. Table 4-2 does not contain background data for sediment samples. The comparison of the data investigation of sediments samples was made with reference to soil background samples. These background concentrations were provided in the EPA approved CERCLA/RCRA Background Soil Study. Although sediment and soil samples are of differing matrices, this comparison was performed following agreement from EPA that this comparison could and should be performed due to the absence of background or reference sediment samples for the area in question. Unlike lakes or rivers, sediments in tributaries like Paddys Run are transient, being washed out and replaced with each large rainfall. Thus, it was assumed that sediment background levels in Paddys Run are most closely approximated by the background in local surface soils that would contribute to the sediment. The surface soil background levels presented in Table 4-2 were developed using soil collected near the origin of Paddys Run (Figure 2-11) and are representative of regional surface soil and the resultant sediment which would be found in Paddys Run. This assumption is now explained in the text.

Action: Page 4-111, lines 24-28, have been revised to read, "Although uranium concentrations in sediment at some location in Paddys Run were slightly elevated, the average concentration was within background levels of uranium contained in regional surface soil. Overall, the sediment data are comparable to surface soil background concentrations provided in Table 4-2. Since these background surface soil samples were collected near the origin of Paddys Run (Figure 2-11), they are considered representative of the sediment that would normally be found in Paddys Run Creek. Maximum uranium concentrations found in Paddys Run

were as high as 3 to 4 times the average background concentrations found in surface soil. Over the six-year period, the data show no discernable trends."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.2.2 Page #: 4-111 Line #: 34 Code:
Original Comment #: 184 (OSC #101)

Comment: The text cites direct radiation readings but does not state how the readings were obtained or what instrument was used to obtain the readings. U.S. DOE should provide this information. Furthermore, the sample results and a map showing sample locations should be provided.

Response: Agree. Sample results and a location map should be provided. However, EPA guidance for preparation of an RI report suggests that methods and procedures should be discussed in Section 2 of the report. Section 2.5.2.1 discusses survey methods and sample locations, and includes a map, Figure 2-7, that further delineates the survey region. Survey results, along with the data collection methods, are summarized in a manner suitable to the usability of the data in contributing to the evaluation of nature and extent of FEMP-related contamination. Additional details of the survey are provided in the referenced report.

Action: Insert the following sentence on page 4-111, line 34. "Survey, sampling methods, and sample locations are addressed in Section 2.5.2.1."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.2.2 Page #: 4-111 Line #: 39 Code:
Original Comment #: 185 (OSC #102)

Comment: The text refers to sediment background concentrations but does not state what they are. U.S. DOE should provide this information.

Response: Agree. See response to Original Comment 110.

Action: Page 4-111, lines 37-39, has been revised to read, "These findings suggest that the contaminants noted in the surface water samples are water soluble and are not attaching to stream sediment in significant quantities. This is supported by the fact that contaminant concentrations in sediment are within the distribution of background contaminant concentrations in surface soil collected near the origin of Paddys Run as discussed in the previous paragraph."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.2.3 Page #: 4-112 Line #: 3 Code:
Original Comment #: 186 (OSC #103)

Comment: The text refers to Figure 2-7; however, this appears to be the incorrect figure. U.S. DOE should review the text and reference the correct figure.

Response: Agree.

Action: Page 4-112, lines 2 and 3, have been revised to read, "The sediment sampling locations within Operable Unit 1 are shown on Figure 2-8."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.2.3 Page #: 4-112 Line #: 6 and 7 Code:
Original Comment #: 187 (OSC #104)

Comment: The text states that samples were analyzed in part for Cs-137, Np-237, and isotopic plutonium; however, these results are not provided in Table 4-38. U.S. DOE should provide these results. Also, it is stated that all radium results were rejected. U.S. DOE should state why these results were rejected.

Response: Agree. All sediment sample results are provided in Appendix B, Section B.3.2.1. The results are now repeated in Table 4-38 for completeness. The radium results were rejected during data validation due to the fact that calibration of laboratory equipment was not fully documented. This is now explained in the text.

Action: Table 4-38 (copy attached) has been expanded to include data for Cs-137, Np-237, and isotopic plutonium. Page 4-112, line 7 has been revised to read, "All radium results were rejected during data validation as a result of the fact that calibration of laboratory equipment was not fully documented."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.2.3 Page #: 4-112 Line #: 15 to 18 Code:
Original Comment #: 188 (OSC #105)

Comment: The text states that, based on uranium ratios, the source of the uranium contamination is depleted uranium. Previously in the text, it is stated that the uranium ratios may indicate that the uranium is mixed and not from depleted uranium. U.S. DOE should state how it can differentiate between depleted and mixed uranium using uranium ratios.

Response: Acknowledged. The ratios of U-238 to U-234 and U-238 to U-235 are used to distinguish natural uranium from depleted or enriched uranium. Natural uranium has a U-238/U-234 activity ratio equal to 1 and a U-238/U-235 activity ratio equal to 20. Depleted uranium has a U-238/U-234 activity ratio greater than 1 and a U-238/U-235 activity ratio greater than 20. Conversely, enriched uranium has a U-238/U-234 activity ratio less than 1 and a U-238/U-235 activity ratio less than 20. These activity ratios help to discern the potential origin of uranium contamination found at the FEMP. These concepts and the use of activity ratios are explained in the introduction to Section 4 and in Section 4.1.1.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.2.3 Page #: 4-112 Line #: 30 and 31 Code:
Original Comment #: 189 (OSC #106)

Comment: See Original Specific Comment 105.

Response: See response to Comment 115 (Original Specific Comment 105).

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.2.4 Page #: 4-112 Line #: 38 and 39 Code:
Original Comment #: 190 (OSC #107)
Comment: The text refers to background surface soil concentrations for comparison to sediment samples. This is not acceptable since two different medias are being compared. U.S. DOE should provide background sediment samples or discuss the rationale for using background soil concentrations for comparison with sediment samples.
Response: Acknowledged. See response for Original Comment #183.
Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.5.3 Page #: 4-113 Line #: 27 Code:
Original Comment #: 191 (OSC #108)
Comment: The text cites Figure 4-19; however, this appears to be the incorrect figure. U.S. DOE should cite the correct figure.
Response: Agree.
Action: Page 4-113, line 27, has been revised to read, "As shown in Figure 4-37."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.6.2 Page #: 4-115 Line #: 32 Code:
Original Comment #: 192 (OSC #109)
Comment: The text cites Figure 2-12; however, this appears to be the incorrect figure. U.S. DOE should review the text and cite the correct figure.
Response: Agree. The correct reference is Figure 2-13.
Action: Page 4-115, line 31-32 has been revised as follows: "The FEMP operates nine on-site air monitoring stations to measure the concentrations of uranium and other airborne radionuclides (Figure 2-13)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4 Page #: 4-165 and 4-166 Line #:TABLE 4-2 Code:
Original Comment #: 193 (OSC #110)
Comment: Table 4-2 on pages 4-165 and 4-166 lists background concentrations for soils and groundwater. Many of the background groundwater concentrations for the constituents appear to be above maximum contaminant levels (MCLs). U.S. DOE should review the data and discuss why the background sample concentrations are above MCLs.
Response: Agree that the reported concentrations for certain analytes exceeded the Federal MCL. The concentrations reported are the values obtained from the EPA approved Characterization of Background Water Quality for Streams and Groundwater. The concentrations reported in Table 4-2 for each analyte are 95th percentile concentrations which may be above the MCLs.
Action: Table 2 has been revised by a footnote that says the following: "The Federal Maximum Contaminant Levels for drinking water have been exceeded for the following analytes: arsenic, chromium, iron, lead manganese, mercury, and sulfate."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4 Page #: 4-167 Line #: TABLE 4-2 Code:
Original Comment #: 194 (OSC #111)

Comment: Footnote "g" in Table 4-2 states that the occurrence of the radionuclides Ru-106, Sr-90, and Tc-99 are due only to atmospheric releases of radiation (e.g. weapons testing). However, as stated in the text, fission material from the Hanford site has been stored in Operable Unit 1. The fission material contains Ru-106, Sr-90, and Tc-99. The material from the Hanford site, therefore, is a probable source of the radionuclides. Also, the footnote states that these radionuclides were expected to be present at or near detectable activities in the surface soil. However, data tables in Section 4.0 indicate that these radionuclides have been detected in subsurface soil and groundwater samples. U.S. DOE should revise the footnote.

Response: Disagree. Table 2 provides background soil concentrations. The samples were chosen specifically to be indicative of the geological area, yet not to be influenced through contamination from the Fernald site either through wind or other transport mechanisms. Therefore, the footnote indicating its presence is due only to atmospheric releases is correct for background soil.

Action: No action required.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4 Page #: 4-609 Line #: TABLE 4-35 Code:
Original Comment #: 195 (OSC #112)

Comment: Footnote "a" in Table 4-35 indicates that sample locations ASIT-27 and ASIT-28 were not sampled during the wet season because these location were dry. However, the locations were sampled during the dry season. This occurrence seems contradictory. U.S. DOE should address this apparent discrepancy.

Response: Agree. It appears contradictory to cite difficulties sampling surface water during the "wet" season while providing information for the same sampling locations for the "dry" season. The dry season was identified as late summer to early fall in Section 3.2.2. The data from 2/21 to 7/10, outside the "dry" season. For this reason, the terms "wet" or "dry season" should be removed from Table 4-35.

Action: Table 4-35 was edited to remove any seasonal distinctions, consistent with precipitation patterns for the area. See attached Table 4-35.

TABLE 4-35
SUMMARY OF SURFACE WATER RADIOLOGICAL RESULTS, RI/FS DATA

Sample Location	Sample Date	Ra-226 (pCi/L)	Ra-228 (pCi/L)	Th-230 (pCi/L)	Tc-99 (pCi/L)	U-234 (pCi/L)	U-235/236 (pCi/L)	U-238 (pCi/L)	U-Total mg/L
ASIT-18	7/10/88	1.1 ± 0.1	1.2 ± 0.1	NA	NA	NA	NA	NA	135 ± 4
ASIT-19	7/10/88	1.1 ± 0.1	1.3 ± 0.1	NA	NA	NA	NA	NA	39 ± 3
ASIT-22	7/10/88	1.0 ± 0.1	1.1 ± 0.1	NA	NA	NA	NA	NA	15 ± 2
ASIT-18	2/21/89	< 1.00	< 3.00	< 1.00	< 30.0	54.7 ± 8.7	6.3 ± 1.6	227 ± 34	700 ± 112
ASIT-19	2/21/89	< 1.00	< 3.00	< 1.00	41.3 ± 18.5	65.9 ± 12.1	5.6 ± 1.9	345 ± 58	944 ± 156
ASIT-22	2/21/89	< 1.00	< 3.00	< 1.00	< 30.0	22.7 ± 2.9	1.5 ± 0.4	30.3 ± 3.8	92 ± 15
ASIT-23	2/21/89	< 1.00	< 3.00	< 1.00	34.9 ± 16.5	80.3 ± 12.7	4.9 ± 1.4	165 ± 25	465 ± 82
ASIT-24	2/21/89	< 1.00	< 3.00	< 1.00	< 30.0	86.4 ± 13.8	6.7 ± 1.8	205 ± 32	517 ± 83
ASIT-30	2/21/89	< 1.00	< 3.00	< 1.00	54.3 ± 19.7	514 ± 200	43.8 ± 12	2548 ± 586	7030 ± 1127
ASIT-31	2/21/89	< 1.00	< 3.1	< 1.00	175 ± 30	419 ± 69	41.5 ± 7.8	2378 ± 384	6853 ± 1144
ASIT-29	3/10/89	NA*	5.7 ± 2	NA	NA	NA	NA	NA	1228 ± 201
ASIT-38	3/29/89	NA	< 3.00	NA	NA	NA	NA	NA	3000 ± 500
ASIT-27	5/9/89	< 1.00	< 3.00	NA	NA	NA	NA	NA	8148 ± 1360
ASIT-28	5/9/89	< 1.00	< 3.00	NA	NA	NA	NA	NA	5067 ± 835
ASIT-38	5/9/89	< 1.00	3.60 ± 1.5	NA	NA	NA	NA	NA	7069 ± 1126

*NA - Not applicable; insufficient sample volume

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 4 Page #: 4-639 Line #: Fig 4-12 Code: C
Original Comment #: 196 (OC #12)

Comment: This figure is a three-dimensional bar graph summarizing radionuclide analytical results from RI/FS sampling. Bar spacing suggests the analysis of 15 distinct radionuclides amongst the 8 locations, while only 8 radionuclides are indicated on the "radionuclide" axis; please revise.

Response: Agree. During final printing of the EXCEL graph files, the y-axis was rotated down too far and the result was that every other label was skipped to make sufficient room for the printed labels.

Action: The graph will be reprinted to provide all y-axis labels.

OEPA COMMENTS

SECTION 4

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 1 Line #: 15 Code: C
Original Comment #: 197 (OC 72)
Comment: What about determining nature and extent of the contamination?
Response: Agree. The statement has been revised to reflect the RI objective as stated in the U.S. EPA RI/FS Guidance Document.
Action: Section 4.0, page 4-1, lines 15-16 are revised to read, "The objective of the RI is to determine the nature and extent of contamination sufficiently to (1) perform a baseline risk assessment and (2) develop and evaluate remedial action alternatives."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.1 Page #: 3 Line #: 25-30 Code: C & E
Original Comment #: 198 (OC 73)
Comment: Unclear paragraph and typo on Bi-210
Response: Agree. The paragraph has been rewritten for clarity.
Action: The fourth paragraph (commencing with line 25) on page 4-3 has been rewritten as follows: "The background soil study did not analyze for Po-210, Bi-210, and Bi-214. As indicated in the example previously discussed, the activity concentrations of Po-210 and Bi-210 are assumed to be in secular equilibrium with their parent Pb-210. Thus, the reported activity concentration is identical to Pb-210, which was analyzed and had adequate detection in the background study. However, Bi-214 concentration cannot be estimated from the concentration of its analyzed parent, Ra-226, as there is a gaseous progeny product, Rn-222, in the decay series between Ra-226 and Bi-214. The loss of gaseous radionuclides by diffusion precludes the estimation of the activity of any radionuclides that occur at later stages of the decay-chain from parents of the gaseous progeny. Consequently, the assumption was made to report Bi-214 at the same activity concentration as the analyzed progeny, Pb-210."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 9 Line #: 23-32 Code: C
Original Comment #: 199 (OC 74)
Comment: Were samples analyzed for PCBs? Were PCBs detected in any groundwater samples?
Response: Samples were analyzed for PCBs. Discussions of pit material results may be found in Sections 4.2.1 through 4.2.2. Groundwater results may be found in Section 4.4. Aroclors were reported in Table 4-32 for Monitoring Well 2643. The referenced section describes site history.
Action: None.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 4 Page #: 9 Line #: 28 Code: E
Original Comment #: 200 (OC 75)
Comment: Change PBCs to PCBs.
Response: Agree.
Action: "PBCs" has been changed to "PCBs" in Line 28.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 10 Line #: 24 Code: E
Original Comment #: 201 (OC 76)
Comment: Typographical error. Word omitted.
Response: Agree.
Action: The missing word "of" has been added. The sentence now reads, "Slag leach was similar in origin to the trailer cake in that it consisted of magnesium fluoride that has been milled...".

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.0.5 Page #: 13 Line #: 31 Code: C
Original Comment #: 202 (OC 77)
Comment: Did DOE make an attempt to resample?
Response: No. As discussed in Section 2.3.2.2, the primary intent of the 1992 RI/FS Waste Pit Sampling was to collect bulk material from Waste Pits 5 and 6 and the Clearwell to be used in Treatability Studies. This objective was met. Materials from Waste Pit 5 and 6 and the Clearwell were collected, using a clamshell crane, and transferred to 55-gallon drums. The 55-gallon drums were sealed and sent to Building 71 where they were stored for approximately 6 months before they were sampled for analysis and then transferred to GTS Duratek for treatability studies. While the samples were representative of the drum contents at the time of sampling, the organic sample results were considered non-representative of the waste pit contents due to (1) the length of time between the removal of material from the pits and ultimate sampling of the drums and (2) differences in the degradation of organic materials in the drums versus the organic material present in the pits (due to differing environmental conditions). While organic results from these samples were considered non-representative, radiological and inorganic data were determined to be of sufficient quality to reduce uncertainty in the baseline risk assessment. The primary objective of the 1992 RI/FS Waste Pit Sampling was met. The data was not specifically intended for use in the baseline risk assessment, and the radiological and inorganic sample data, although not intended to, did provide additional information for the baseline risk assessment. DOE, therefore, considered the results of the sampling effort satisfactory and no attempt was made to resample.
Action: The text beginning with "However, because..." in line 26, page 4-13, and ending with "...data quality." in line 31, page 4-13, has been replaced by the following: "The 1992 RI/FS sampling was performed for the purpose of treatability studies, as discussed in Section 2.3.2.2. The samples were drummed and held for an extended period of time prior to sampling and analysis. Although the sampling and preservation protocols were valid for providing analytical data regarding the drum contents, the length of time and storage conditions within the drums prevented the samples from representing the organic chemical composition of the "wet" pits at the time that the drums were filled. As a result of the validation process, the organic chemical data were rejected for use as a supplement to the organic chemical data obtained during the CIS."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.0.5 Page #: 15 Line #: 2 Code:
Original Comment #: 203 (OC 78)
Comment: The point made is not well supported.
Response: Agree. Site personnel have reported the use of gasoline-powered equipment (OU3 Work Plan Addendum). It was extremely likely that small spills occurred during mobile equipment use at the FEMP. However, such occurrences are never documented.
Action: The following statement was added to line 2, page 4-15: "It is possible that small spills of gasoline could account for the low level concentrations of volatile aromatic hydrocarbons that were found in the Waste Pit Area."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.1.3 Page #: 18 Line #: 8-14 Code: C
Original Comment #: 204 (OC 79)
Comment: Is a composite profile of the pit available?
Response: Composite areal profiles for each waste pit are presented in the CIS Volume 1: Geophysical Survey dated October, 1987. This 270-page document describes in detail the methods, procedures and results of the geophysical surveys. The use of the data as a pre-sampling survey tool does not warrant presentation of extensive survey details as part of the RI report.
Action: No action required.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.1.4 Page #: 19 Line #: 18 Code: C
Original Comment #: 205 (OC 80)
Comment: At what depth was the Tc-99 found?
Response: CIS pit samples were composite samples from a 0- to 12-foot boring, so the actual depth cannot be determined.
Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.1.6 Page #: 24 Line #: 37 Code: C
Original Comment #: 206 (OC 81)
Comment: Did DOE subject the waste to TCLP analysis to meet current hazardous waste protocol?
Response: No. These analyses were performed prior to promulgation of the current hazardous waste protocols. During the CIS analytical survey only EP Toxicity leachates were conducted cue to the fact that the present TCLP methodology was not promulgated. During the 1991 RI/FS analytical Survey, TCLP analyses on the pit materials were performed for use to meet hazardous waste classification.
Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 25 Line #: 2 Code: E
Original Comment #: 207 (OC 82)
Comment: Typographical error.
Response: Agree.
Action: The spelling of Xylene has been corrected.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.2.3 Page #: 27 Line #: 10-15 Code: C
Original Comment #: 208 (OC 83)
Comment: Why is area C shown outside the boundary of Pit 2?
Response: Agree. Area C is outside the boundary of Waste Pit 2. In fact, many of the waste pit geophysical anomaly maps indicate anomalies outside the drawn pit boundaries. The waste pits were covered when the geophysical determination was performed. It is possible that ferrous materials are buried beneath the cover just outside the pit boundary.
Action: The following sentence has been inserted into line 12, page 23: "Anomaly C extends beyond the boundary of Waste Pit 2, possibly because there are buried ferromagnetic materials near the pit cover but just outside the as-built pit boundaries.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 36 Line #: 38 Code: E
Original Comment #: 209 (OC 84)
Comment: Typographical error.
Response: Agree.
Action: The word "stabilized" has been changed to "stabilize."

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 4 Page #: 37 Line #: 17-18 Code: E
Original Comment #: 210 (OC 85)
Comment: The geophysical anomaly map for waste pit 3 is presented in Figure 4-20 rather than Figure 4-12.
Response: Agree.
Action: The text on page 4-37, first sentence, second paragraph, has been revised as follows: "The anomaly map from the integration of Waste Pit 3 geophysical data is presented in Figure 4-20."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 43 Line #: 31 Code: 3
Original Comment #: 211 (OC 86)
Comment: Typographical error. Tense change.
Response: Agree.
Action: The word "were" was deleted from the text.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 45 Line #: 32 Code: C
Original Comment #: 212 (OC 87)
Comment: Since material was in such a liquid state that it could not be sampled, were any attempts made to sample the material by utilizing a different method? If not, why?
Response: Comment acknowledged. No other sampling method was attempted during installation of pit borings because it was determined that leachate samples would provide the needed characterization data.
Action: None.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 4 Page #: 4-46 Line #: 1-2 Code: E
Original Comment #: 213 (OC 88)
Comment: Referenced Figure 4-13 should read 4-22.
Response: Agree.
Action: The text on page 4-46, first sentence, first paragraph, has been revised as follows: "The anomaly map from the integration of Waste Pit 4 geophysical data is presented in Figure 4-22."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.4.4 Page #: 47 Line #: 34 Code: E
Original Comment #: 214 (OC 89)
Comment: DOE needs to justify why one sample is sufficient to determine the existence of radionuclides.
Response: Disagree. Waste Pit 4 was closed in May 1986. A local depression on the southeast corner of the waste pit resulted in ponded water. This ponded water existed until an interim RCRA closure was completed for Waste Pit 4 in August 1989. The surface water sample in question was taken as part of the CIS in 1987. It was a sample of the ponded water, not surface water runoff. Collection of a single sample is a standard practice for sampling of ponded water, especially when the ponded water has had a year to reach equilibrium. The single sample is considered representative of the water which was present at the southeast corner of Waste Pit 4. As stated previously, the water is no longer present following the interim RCRA closure of Waste Pit 4.
Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.5.5 Page #: 57 Line #: 8-11 Code: C
Original Comment #: 215 (OC 90)
Comment: Who caused the holding times to be exceeded? Did DOE attempt to resample?
Response: As discussed in Comment 202, no sampling was attempted. Based upon the facts that (1) the primary objective of the 1992 RI/FS Waste Pit Sampling was met, (2) the data were not specified for use in the baseline risk assessment, and (3) the radiological and inorganic sample data, although not intended to, did provide additional information for the baseline risk assessment.
Action: Lines 4-6, page 4-56, beginning with "1992 RI/FS..." were replaced by the following text: "As discussed in Sections 2.3.2.2 and 4.2.0.5, the RI/FS treatability study organic chemical data were not chosen to supplement the CIS data because the samples, as analyzed, did not represent the contents of Waste Pit 5 at the time of the original sampling."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.6.5 Page # 60 Line #: 20-23 Code: C
Original Comment #: 216 (OC 91)
Comment: Who caused the holding times to be exceeded? Did DOE attempt to resample?
Response: As discussed in Comment 202, no sampling was attempted. Based upon the facts that (1) the primary objective of the 1992 RI/FS Waste Pit Sampling was met, (2) the data were not specified for use in the baseline risk assessment, and (3) the radiological and inorganic sample data, although not intended to, did provide additional information for the baseline risk assessment.
Action: Lines 22-24, page 4-60, beginning with "Organic data..." were replaced with the following text: "As discussed in Sections 2.3.2.2 and 4.2.0.5, the RI/FS treatability study organic chemical data were not chosen to supplement the CIS data because the samples, as analyzed, did not represent the pit contents of Waste Pit 6 at the time of the original sampling."

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 4 Page #: 4-63 Line #: 8 Code: E
Original Comment #: 217 (OC 92)
Comment: The geophysical anomaly map is given in Figure 4-24, not Figure 4-14 as stated. Also the anomaly area appears to cover 80 percent of the pit area, not 50 percent as noted.
Response: Agree. The geophysical anomaly map for the Burn Pit is found on Figure 4-24, not Figure 4-14, and the coverage of the anomaly was underestimated in the text.
Action: The text on page 4-63, first sentence, second paragraph, has been revised as follows:"The anomaly map from the integration of Burn Pit geophysical data is presented in Figure 4-24. A single magnetic anomaly, labeled A, characterizes nearly 80% of the area referred to as the Burn Pit."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.8 Page #: 69 Line #: 14 Code: C
Original Comment #: 218 (OC 93)
Comment: Where was the sludge disposed?
Response: General sump sludge was disposed of in Waste Pits 1, 2, 3, and 5. Water treatment sludge was disposed of in Waste Pits 3 and 5. The supernatant liquids from these sludges were allowed to overflow to the Clearwell, as described in Section 4.2.8.1. The sludge/sediment from the Clearwell was dredged in the late 1960s and transferred to Waste Pit 3."
Action: Add to line 11, page 4-69, the following: "Dredged sludge sediment from the Clearwell was disposed of in Waste Pit 3 (Parsons 1993)." Add to line 16, page 4-69, the following: "General sump sludge and water treatment sludge were disposed of in Waste Pits 3 and 5. No sludges were directly disposed of in the Clearwell."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.2.8.5 Page #: 73 Line #: 8 Code: C
Original Comment #: 219 (OC 94)

Comment: Who caused the holding times to be exceeded? Did DOE attempt to resample?

Response: As discussed in Comment 202, no sampling was attempted. Based upon the facts that (1) the primary objective of the 1992 RI/FS Waste Pit Sampling was met, (2) the data were not specified for use in the baseline risk assessment, and (3) the radiological and inorganic sample data, although not intended to, did provide additional information for the baseline risk assessment.

Action: Lines 37-39, page 4-71, beginning with "The 1992..." were replaced with the following text: "As discussed in Sections 2.3.2.2 and 4.2.0.5, the RI/FS treatability study organic chemical data were not chosen to supplement the CIS data because the samples, as analyzed, did not represent the pit contents of the Clearwell at the time of the original sampling."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.3.1.2 Page #: 4-76 Line #: 24-27 Code: C
Original Comment #: 220 (OC 95)

Comment: Figure 2-8 CIS sediment screening locations not surface soils locations. Figure 2-9 does not include any CIS surface soil sampling locations. The text or figures should be revised.

Response:, Agree. CIS surface soil screening sample locations were actually shown on Figure 2-10. Locations of the CIS surface soil sampling points for off-site radiochemistry analysis have been added to Figure 2-9.

Action: The figure number has been revised to read Figure 2-10 in line 25 on page 4-76.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.3.1.2 Page #: 4-76 & 78 Line #: Code: C
Original Comment #: 221 (OC 96)

Comment: The RA-226 data discussed within these bullets were not incorporated into the baseline risk assessment. Failure to include these data in the risk assessment results in a negative bias to the calculated risks. DOE should discuss why these data were not incorporated into the baseline risk assessment and the impacts of not including them.

Response: Acknowledge. The current database includes all data that were relevant to the determination of the nature and extent of contamination. For the purposes of the definition of the nature and extent of contamination in Operable Unit 1, nonvalidated as well as validated data were used. Only validated data were considered for baseline risk assessment. On-site gamma spectroscopy data met the requirements for ASL II, and were appropriate for the determination of the nature and extent of contamination. These data were not suitable for validation and subsequent use for the purpose of baseline risk assessment. All suitable, available data were used in the baseline risk assessment.

Action: The following text was appended to line 6, page 4-76: "On-site gamma spectroscopy data obtained during the CIS were used in the determination of the nature and extent of contamination of the surface and subsurface soils of Operable Unit 1. This data met ASL II requirements, but was not validated. This nonvalidated data was not required to be used for the baseline risk assessment."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.3.1.2 Page #: 4-78 Line #: 23-24 Code: C
Original Comment #: 222 (OC 97)

Comment: The baseline risk assessment does not use all available data. Only seven RI/FS samples (Table E.2-2) were used compared to the 13 available. DOE should revise the baseline risk assessment to incorporate all usable data.

Response: Agree. The baseline risk assessment calculations that were presented in the EPA reviewed draft final RI report for OU1 were based on incomplete data sets. Current data has been used to prepare the final baseline risk assessment. This data is consistent with Appendices A, B, and C as they are presented in the final RI report for OU1. All usable validated surface soil data has been used in the risk assessment.

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.3.1.2 Page #: 4-78 &79 Line #: Code: C
Original Comment #: 223 (OC 98)

Comment: The data reported in this section is inconsistent with that used in the baseline risk assessment. Examples are U-238 max pg. 4-78 =103.7, Table E.2-2 = 16.1; U-total max pg. 4-79 = 413.5, Table E.2-3 = 62; etc. DOE must revise the baseline risk assessment to incorporate all usable data.

Response: Agree. The baseline risk assessment calculations that were presented in the EPA reviewed draft final RI report for Operable Unit 1 were based on incomplete data sets. Current data has been used to prepare the final baseline risk assessment. This data is consistent with Appendices A, B, and C as they are presented in the final RI report for OU1. All usable validated surface soil data has been used in the risk assessment.

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4.3.1.3 Page #: 4-79 Line #: 35-36 Code: C
Original Comment #: 224 (OC 99)

Comment: It is unclear what basis DOE has for making this statement. The VOC and Semi VOC data are included in Section B.1.1.4 of the report, thus they were available for evaluation.

Response: Comment noted. As indicated in Comment Response 150, the VOC and semi VOC data are available for evaluation. They have been evaluated for nature and extent of contamination in the surface soil media.

Action: See Comment 150 for the revision.

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.1 Page #: 4-85 Line #: 39 Code:
Original Comment #: 225 (OC 100)
Comment: What method is used to quantify interconnection when the contouring was performed?
Response: Figures 4-30 and 4-31 (now 4-31 and 4-32) were derived from FEMP-wide contouring of water level elevations in the glacial overburden. As a result of this comment and comment # 72 (RI Section 3.4), it was determined that the maps presented did not provide the best representation of the OU1 site-specific conditions. Therefore, the maps have been redrawn using April and October 1993 data in order to show the most recent conditions (please see comment #72 response and action).

The revised figures show potentiometric head elevations and contours which are qualitative rather than quantitative. Due to the presence of low conductivity silt and clay overlying higher conductivity sand and gravel (glacial interbeds and the Great Miami Aquifer) the potentiometric field is interpreted to include a strong vertical flow component. Since well clusters or nests were not installed above the Great Miami Aquifer, the true direction of groundwater flow can not be surmised for the glacial overburden. However, the contours are useful in providing the reader with a visual means of comparing the head distribution over a large areal extent. It should be remembered that the contours only represent a two-dimensional, horizontal cross-section of the three-dimensional potentiometric field.

Interconnection implied by the contour lines on the revised figures is based on similarity and consistency of water levels inside and outside of the waste pits over time. Conversely, areas with large potential head gradients coincide with the perimeters of several of the waste pits and are interpreted to represent zones where the liners are restricting groundwater flow (i.e., high potential, but very low conductivity). Therefore, the contours are not shown to cross these areas.

Action: Page 4-85, Line 39 through Page 4-86, Lines 1-3, will be revised to read as follows: "Although the glacial overburden is composed predominantly of silt and clay with only occasional interbedded sand lenses, hydraulic continuity is implied by the potentiometric head distribution across portions of the OU1 facilities. The potentiometric head elevations in wells to the east of Waste Pits 2, 3, and 4 are consistently comparable to those in these waste pits. Groundwater elevation data collected in 1993 show similar responses for the following wells:

WELL NO.	LOCATION	APRIL	JUNE	AUGUST	OCTOBER
1772	Pit 3	581.84	580.85	579.38	579.01
1777	Burn Pit	581.81	581.51	580.68	580.43
1643	overburden	-----	579.60	578.73	578.62
1776	Burn Pit	581.74	581.49	580.79	580.40
1775	Pit 4	579.72	578.10	580.42	580.30
1645	overburden	580.44	579.20	578.08	577.80
1768	Pit 2	577.95	577.57	576.56	577.03
1076	overburden	581.05	578.73	-----	576.93

In addition, as discussed in Section 3.4.2.3, cross sections A-A', B-B', E-E', and G-G'(Figures 3-24, -25, -28, and -30) and Figure 3-32 show the overlap between the waste pits and the coarse

grained lens. These relationships support the interpretation that more hydraulic continuity exists to the east (vs. the north, west, and south). However, the presence of a water table or potentiometric surface across the area cannot be assumed from the well data.

As discussed in Section 3.4.2.4, Waste Pits 5 and 6 have elastomeric liners and large differences in potentiometric head are observed between wells located in the vicinity of these waste pits compared to the elevation of standing water in the waste pits (typically 582 feet in Pit 6 and 588 feet in Pit 5). Similarly, large differences are observed between wells in Waste Pit 1 and nearby wells 1031 and 1838 (southern perimeter) and between Waste Pit 3 and Wells 1028 and 1004 (western perimeter). Since the areas of large hydraulic gradient coincide with the perimeters of the waste pits, they are interpreted to represent zones where the clay and elastomeric liners are restricting groundwater flow (i.e., high potential, but very low conductivity). These large differences indicate that relatively less leakage is occurring from the waste pits in these areas when compared to areas east of Waste Pits 2, 3, and 4."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.1 Page #: 4-86 Line #: 10-18 Code:
Original Comment #: 226 (OC 101)
Comment: These water elevations are not useful without referencing the surface elevations for the waste pits.
Response: The relationship between the surface water elevation in Waste Pits 5 and 6 and the potentiometric head in nearby wells is now discussed in detail in Section 3.4.2.4.
Action: Also see response to comment #225 which references surface water elevations in Waste Pits 5 and 6.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 4 Page #: 4-86 Line #: 25-27 Code: C
Original Comment #: 227 (OC 102)
Comment: The cited water-level data does not indicate that Waste Pits 5 and 6 are not leaking; only that the rate of leakage is not so great as to result in a hydraulic gradient less than that observed. Consider providing a calculation to illustrate what the maximum leakage rate may be.
Response: Agree. This section of the document was intended to highlight the significant gradients between the contents of Waste Pits 5 and 6 and the surrounding groundwater. These gradients are much greater than those between Waste Pits 1, 2, 3, and 4 and the Burn Pit and the surrounding groundwater. This section has been revised in response to comment #225. Calculation of the maximum leakage rate of Waste Pits 5 and 6 would require the hydraulic conductivity of the pit liner , the pit solids, and the surrounding material. Since these properties of the liners are unknown, it would be difficult to calculate a meaningful, maximum leakage rate based upon hydraulic gradient alone.
Action: None. Please see action for comment #225.

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.1.1 Page #: 4-88 Line #: 10-11 Code:
Original Comment #: 228 (OC 103)

Comment: This needs to be expanded. What are the "chemical interactions"? What is the stability of the complexes? What work was performed to document this/these reactions?

Response: After further review of the data, it is no longer believed that tributyl phosphate plays a major role in the enhanced migration of uranium from the pit material into the surrounding environment.

Action: Page 4-88, lines 7-8 have been revised to read, "Although confirmed to be present in the waste pits, Th-230 and Ra-226 are present in much lower levels in the wells containing elevated concentrations of uranium." Also, Lines 10-11: "Thus, it...pits," has been deleted from the text and replaced with the following text: "This is not unexpected, since these contaminants are not as mobile as uranium in the environment and would not be expected to migrate as fast (Salter and Jacobs 1982)." In addition, Lines 13-19, "Waste pit...groundwater," have been deleted from the text.

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.1.1 Page #: 4-88 Line #: 11 Code:
Original Comment #: 229 (OC 104)

Comment: What evidence indicates the mobilization of uranium instead of the retardation of Th^{230} and Ra^{226}?

Response: Acknowledge. Because it is no longer believed that uranium solution by tributyl phosphate enhances mobilization of uranium, the comment is moot.

Action: Page 4-88, lines 7-8 have been revised to read, "Although confirmed to be present in the waste pits, Th-230 and Ra-226 are present in much lower levels in the wells containing elevated concentrations of uranium." Also, Lines 10-11: "Thus, it...pits," has been deleted from the text and replaced with the following text: "This is not unexpected, since these contaminants are not as mobile as uranium in the environment and would not be expected to migrate as fast (Salter and Jacobs 1982)." In addition, Lines 13-19: "Waste pit...groundwater" have been deleted from the text.

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.1.1 Page #: 4-88 Line #: 24 Code:
Original Comment #: 230 (OC 105)

Comment: What is meant by "average" concentrations?

Response: The term "average" which was used in the referenced statement may be defined as the arithmetic mean of all RI/FS results for Tc-99 for each well. The derivation of "average" concentration is given in Section 4.1.3. Because the background groundwater concentration of Tc-99 (Table 4-2) was determined to be 0.0 pCi/L, any reported quantity of Tc-99 was considered to be above background.

Action: Line 24, page 4-88, has been revised to read as follows: "Tc-99 was detected in concentrations above background in 8 of 22 monitoring wells."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.1.1 Page #: 4-88 Line #: 29 Code:
Original Comment #: 231 (OC 106)

Comment: A table which specifies the detection of other radiological constituents should be included in the report. This will help quantify "infrequently."

Response: Agree. While the data was provided in the report, this sentence did not refer the reader to the proper location.

Action: Section 4.4.1.1, page 4-88, line 29 revised to read, "Other radiological constituents were detected infrequently and at levels near background (Table 4-21)..."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.1.2 Page #: 4-91 Line #: 5-6 Code:
Original Comment #: 232 (OC 107)

Comment: Is this statement indicating that significant migration has occurred in the 1 to 2 years between the RI and the RCRA groundwater sampling? If this is so, then why did the plume not migrate in this manner in the 30 years of operation prior to the RI sampling?

Response: Agree that the statement about migration can not be directly supported by the data. The differences between the RI/FS and RCRA data may be attributed to several factors. First, the time of sample collection varies over several years and during different seasons. Seasonal and temporal recharge, percolation, and groundwater elevation fluctuations can effect contaminant mobility and consequently well concentrations. Second, even slight, unintentional variances in sample collection activities which result in more or less suspended solids may change the sample chemistry.

Action: Page 4-91, Lines 5-11, have been deleted. Page 4-91, Lines 1-2, have been revised to read as follows: " The RCRA wells that had the highest concentrations of the prominent RI/FS inorganics were 1021, 1077, and 1074. All three of these wells are located east of Waste Pits 2, 3, and 4. However, lead and nickel were highest at wells 1028 and 1031 located along the western perimeter of Waste Pits 1 and 3.

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.1.2 Page #: 4-92 Line #: 6-8 Code:
Original Comment #: 233 (OC 108)

Comment: This appears unlikely. The ground water has had 30 plus years to approach a geochemical equilibrium. In addition, no source material has been removed from the waste pit.

Response: Agree that the statement about migration can not be specifically supported by the data. Please see rational in response to comment #232.

Action: The referenced statement on Page 4-92, Lines 6-8, has been deleted. Page 4-92, Line 2, has been revised to read: "The RCRA organic data reflects the findings of the RI/FS data, but concentrations were generally lower in the RCRA data set.

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.2.1 Page #: 4-96 Line #: 13-14 Code:
Original Comment #: 234 (OC 109)
Comment: How can this be explained without source removal?
Response: Agree. The text has been corrected accordingly. Please also read rationale in response to comment #232.
Action: Lines 12-14, page 4-96, have been revised to read as follows: "However, the concentrations and numbers of inorganic constituents detected above background levels during the RCRA were lower than those obtained during the RI/FS investigation."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 96 Line #: 28 Code: C
Original Comment #: 235 (OC 110)
Comment: The Burn Pit is described as being in close contact with the Great Miami Aquifer. If the pit is in contact with the aquifer, are contaminants being expelled into the aquifer? DOE should consider a removal action to address those pits believed to be in direct contact with the aquifer. If it is not practical to implement a removal prior to remediation, those pits should be the first remediated.
Response: Comment acknowledged. The DOE continues to consider, propose, and implement removal actions for those conditions which represent "an imminent potential threat to human health and the environment, and which meet the other EPA criteria for removal actions." One example includes the Waste Pit 5 and 6 removal actions, in which waste materials were covered with water to prevent current dry air dispersion of pit materials.

In contrast, measured groundwater constituent levels, the results of fate and transport calculations, and the results of the baseline risk assessment, as reported in Sections 4.0, 5.0 and 6.0, respectively, do not indicate an imminent potential threat to human health and the environment due to the Burn Pit. Based upon pit leaching rates and groundwater migration rates, the maximum risk due to uranium in groundwater under the future scenario is predicted to occur in 500 years for an on-property resident and 630 years for an off-site resident. Since risks related to the groundwater pathway are not "imminent," a removal action has not been proposed. With regard to implementing remedial action of the Burn Pit first, the order in which the waste pits will be remediated will be addressed during remedial design.
Action: None.

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.2.2 Page #: 4-98 Line #: 28-30 Code:
Original Comment #: 236 (OC 111)
Comment: The Tc99 has been present in the waste pits for many years. There has been no source removal or addition between the RI and the RCRA sampling. Therefore, it is unlikely that a dramatic migration, such as is described in this section, could occur.
Response: The reported values for TC-99 in Table 4-28 were laboratory 'less than' values errantly reported in the table as detected quantities. Since background equals 0.0 for this element (see Table 4-2) it appeared to be above background across the site. Table 4-28 has been revised. Only Well 3084 has a concentration of Tc-99 above background. The statement about migration is not supported and will be deleted.

Action: Page 4-98, Lines 28-30, have been revised to read: "Technetium-99 was found above background in only one of the eight RCRA wells tested. Well 3084, located along the northern perimeter of Waste Pit 4, contained an average concentration of 11.51 pCi/L."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.2.2 Page #: 4-100 Line #: 29-30 Code:
Original Comment #: 237 (OC 112)
Comment: This is unlikely. These compounds have had 30 years to migrate away from the middle zone of the aquifer. What would cause them to do this in the 1 to 2 year period of time between the RI and the RCRA sampling?
Response: Agree that the statement about the difference between RI/FS and RCRA data is not supported by the available data. Please also read rationale in response to comment #232.
Action: The following statement, lines 29-30, page 4-100, has been deleted from the text. "It appears that the organic contamination seen in the RI/FS sampling may have migrated vertically and/or horizontally, away from the aquifer in the vicinity of the waste pit area."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.2.3 Page #: 4-103 Line #: 4-6 Code:
Original Comment #: 238 (OC 113)
Comment: These compounds have had 30 years to migrate from the area into the bedrock. What would cause them to do this in the 1 to 2 year period of time between the RI and the RCRA sampling?
Response: Agree that the statement about the difference between RI/FS and RCRA data is not supported by the available data. Please also read rationale in response to comment #232.
Action: The last part of lines 5-6, page 4-103, has been deleted from the text: "..., which may indicate migration of the RI/FS organic compounds from the area either horizontally and/or vertically into the bedrock."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 4.4.2.3 Page #: 4-104 Line #: 12-13 Code:
Original Comment #: 239 (OC 114)
Comment: One to two years is not enough time to significantly leach out a large enough volume of contaminants in the waste pits, so as to create a large drop in ground water contaminant concentrations.
Response: Agree that the statement about the difference between RI/FS and RCRA data is not supported by the available data. Please also read rationale in response to comment #232.
Action: The following statement, Lines 12-15, Page 4-104, has been deleted from the text: "This is probably due to the fact that the RCRA samples were collected 1 to 2 years after the majority of the RI/FS samples were collected. It appears that much of the radionuclide contamination is migrating, either vertically or horizontally, out of the perched groundwater zone in the vicinity of the waste pits."

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 4 Page #: 4-104 Line #: 22-23 Code: E
Original Comment #: 240 (OC 115)

Comment: Please identify the four source areas referenced on Lines 22-23. Based on the discussion given on Page 7-7, Line 17, it appears that these areas are Waste Pits 4, 5, 6 and the Burn pit.

Response: The referenced sentence has been revised to indicate that Waste Pit 4 is believed to be the major contributor of radionuclides to the groundwater.

Action: Page 4-104, Lines 22-23 have been revised to read, "It appears that Waste Pit 4 is the major contributor of radiological contamination to the upper horizon of the Great Miami Aquifer."

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 4 Page #: 4-104 Line #: 23-23 Code: C
Original Comment #: 241 (OC 116)

Comment: With regard to this citation, and the discussion on Page 7-7 (Lines 13-19), why is Waste Pit 3 not considered a potential major source area? Waste Pit 3 has very little low-permeability material between the waste and the Great Miami Aquifer. In places, the pit may have been excavated directly into the aquifer. High uranium concentrations in GMA groundwater are located in the monitor wells directly downgradient (east) of and nearest to Waste Pit 3 (Figure 4-33).

Response: The referenced sentence has been revised to infer that Waste Pit 4 is the suspected major contributor of radionuclides to the groundwater per Comment 240. Based on the results of the waste pit material and leachate sampling, the uranium levels detected in Waste Pit 3 were very low compared to Waste Pit 4 concentrations. The monitor wells in question are located closer to the direct influence of Waste Pit 4 rather than that of Waste Pit 3.

Action: Page 4-104, Lines 22-23 have been revised to read, "It appears that Waste Pit 4 is the major contributor of radiological contamination to the upper horizon of the Great Miami Aquifer."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 4-256 Line #: TABLE 4-19 Code: C
Original Comment #: 242 (OC 117)

Comment: The data reported within this table do not incorporate all organics detected during the Stormwater Runoff Control Removal Action. Upon review of Section B.1.1.4 it is noted that several additional organics, including PAHs and VOCs were detected. DOE should revise the table or clarify that only selected organics are reported.

Response: Comment noted. Similar to Response Comment #389, the organic data that were presented in Appendix B.1.1.4 include volatile organics, semi-volatile organics, and pesticides/PCBs. These data have been summarized in Table 4-19.

Action: Table 4-19 has been revised to include all organic data as presented in Appendix B.1.1.4.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 4 Page #: 4-652 Line #: FIG. 4-25 Code: C
Original Comment #: 243 (OC 118)

Comment: The contour Lines over Pits 1,2,3,4 & 5 should be dashed or deleted since there is not data to support their presence.

Response: Agree.

Action: The contour lines in Figure 4-25 (now designated 4-28) have been changed from solid to dashed.

USEPA COMMENTS

SECTION 5

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 5.3.3.2 Page #: 5-27 Line #: 17 Code: C
Original Comment #: 244 (OC #13)

Comment: In the future scenario, it is assumed that Waste Pits 5 and 6 are half-filled with water and that the Clearwell remains completely covered with water; please explain the basis for these assumptions.

Response: Agree. The annual rainfall is approximately equal to the annual evaporation rate at the FEMP site (reference). Waste Pit 5 stopped receiving slurried materials in 1983 and its use as a settling basin was discontinued in 1987. At that time, the wastes in Waste Pit 5 were approximately half covered with water. Due to the balance between rainfall and evaporation, the material remained half covered with water until the conduct of Removal Action 18 in 1993, during which exposed material was dredged to restore a water cover to the entire waste pit. The use of Waste Pit 6 ceased on March 11, 1985. At that time, waste materials in the pit were partially exposed above the water level. The pit remained in this state until the conduct of Removal Action Number 6 was completed in December 1990. This action involved the redistribution of exposed material in the waste pit so that the material would be completely covered by water. Based upon the balance between rainfall and evaporation and observations made over the past 8 years, one might assume that the waste materials remain covered by water. The assumption that the waste materials are only half covered by water was made for conservatism. In this state, the entire surface areas of the pits collect rainfall. Evaporation, however, only occurs over one-half of the pit surface area (i.e., that half still covered by water). Assuming that the average annual rainfall in the Cincinnati remains approximately equal to annual evaporation, this assumption will remain conservative by at least a factor of 2.

Action: The following sentence has been added to Section 5.3.3.2, page 5-27, line 17. "Since the annual rainfall in Cincinnati is approximately equal to annual evaporation, these assumptions are considered to be conservative."

OEPA COMMENTS

SECTION 5

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 5.1.2 Page #: 5-3 Line #: 1-5 Code:
Original Comment #: 245 (OC 119)
Comment: The transportation of colloidal particles of up to 2 microns is also a ground water pathway.
Response: Agree. This potential pathway has been added to the text.
Action: Line 5 has been revised to read, "The movement of water in the Great Miami Aquifer can carry dissolved contaminants and potentially, contaminants absorbed to colloidal particles of up to 2 microns."

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 5.2.1 Page #: 5-4 Line #: 18 Code: E
Original Comment #: 246 (OC 120)
Comment: Change "too" to "to."
Response: Agree.
Action: The text was changed from "too" to "to."

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 5.2.1 Page #: 5-4 Line #: 28-31 Code: E
Original Comment #: 247 (OC 121)
Comment: Edit sentence.
Response: Agree. This paragraph was intended to explain how different parent/progeny activity ratios can help to identify the FEMP process from which a waste originated. The text has been revised to achieve this objective.
Action: Section 5.2.1, page 5-4, lines 25-32 has been revised to read, "As a result of the different chemical processes used in different areas of the FEMP, there is a wide variance in terms of the presence or absence of members of the decay chain, their concentrations, and the isotopic content of wastes within the boundaries of OU1. These differences can sometimes be used to identify the FEMP process that generated a waste contained in the waste pits. For example, natural uranium ore has a U-238/Th-230 activity ratio equal to 1. Uranium that has been refined (i.e., extracted from uranium concentrate leaving behind Th-230 and other contaminants) has a U-238/Th-230 ratio much greater than 1. Waste Pit 6 exhibits a U-238/Th-230 ratio, which is much greater than 1, indicating that it was used primarily for the disposal of materials containing refined uranium. Waste Pits 3 and 5, by contrast, exhibit U-238/Th-230 ratios much less than 1. These pits were used for the disposal of raffinates from the FEMP refinery operations in Plant 2/3. These raffinates, which are the wastes remaining following the extraction of uranium from ores or uranium concentrates, contained only residual quantities of uranium, but contained all of the Th-230 which was originally present in the ore or concentrate. The low U-238/Th-230 ratio of waste materials contained in Waste Pits 3 and 5 indicates that much of the waste materials in these pits originated from the FEMP refinery."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 5.2.1 Page #: 5-4 Line #: 34 Code:
Original Comment #: 248 (OC 122)
Comment: Radon should be added to the list of relatively short lived radionuclides.
Response: Agree.
Action: Section 5.2.1, page 5-4, line 34, has been revised to read, "Exceptions are Sr-90 with a half-life of 29 years, Cs-137 with a half-life of 30 years, and Rn-222 with a half-life of 4 days."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 5.2.1 Page #: 5-5 Line #: 1-2 Code:
Original Comment #: 249 (OC 123)
Comment: These lines should be changed to, "Many geochemical reactions occur that affect constituent retardation, which affects the velocity of the contaminant movement in a medium." This change is necessary because geochemical reactions can increase or decrease retardations.
Response: Agree.
Action: Section 5.2.1, page 5-5, lines 1-2, has been revised to read, "Many geochemical reactions occur that affect constituent retardation, which affects the velocity of the contaminant movement in a medium."

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 5.3.2.3 Page #: 5-19 Line #: 18 Code:
Original Comment #: 250 (OC 124)
Comment: The GO-UGMAS model for OU5 is currently being updated to create a 3 dimensional model. The DOE decided that this was needed in order to accurately represent the vadose zone. Why was this not necessary for OU1?
Response: The three-dimensional GO/UGMAS model was developed to evaluate the potential lateral migration of major perched water contaminant plumes in the glacial overburden where significant lenses of coarse material with underlying clay layer exist. For the Operable Unit 1 area, because the thickness of till under the waste pits is relatively thin and there are no far-reaching continuous sand lenses, the most significant contaminant migration pathway is the vertical percolation to the Great Miami Aquifer. Therefore, it was determined that a one-dimensional vertical model, assuming all the contaminant mass can migrate downward, is sufficient and conservative for modeling the overburden of the OU1 Waste Pit Area.
Action: None requested.

Commenting Organization: OHIO EPA Commentor: DDAGW
Section #: 5.3.2.4 Page #: 5-21 Line #: 23 Code:
Original Comment #: 251 (OC 125)
Comment: How will the current OU5 model improvements affect the OU1 model? Are the input variables and grid constructions consistent between the operable units?
Response: Operable Unit 1 RI utilizes the previously developed groundwater model for the Great Miami Aquifer contaminant fate and transport modeling. The Operable Unit 5 model improvements include an increased number of vertical layers, larger model area, and modified hydraulic parameters. The improved groundwater flow and transport model will be used in the Operable Unit 5 RI/FS, Operable Unit 2 Feasibility Study, as well as

the Operable Unit 1 Feasibility Study for selecting final remedial alternatives. Although the predicted contaminant concentrations may be different, the improved modeling results are not expected to affect the conclusions of current Operable Unit 1 RI baseline risk assessment (i.e., the risk under the no action alternative is unacceptable). This approach was presented to representatives from both the U.S. EPA and Ohio EPA at the June 1993 Technical Information Exchange meeting.

Action: None requested.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 5.3.2.4 Page #: 5-22 Line #: 19-23 Code: M
Original Comment #: 252 (OC 126)

Comment: The sole attribution of current uranium contamination of groundwater beneath OU1 to leakage via well casings is unsubstantiated. Substantial potential exists for "direct" leakage from Waste Pit 3 (where the till is very thin), or from other waste pits via relatively permeable heterogeneities. The field data suggest that there will be a continuum of uranium migration into the Great Miami Aquifer from the waste pits until the maximum concentrations are achieved. Different arrival times and downward migration rates are associated with different thickness and permeabilities of the media beneath the pits, and with the different vertical hydraulic gradients that drive downward fluid movement.

Response: Agree. As shown in Case 4 of Figure D-3-3 and Table D.3-12, contaminants with a high source concentration and low retardation are currently present in the Great Miami Aquifer from both the direct leak and natural migration scenarios. This concept is explained in the revised text presented in response to Comment Number 280 and 281. Pit-specific hydrogeological conditions (e.g., surface coverage and thicknesses of underlying layers) and contaminant source leachate concentrations were utilized to determine the time-varying contaminant loading rates from each waste pit in the groundwater model. Because of differing pit construction, the mass loading rates and arrival times of contaminants to the Great Miami Aquifer vary from pit-to-pit. The Great Miami Aquifer groundwater model is then used to incorporate and simulate the pit-specific loadings from all the pits simultaneously. The modeling results represent the accumulated future impacts from the entire Operable Unit 1 Waste Pit Area. Comments 252, 280, 281, 282, 283, 285, 286, 287, and 288 all relate to the use of both the direct leak and natural migration scenarios. All of these comments are inter-related and are addressed by the responses to Comments 252, 280, and 281.

Action: Section 5.3.2.4, page 5-22, line 30 has been revised to read "Pit-specific hydrogeological conditions (e.g., surface coverage and thicknesses of underlying layers) and contaminant source leachate concentrations were utilized to determine the time-varying contaminant loading rates from each waste pit in the groundwater model. Because of differences in waste pit construction, the mass loading rates and arrival times of contaminants to the Great Miami Aquifer vary from pit-to-pit. The Great Miami Aquifer groundwater model is then used to incorporate and simulate the pit-specific loadings from all the pits simultaneously. The modeling results represent the accumulated future impacts from the entire Operable Unit 1 Waste Pit Area." The above text has been inserted immediately preceding the text inserted in response to Comment Number 280.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 5.3.2.5 Page #: 5-25 Line #: 31 Code: C
Original Comment #: 253 (OC 127)

Comment: There appears to be a discrepancy between the reported retardation factor used for the Great Miami aquifer in the text (factor = 12) as compared with the appendix, specifically Tables D.3-4 and D.3-11 in which a value of 10.1 is reported for U-238. A value of 10.1 is the value for the vadose (ODAST) modeling, whereas a value of 12 is the nominal value used in the saturated (SWIFT) modeling.

Response: Agree. Table D.3-4 presents the retardation factors for the vadose zone. A value of 10.1 for U-238 is correct in this table. Table D.3-11 presents the retardation factors used in modeling the Great Miami Aquifer using SWIFT. The retardation factors for U-234, U-235, and U-238 were incorrectly reported in this table.

Action: The values for U-234, U-235, and U-238 in Table D.3-11 have been changed from 10.1 to 12.

USEPA COMMENTS

SECTION 6

5134

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.0 (GENERAL) Page #: NA Line #: NA Code:
Original Comment #: 254 (OGC 3)
Comment: The Baseline Risk Assessment (RA) frequently refers to U.S. Environmental Protection Agency (U.S. EPA) Region V guidance or direction. However, this guidance or direction is never adequately cited. The RA should be revised to cite references for all U.S. EPA Region V guidance used during the RA.
Response: Agree. This guidance is difficult to cite because it is usually verbal.
Action: Reference to EPA guidance which cannot be specifically cited was removed from the text. "Region V guidance" will no longer be used as a reference.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.0 Page #: NA Line #: NA Code:
Original Comment #: 255 (OGC 1)
Comment: Section 6.0 should be revised to reflect, as necessary, the general and specific comments regarding Appendix E as a result of general and specific comments to the Operable Unit 1 RI.
Response: Agree.
Action: Changes to Appendix E were incorporated into Section 6.0 as applicable.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.0 Page #: 6-1 Line #: 29 & 30 Code:
Original Comment #: 256 (OSC 1)
Comment: These lines suggest that a summary of the ecological assessment is found in Appendix E, Section E.5.4. This is not true; Section E.5.4 is a summary of the risk characterization. These lines should be revised to remove any reference to Appendix E.
Response: Agree.
Action: The referenced sentence has been deleted from page 6-1.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.3 Page #: 6-4 Line #: 31 Code:
Original Comment #: 257 (OSC 2)
Comment: This line states that the RCRA cap over Waste Pit 4 includes, in part, a 4-foot thick clay cover. However, at several points in Appendix E, Section E.3, this clay cover is described as being 6 feet thick. The RA should be revised to consistently and accurately state the thickness of the clay cover over Waste Pit 4.
Response: Agree. According to Section 1.2.1.4, Waste Pit 4 has 6 feet of cover material.
Action: The reference to clay depth on page 6-4, line 31, has been changed to "(a 6-foot-thick clay cover...)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.5 Page #: 6-7 Line #: 13 Code:
Original Comment #: 258 (OSC 3)
Comment: This line reads in part "... results were calculated based..." However, the characterization of the results, rather than the calculation, is being referred to. Therefore, the line should be revised to read in part "...results were characterized based..."
Response: Agree.
Action: The text on page 6-7, line 13, has been changed from "... results were calculated based..." to "... results were characterized based..."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.5.2 Page #: 6-8 Line #: 6 Code:
Original Comment #: 259 (OSC 4)
Comment: This line reads in part "The total chemical risk is from..." The risks being referred to are carcinogenic. Therefore, the line should be revised to read in part "The total ILCR is..."
Response: Comment acknowledged.
Action: This section of the risk assessment was re-written in total. The referenced text was deleted.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.5.3 Page #: 6-9 Line #: 2 Code:
Original Comment #: 260 (OSC 5)
Comment: This line reads in part "...majority to the hazard index." This wording is awkward. The line should be revised to read in part "...majority of the noncarcinogenic risk."
Response: Comment acknowledged.
Action: This section of the risk assessment was re-written in total. The referenced text was deleted.

Commenting Organization: U.S. EPA Commentor: Van Leeuwen
Section #: 6.5.5 Page #: 6-10 Line #: Code: (M)
Original Comment #: 261
Comment: I believe that we agreed that the proper approach for radionuclides was to subtract natural background levels and calculate the risk for the residual. This methodology applies to the radionuclides only.
Response: Disagree. The approach suggested in this comment contradicts the approach that EPA Region V agreed to. Region V's position is documented in a July 30, 1992, memo. Further discussion is provided in Comment 22 of the Response to Comments - Risk Assessment Work Plan Addendum, February 1992 issued by US DOE in June 1992. The Operable Unit 1 Risk Assessment will present site-related risks (including the background component) and background risks separately. This is consistent with the approved Site Wide Characterization Report and Operable Unit 4 RA documents.
Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.5.5 Page #: 6-10 Line #: 34 Code:
Original Comment #: 262 (OGC 2)
Comment: Section 6.5.5 concludes by stating that the risk assessment (RA) has a conservative bias based on the results of the background risk calculations. While this may be true, the statement is misleading. A review of Tables 6-5 and 6-6 reveals that significant risks [carcinogenic (1×10^{-2}) and noncarcinogenic (hazard index [HI] = 30)] remain after subtracting the risks associated with background contaminant concentrations from the total risks based on total Operable Unit 1 contaminant concentrations. Section 6.0 should be revised to clearly state the conclusion.
Response: Comment acknowledged.
Action: This section of the risk assessment was re-written in total. The referenced text was deleted.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.0 Page #: 6-18 Line #: TABLE 6-1 Code:
Original Comment #: 263 (OSC 6)

Comment: The total risk for all media for the visitor is presented as 3×10^{-4}. However, the sum of the radiocarcinogenic and chemical carcinogenic risks for the visitor is 9×10^{-4}. Therefore, the value for the total risk for all media for the visitor should be changed from 3×10^{-4} to 9×10^{-4}.

Response: Agree. There were some inconsistencies in the summary tables.

Action: Risks assessment calculations were performed and results presented in linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate results.

OEPA COMMENTS

SECTION 6

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 6.2 Page #: 6-3 Line #: 5-7 Code: C
Original Comment #: 264 (OC 128)

Comment: With the development of pit by pit CPCs does DOE intend to develop pit specific remediation goals? Based upon the lack of characterization data below the pits, such pit specific PRGs would seem inappropriate.

Response: Agree. We do not intend to calculate PRGs for each waste pit. The rationale for doing CPC screening and modeling on a pit-by-pit basis was to accurately assess waste concentrations for use in the Feasibility Study.

Action: The following statement has been added to 6.2: "This approach was chosen to accurately assess waste concentration for use in the Feasibility Study. It is not intended to be used for developing pit-specific preliminary remediation goals."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 6.3 Page #: 6-4 Line #: 30-34 Code: C
Original Comment #: 265 (OC 129)

Comment: DOE's assumption that the pits 1, 2, and the burn pit are covered with soil rather than waste would not seem to agree with previous portions of the document which state that waste was continually transferred from pit to pit between 1, 2 and 3. Figure 4-26 contradicts this assumption showing the highest FIDLER measurements on top of the waste pits. The lack of surface samples from within these pit may result in a significant under estimation of risks. Additionally, the assumption that vegetation will cover the pits seems questionable, since vegetation does not completely cover these pits currently.

Response: Disagree. FIDLER measurements are high because soil does not block gamma radiation. Waste pits 1, 2, and 3 are covered with adequate soil to support vegetative cover and there currently is partial vegetative cover over the waste pits. Waste Pits 1, 2, 3 and the Burn Pit have 70 percent vegetative cover at this time, and there is no reason why re-vegetation should not continue.

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 6.5.4 Page #: 6-9 Line #: 14-19 Code: C
Original Comment #: 266 (OC 130)

Comment: DOE should provide data to support its contention that sufficient water is not available to provide a potable water supply. DOE's choice of background wells for the perched groundwater support the fact that the perched aquifer can provide sufficient water for residential usage. DOE should provide data to support the rate at which water could be provided by the perched aquifer and a rate acceptable for residential usage.

Response: Agree. DOE did assess perched water as a possible drinking water source for the resident farmer but did not include it in other pathways. It was presented as a risk that could be added to the resident farmer scenario. It was not included in the total risks because the Great Miami Aquifer is a more likely water source, since it is easily accessible and provides a copious supply of good quality water.

Action: The first sentence in the third paragraph of Section 6.5.4 (now section 6.5.2) was replaced with: "Risks associated with using groundwater from the perched aquifer for drinking and domestic purposes are evaluated in Appendix E. The results of this evaluation are presented concurrently with risks to the future on-property farmer using

the Great Miami Aquifer." Use of perched water for household use was evaluated for the on-property resident farmer and presented as an additional receptor.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 6.7.2 Page #: 6-14 Line #: 6-14 Code: C
Original Comment #: 267 (OC 131)
Comment: This paragraph seems to make light of the significant data gaps within the RI database and their potential impact on the risk assessment. The paragraph does not even discuss the lack of surface soil data from within the waste pits. This lack of data could potentially have a significant negative bias on the risk assessment (see Figure 4-26). Additionally, the lack of any VOC or Semi-VOC data for surface soils (see pg. E-1-13) could significantly negatively bias the risk assessment.
Response: Agree.
Action: The last sentence of this paragraph has been revised to state, "These specific data limitations are of low to moderate significance in introducing negative bias to the risk assessment results."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 6.0 Page #: 6-18 Line #: TABLE 6-1 Code: E
Original Comment #: 268 (OC 132)
Comment: The total for all media for the visitor should be "9.9 X 10^{-4}" not "3 X 10^{-4}."
Response: Comment acknowledged. This receptor was replaced by the "groundskeeper" receptor to include soil contact and incidental ingestion, and for consistency with the OU4 baseline risk assessment.
Action: Risk assessment calculations were performed and the data presented in linked spreadsheets to eliminate entry errors. These spread sheets were extensively checked to assure accurate results.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 6.0 Page #: 6-25 Line #: TABLE 6-7 Code: C
Original Comment #: 269 (OC 133)
Comment: The table understates the potential affects of the database adequacy. See previous comment concerning database adequacy. The magnitude of this uncertainty is at a minimum moderate if not more based on the potential for overlooking CPC and underestimating concentration source terms.
Response: Agree.
Action: The magnitude of uncertainty associated with the adequacy of the database in Table 6-7 (now 6-11) was changed from "low" to state "low to moderate."

USEPA COMMENTS

SECTION 7

Commenting Organization: U.S. EPA Commentor: Van Leeuwen
Section #: 7.7.2.1 Page #: 7-23 Line #: Code: (C)
Original Comment #: 270 (OC 2)
Comment: EPA does not consider 10-4 a discrete limit; risks below that level may be unacceptable depending on site-specific conditions.
Response: The NCP states this is generally acceptable.
Action: Change text. Replace "acceptable " with "generally acceptable" in line 29 and insert the following at the end of the line: "...; while at some sites risks less than 10^{-4} may not be acceptable."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 7.7.2.1 Page #: 7-24 Line #: 21 to 24 Code:
Original Comment #: 271 (OSC #113)
Comment: These lines state preliminary remediation goals (PRG) were calculated to ensure that cumulative site-wide risk does not exceed 10^{-4}. However, carcinogenic risks from exposure to soil and groundwater were presented separately and PRGs for soil and groundwater were estimated separately. Therefore, the risks and PRGs do not consider the cumulative effects of exposure to both soil and groundwater. The risks and PRGs should be revised to consider cumulative effects from exposure to both soil and groundwater.
Response: PRGs were developed: (a) to be protective of human health; and (b) to comply with ARARs. As suggested by Part B of RAGs, a risk-based determination was made and compared with ARARs to ensure that both threshold criteria would be met. A risk goal of 10^{-6} and a HI of 0.2 were used to ensure that the PRGs would be protective given exposure to multiple media (e.g., groundwater, soil, sediment) and to multiple contaminants. By using these points of departure (10^{-6} and 0.2), it is judged that an alternatives combined risk will remain less than 10^{-4}. While the tables of PRGs presented in Section 7 do display a column representing 10^{-4} risk, this is done for comparison purposes and is not intended as the PRG. Rather, the PRG used in evaluating alternatives in the FS is the lower of the 10^{-6} or 0.2 HI column and the ARAR column in keeping with Part B guidance.
Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 7.7.2.1 Page #: 7-26 Line #: 20 to 22 Code:
Original Comment #: 272 (OSC #114)

Comment: These lines summarize the hypothesized exposures for the off-property farmer. The list of potential exposures does not include exposure to groundwater. On the other hand, Appendix E (the complete baseline risk assessment) does include exposure to groundwater among the potential exposures for the off-property farmer. These lines (and the relevant PRGs) should be revised to include exposure to groundwater for the off-property farmer.

Response: PRGs are established on a media basis. In establishing PRGs for soils, several potential receptors were reviewed to ensure that the PRGs established are health protective. This review of numerous receptors is necessary since a given source medium (e.g., soil) can impact the receptor via a number of exposure routes/pathways (e.g., air, surface water, dermal contact, direct radiation, incidental ingestion). There are two reasons for not including groundwater as a transfer media for soils. First, experience has shown that the groundwater exposure route is quite small in comparison to the risk from the conservative assumptions made for air transport and other exposure routes. Second, groundwater as a medium is addressed by separate PRGs which are established on 10^{-6}/0.2 risk and hazard indices. By using these departure points, there is a high degree of confidence that a remedial alternative which meets all PRGs will be health protective for all combined media, exposure routes, and contaminants.

Action: Insert the following at the end of line 22: "Groundwater PRGs were also developed for the off-property farmer (see Section 7.7.7.4)."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 7.7.2.3 Page #: 7-27 Line #: 12 Code: C
Original Comment #: 273 (OC #14)

Comment: It is stated that PRGs for soil were only derived for those carcinogenic CPCs exhibiting an ILCR greater than 10^{-6} to the on-property farmer, under a current source term scenario as defined in the baseline risk assessment. It seems that the baseline risk assessment only provides for on-property farmers under future source term, future land use conditions; please explain.

Response: Agree. The report states "current source term" rather than "future." In reality, Preliminary Remediation Goal(s) were initially developed for all constituents of potential concern. The draft final document appropriately lists only those constituents having an Incremental Lifetime Cancer Risk of 10^{-6} or greater or a Hazard Index of 0.2 or greater.

Action: All Preliminary Remediation Goal(s) tables were revised to reflect the selection of Constituents of Concerns based on the results of the baseline risk assessment for the on-property farmer.

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 7.7.2.3 Page #: 7-27 Line #: 22 Code: E
Original Comment #: 274 (OC #15)

Comment: It is stated that the PRGs presented in Table 7-10, Development of Preliminary Remediation Goals - Operable Unit 1, consider contributions of radioactive progeny to be an integral part of the total risk from the parent nuclide; this table does not present PRGs.

Response: Agree. This is an editorial error. The sentence should refer to Table 7-11.

Action: The table number in line 22 of page 7-27 was revised to Table 7-11.

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: 7.7.2.3 Page #: 7-29 Line #: 28 Code: C
Original Comment #: 275 (OC #16)

Comment: Please clearly define the recreational user, specify all of the assumptions made, and compare the Operable Unit 1 recreational user to the passive recreational receptor considered for OU4 PRG development.

Response: The assumptions used for the "recreational user" in Operable Unit 1 are the same as those referred to as the "passive recreational receptor" in the Operable Unit 4 Feasibility Study Report. The Operable Unit 4 Feasibility Study is currently being revised based on EPA comments. Operable Unit 1 is tracking these revisions and will provide consistency between the two documents in the draft final Remedial Investigation Report.

Action: The assumptions and terminology have been changed to be consistent with Operable Unit 4 in the naming of receptors used in PRG development.

OEPA COMMENTS

SECTION 7

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 7.0 (GENERAL) Page #: Line #: Code: C
Original Comment #: 276 (OC 4)

Comment: The deficiencies in organic data from the pits and the lack of data from beneath the pit will significantly impair the development of PRGs for soils below the pit. The document does not discuss how DOE intends to address these deficiencies during the development of PRGs. DOE should address this problem within the RI.

Response: Acknowledged. The fact that there are limited organic analyses from Waste Pits 5, 6 and the Clearwell is addressed in Table 7-7, DATA LIMITATIONS AND RECOMMENDED ACTIONS. As discussed in the table, "Organic results were available from the CIS for both waste material and leachate. Organic data collected under the RI was intended to confirm the data set available from the CIS, thereby increasing confidence in any decision made. The level of confidence is high for decision making for treatment options based on the extensive treatability studies currently being conducted on all OU1 waste."

With regard to the perceived lack of data beneath the waste pits, this data limitation is also discussed in Table 7-7. As stated in the Table, "DOE and U.S. EPA reached a consensus that sampling of the soils beneath the waste pits was deemed impractical. Any attempt to collect samples by boring through the bottom of the pits ran the risk of releasing pit leachate into the Great Miami Aquifer. Transport modeling is used to establish the movement of contaminants from the waste pits into the soil beneath the pits. This allows the estimation of the quantity of contaminants beneath the pits and their volume to a sufficient level of confidence to meet the objectives of the detailed analysis of alternatives."

Finally, with regard to preliminary response goals (PRGs), as stated in the Risk Assessment Guidance for Superfund, "Preliminary Remediation Goals are based initially on readily available chemical-specific ARARs (e.g., maximum contaminant levels (MCLs) for drinking water). Preliminary remediation goals for individual substances are refined or confirmed at the conclusion of the baseline risk assessment." In short, PRGs are established based upon the constituents present and the remediation "goal" required to be protective of human health and the environment and to comply with ARARs. As stated in Table 7-7, "While additional samples from beneath the pits might slightly increase the confidence in the baseline risk assessment, conservative assumptions were used to ensure that risks to potential receptors were not underestimated." Thus, PRGs can be readily established for soils beneath the pits.

Action: None.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 7.0 Page #: 7-1 Line #: 9 Code: E
Original Comment #: 277 (OC 134)

Comment: The "Contaminant Fate and Transport" topic is not noted as a bulleted item.

Response: Acknowledged.

Action: A bullet has been added after line 9 on page 7-1 as follows: "Fate and transport of contaminants."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: 7.3.1 Page #: 7-6 Line #: 15-18 Code: C
Original Comment #: 278 (OC 135)

Comment: DOE seems to be downplaying the role of organics contaminates within the waste pits. The lack of valid data to support the nature and extent should be noted in this paragraph.

Response: This section is intended to discuss the nature and extent of contamination in the surface and subsurface soils of Operable Unit 1. Sufficient data is available for characterizing these media in all areas except directly beneath the pits. Sampling was not possible beneath the pits for safety reasons. This was fully explained in Table 7-7. Conservative assumptions have been made in transport modeling using characterization data from the pits as a source term; however, DOE acknowledges the fact that vertical infiltration of leachate from the pits is the most likely route of contaminant transport.

Action: Add the following after the period in line 5 on page 7-6: "No samples could be safely collected from directly beneath the waste pits, the most likely route for contaminant movement from the pits to the aquifer."

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: 7.0 Page #: 7-58 Line #: TABLE 7-10 Code: C
Original Comment #: 279 (OC 136)

Comment: Why are no PRGs presented in Table 7-10 for air (e.g., surface radiation)?

Response: If the interest is in air as a media, it is appropriate to remediate air releases by addressing the source. If direct radiation is the issue, this is addressed in two ways. First, direct radiation from radionuclides in surface soils is considered as one exposure route in the calculation of surface soils PRGs. Second, direct radiation is raised as an ARAR-based limit for the waste materials during the development of remedial action objectives, as noted in Table 7-15. Air as a transport mechanism is considered in the development of soil PRGs.

Action: None.

USEPA COMMENTS

APPENDIX D

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D Page #: NA Line #: NA Code:
Original Comment #: 280 (OGC #9)

Comment: Insufficient information about the assumptions and applications of the direct leak loading scenario is presented in the RI report. Furthermore, it is unclear how this scenario relates to the other release scenario presented in later sections of Appendix D. This missing information places considerable doubt on the model's ability to predict future contaminant concentrations and diminishes the usefulness of the model's results, which should be used to predict relative rather than absolute future conditions. Additional information concerning the relationship between the two release scenarios and calibration should be provided.

Response: Agree. The text has been revised to (1) provide additional information on the direct leak loading scenario and (2) clarifies how this scenario relates to the natural migration scenario presented in Appendix D. Comments 252, 280, 281, 282, 283, 285, 286, 287, and 288 all relate to the use of both the direct leak and natural migration scenarios. All of these comments are inter-related and are addressed by the responses to Comments 252, 280, and 281.

Action: The following text has been inserted in Section 5.3.2.4, page 5-22, line 30: "The Operable Unit 1 groundwater fate and transport model contains two release scenarios; (1) natural migration of waste pit leachate through glacial overburden and (2) direct leakage of pit leachate to the Great Miami Aquifer via some form of direct channel (eg., perched water flowing to the Great Miami Aquifer via the casing of a leaking well). During early calibration of the fate and transport model, it was determined that the concentration of contaminants in the Great Miami Aquifer, in an area south east of Waste Pit 4, could not be accounted for using the natural migration scenario alone. To do so required that the glacial overburden be approximated by a media approaching the permeability of sand and that chemical retardation of contaminants be assumed to approach zero. The direct leakage scenario was added to the model to account for these elevated contaminant concentrations in a localized area. Ten cells in the vicinity of Waste Pit 4 and the Burn Pit were used to model the potential contribution due to leaky wells in the vicinity of Waste Pit 4 and the historical lack of a cover over Waste Pit 4 and the Burn Pit. The addition of this direct leakage scenario allowed the model to accurately represent current contaminant concentrations in the Great Miami Aquifer while using realistic characteristics for the glacial overburden and contaminants. The contribution from the 10 cells was assumed to end concurrent with the covering of Waste Pit 4 and the Burn Pit and the plugging of 8 leaking wells in the vicinity of Waste Pit 4.

Beyond having the same source, the two release scenarios provide separate distinct source terms within the fate and transport model. During 30 of the first 40 years of the model simulation, the model includes a contribution from the direct leakage scenario. The contribution from the natural migration scenario begins on the initial day of the model simulation and continues for all future time. Using the natural migration scenario, uranium reaches its maximum concentration beneath the waste pits, 32 ppm, in 500 years. Even if the direct leakage scenario were assumed to continue throughout the entire 500 year period, the ultimate maximum concentration would be increased by less than 1 ppm uranium. Thus, the direct leakage scenario provides a method to model current contaminant concentrations in the Great Miami Aquifer but has little impact on the maximum contaminant concentrations which will eventually occur as a result of the natural migration scenario."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D Page #: NA Line #: NA Code:
Original Comment #: 281 (OGC #10)

Comment: The modeling approach uses the concept of "direct leak" cells that introduce contaminants into the Great Miami Aquifer for a period of 30 years. The text does not provide sufficient information to justify this concept. In addition, the text does not present any information explaining why direct leak cells stop introducing contaminants into the Great Miami Aquifer after 30 years. This approach appears to underestimate the future contaminant loading rate to the Great Miami Aquifer. U.S. DOE should provide specific information to address these issues.

Response: Agree the text in Section D.3.4.6 was revised to (1) justify the "direct leak" concept, (2) explain why direct leak cells stop introducing contaminants into the Great Miami Aquifer after 30 years and (3) explain why stopping the direct leak cells does not significantly underestimate the ultimate contaminant concentration in the Great Miami Aquifer. Comments 252, 280, 281, 282, 283, 285, 286, 287, and 288 all relate to the use of both the direct leak and natural migration scenarios. All of these comments are inter-related and are addressed by the responses to Comments 252, 280, and 281.

Action: Section D.3.4.6, page D-3-17, lines 17-27 were revised to read, "The combined source term from the direct leaks and natural migration scenarios are illustrated in Figure D.3-3. The figure depicts five possible cases of the direct leak and natural migration scenario source terms using different combinations of contaminant source concentration and contaminant retardation factors. Potential CPCs are categorized into one of these five cases as presented in Table D.3-12.

The Operable Unit 1 groundwater fate and transport model contains two release scenarios; (1) natural migration of waste pit leachate through glacial overburden and (2) direct leakage of pit leachate to the Great Miami Aquifer via some form of direct channel (e.g., perched water flowing to the Great Miami Aquifer via the casing of a leaking well). During early calibration of the fate and transport model, it was determined that the concentration of contaminants in the Great Miami Aquifer, in an area south east of Pit 4, could not be accounted for using the natural migration scenario alone. To do so required that the glacial overburden be approximately a media approaching the permeability of sand and that chemical retardation of contaminants be assumed to approach zero. The direct leakage scenario was added to the model account for these elevated contaminant concentrations in a localized area. Ten cells in the vicinity of Waste Pit 4 and the Burn Pit (Figure D.3-14A) were used to model the potential contribution due to leaks wells in the vicinity of Waste Pit 4 (Table D.3-13) and the historical lack of a cover over Waste Pit 4 and the Burn Pit. The addition of this direct leakage scenario allowed the model to accurately represent current contaminant concentrations in the Great Miami Aquifer while using realistic characteristics for the glacial overburden and contaminants. The contribution from the 10 cells was assumed to end concurrent with the covering of Waste Pit 4 and the Burn Pit and the plugging of 8 leaking wells in the vicinity of Waste Pit 4. The leak is deemed to have started at year 10 and persisted for 30 years to year 40. This overall calibration scheme is illustrated in Figure D.3-3. In effect, five possible scenarios are created (see Figure D.3-3) that depicted different combinations of the direct leak source term and vadose zone breakthrough. Potential CPCs are categorized into one of these five cases as presented in Table D.3-12.

Case 1 illustrates the case of a potential CPC which has a direct leak to the Great Miami Aquifer and also has a significant loading to the Great Miami Aquifer through the vadose zone (calculated by One-Dimensional Analytical Solute Transport [ODAST]) prior to 1,000 years but separated in time from the direct leak. Case 1 behavior is typical of uranium. Case 2 is similar to Case 1 except that the future releases to the aquifer are insignificant (i.e., concentrations are less than the 10^{-7} cancer risk or 0.1 Hazard Quotient criterion). Case 2 behavior is typical of barium. Case 3 illustrates the case of a CPC which has some current contamination but whose retardation factor is so high that any loading through the vadose zone would not occur until after 1,000 years. Case 3 behavior is typical of thorium-230. Technetium-99 behavior is unusual and is illustrated by Case 4. Technetium-99 is very mobile and some quantity is expected to have already migrated through the vadose zone. However, to approximate the concentrations found, it is also necessary to have an additive direct leak block. Finally, Case 5 illustrates the case of the many screened-out CPCs that are determined by the procedure given in Figure D.3-2 to not pose any risk. SWIFT modeling is required only for CPCs that fall into Case 1 or Case 4, or Cases 2 and 3 when a contaminant already in the Great Miami Aquifer can reach the fenceline.

Beyond having the same source, the two release scenarios provide separate distinct source terms within the fate and transport model. During 30 of the first 40 years of the model simulation, the model includes a contribution from the direct leakage scenario. The contribution from the natural migration scenario begins on the initial day of the model simulation and continues for all future time. Using the natural migration scenario, uranium reaches its maximum concentration beneath the waste pits, 32 ppm, in 500 years. Even if the direct leakage scenario were assumed to continue throughout the entire 500 year period, the ultimate maximum concentration would be increased by less than 1 ppm uranium. Thus, the direct leakage scenario provides a method to model current contaminant concentrations in the Great Miami Aquifer but has little impact on the maximum contaminant concentrations which will eventually occur as a result of the natural migration scenario." Figure D.3-14A and Table D.3-13 have been added (attached).

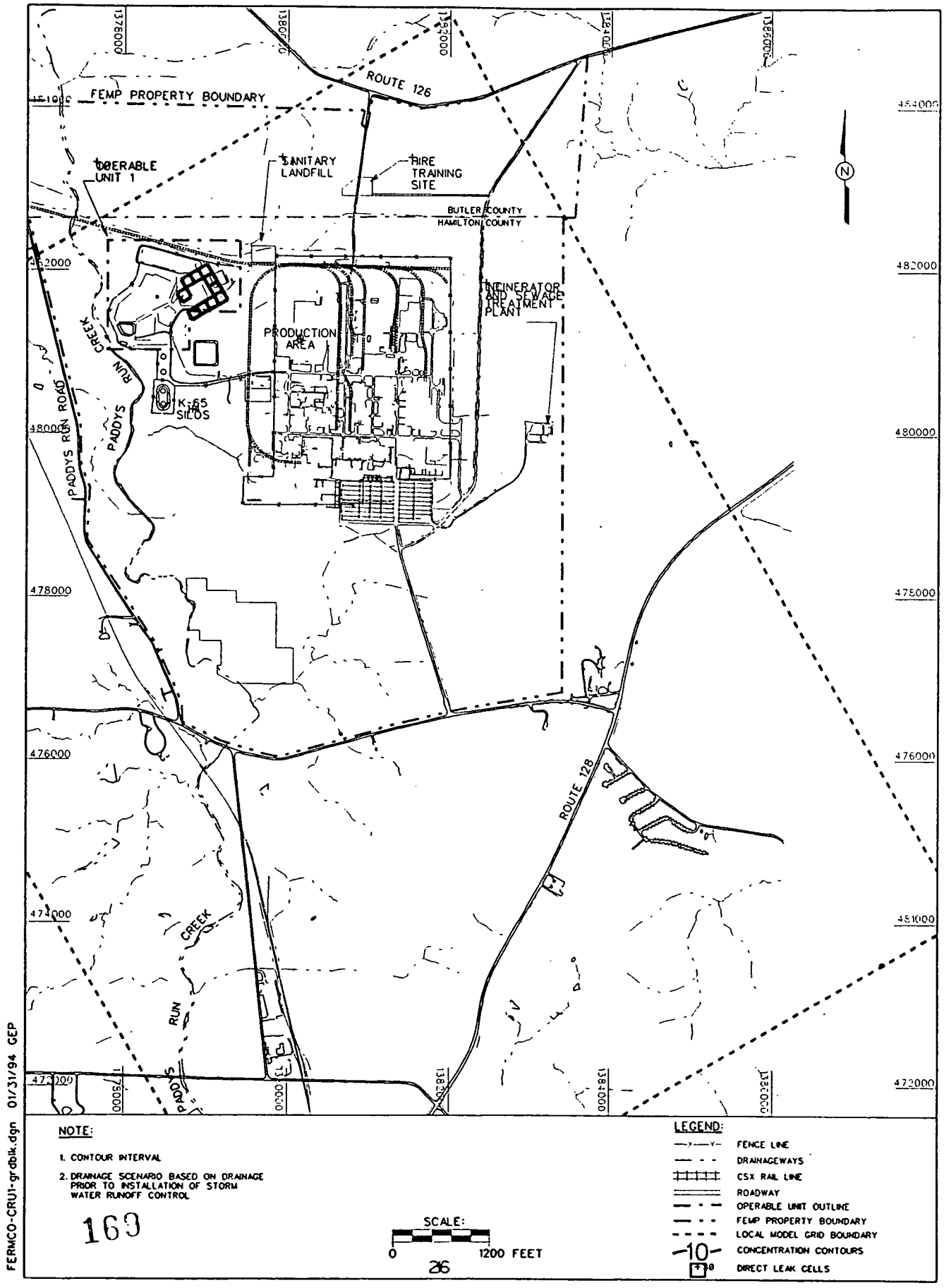

FIGURE D.3-14A LOCATIONS OF DIRECT LEAK CELLS

TABLE D.3-13

PLUGGED WASTE PIT MONITORING WELLS

Well Number	Depth (ft)	Riser Material	Installation Date	Plugged Date	Reason for Plugging
1019	10	PVC	02/**/85	07/23/92	Failed casing joints (camera surveyed).
1021	10	PVC	02/**/85	08/31/92	Failed casing joints (camera surveyed).
1022	11.35	PVC	02/**/85	08/18/92	Failed casing joints (camera surveyed).
2019	72	PVC	02/**/85	07/30/92	Failed casing joints (camera surveyed).
2021	72	PVC	02/13/85	09/10/92	Failed casing joints (camera surveyed).
2022	83	PVC	02/14/85	08/26/92	Failed casing joints (camera surveyed).
3019	123	PVC	02/06/85	08/06/92	Failed casing joints (camera surveyed).
3084	116	Stainless	11/14/87	09/30/93	Failed casing joints and bore-hole seal (camera surveyed).

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.3.4.6 Page #: D-3-17 Line #: 21 Code:
Original Comment #: 282 (OSC #115)

Comment: The modeling approach uses the concept of "direct leak" cells that place contaminants into the aquifer and represent current conditions. The text states that these direct leak cells represent areas where PVC casings may have deteriorated or where conditions may have been different from those currently found at Operable Unit 1. The RI report does not provide enough information about either of these two possibilities. The RI should state which specific PVC wells have the potential to leak. In addition, the year each well was installed should be provided. Furthermore, the RI should include any testing results that support the hypothesis of well deterioration, including the presence of any geochemical environment that might cause this deterioration.

Response: Agree. Information about leaking wells in the Waste Pit Area that were plugged have been provided. The dates of installation, plugging, and reasons of plugging have also been provided. Capping of the pits also reduced the contaminant migration rate to the Great Miami Aquifer.

Action: Section D.3.4.6, page D-3-17, lines 17-27 have been rewritten and Table D.3-13 has been added. For specific text revisions, see response to Comment 281.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.3.4.6 Page #: D-3-17 Line #: 21 Code:
Original Comment #: 283 (OSC #116)

Comment: The text also suggests that direct leak cells could also result from conditions that were different from those currently existing at Operable Unit 1. DOE should provide information about any past conditions that would have resulted in a direct leak to the Great Miami Aquifer and what has changed to stop this conceptual direct leak.

Response: Agree. Information about leaking wells in the Waste Pit Area that were plugged is now provided. The dates of installation, plugging, and reasons of plugging are presented in the revised Table D.3-13. Covering of the pits also reduced the contaminant migration rate to the Great Miami Aquifer. Conditions which might result in direct leak cells are now explained in the text.

Action: Section D.3.4.6, page D-3-17, lines 17-27 has been rewritten and Table D-3-13 has been added. For specific text revisions, see response to Comment 281.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.3.7.2 Page #: D-3-29 Line #: 8 Code:
Original Comment #: 284 (OSC #117)

Comment: The calibration information provided in the RI report is incomplete and insufficient to support the statement that calibration can be considered complete. The text provides a brief discussion for each of the four contaminants of potential concern (CPC) and provides results for only one or two wells. The model's calibration should consider all wells within the Operable Unit 1 area. A table presenting all of the calibration information pertinent to the model should be provided.

Response: Agree. The wells used for comparing the measured and simulated contaminant concentrations usually have higher concentrations than other wells in the Waste Pit Area and, therefore, are preferred targets for comparisons. A figure showing the simulated current U-238 concentration contours at the 40th year and all the measured current concentrations have been added to the report to demonstrate the overall modeling results in the entire Waste Pit Area.

Action: Section D.3.7.2, page D-3-29, lines 29-33 have been revised to read, "For uranium, a direct leak source term of 0.2×10^{-3} lbs/day was added through the 10 cells within Operable Unit 1 for the 30 year block of time. This loading rate resulted in modeled uranium concentration which closely approximate those measured in the Great Miami Aquifer. Figure D.3-14C shows the modeled U-238 concentration contours in the vicinity of Operable Unit 1. A comparison of the modeled versus measured valves for the seven wells used to calibrate the model in the vicinity of Waste Pit 4 are shown in Table D.3-18. Figure D.3-14C and Table D.3-18 (copies attached) have been added to the document.

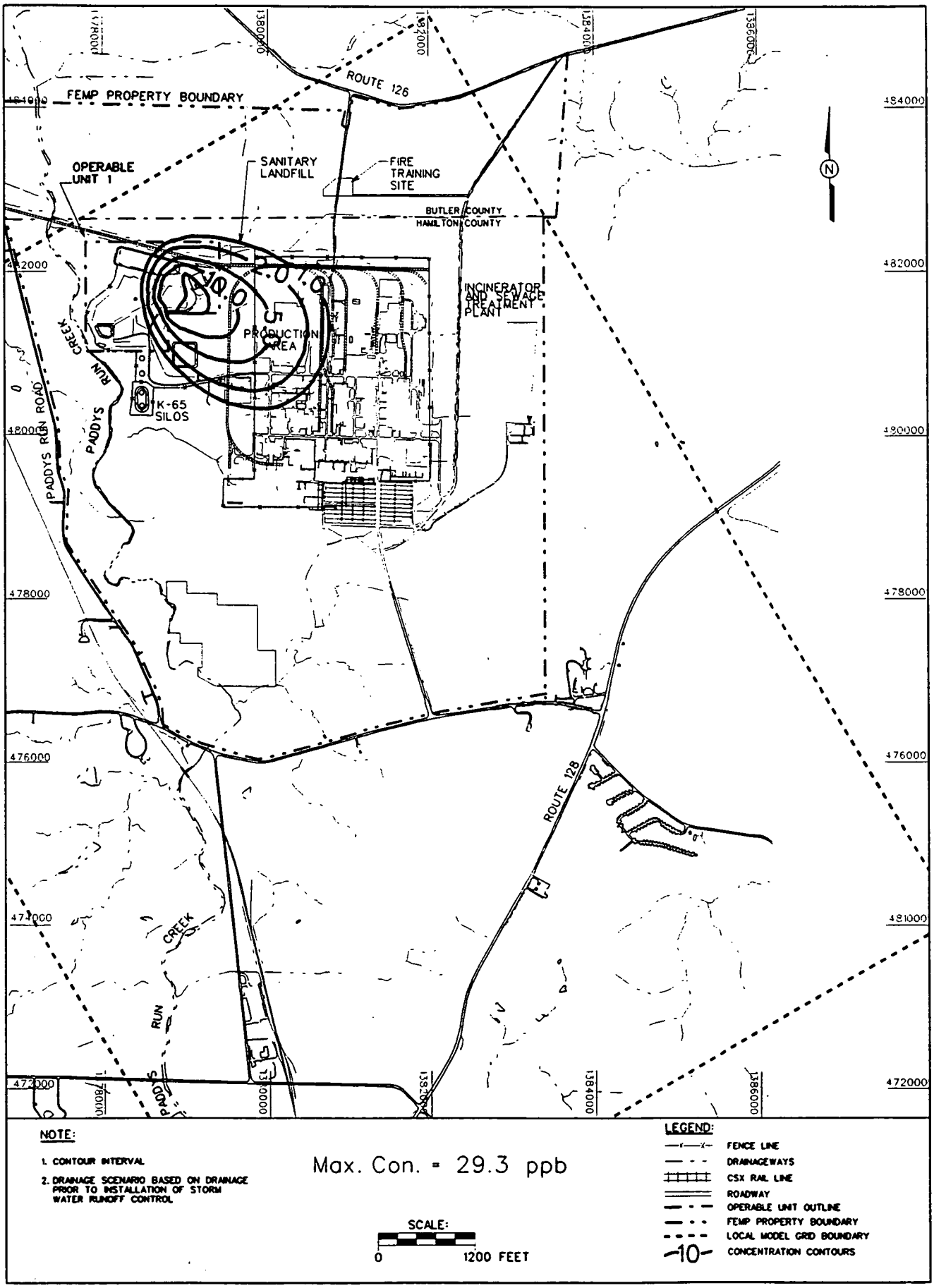

FIGURE D.3-14C. SIMULATED U-238 CONCENTRATION CONTOURS LAYER 1 AT 40 YEARS

TABLE D.3-18

SUMMARY TABLE OF COMPARISON BETWEEN MEASURED AND MODELED U-238 CONCENTRATIONS IN THE GREAT MIAMI AQUIFER

Well	Measured (μg/l)* Maximum	Measured (μg/l)* Average	Modeled (μg/l)
2004	13.90	7.74	0.032
2019	15.70	4.28	26.11
2021	15.80	7.68	22.44
2027	16.00	8.48	8.12
2643	15.40	7.00	14.19
2648	27.00	9.72	20.31
2649	9.30	4.86	0.164

* Average of 1992 and 1993 snapshots data.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.3.7.2 Page #: D-3-29 Line #: 8 Code:
Original Comment #: 285 (OSC #118)

Comment: It appears DOE used two loading rates to introduce contaminants into the Great Miami Aquifer: one loading rate for the direct leak scenarios and a different loading rate for future migration of contaminants. DOE should justify the use of each of these loading rates.

Response: Agree. The justification for the loading rates for both the direct leak and natural migration scenarios have been presented in response to Comments 280 and 281.

Action: See text revisions made in response to Comments 280 and 281.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.3.7.2 Page #: D-3-29 Line #: 8 Code:
Original Comment #: 286 (OSC #119)

Comment: It appears that the model was calibrated for the direct leak loading scenario only. If this is correct, DOE should explain what efforts have been made to calibrate the simulated future contaminant loading to the Great Miami Aquifer.

Response: All pits in the Waste Pit Area have specific contaminant loading terms associated with contaminant migration through the underlying soil layers in the fate and transport model. The additional direct leak loading terms were only used around Waste Pit 4 and the Burn Pit to match measured concentrations in specific monitoring wells close to these two contaminant sources (See response to Comments 280 and 281). In general, the modeled concentrations around other waste pits are in agreement with field conditions without using direct leaking terms. Considering the results of the modeling and the objectives of the RI, the predictive capability of the overall model for the Waste Pit Area is acceptable.

Action: See action in response to Comment 252.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.3.7.2 Page #: D-3-29 Line #: 8 Code:
Original Comment #: 287 (OSC #120)

Comment: Because the direct leak loading scenario uses loading rates not attained using the ODAST model, the calibration of the direct leak scenario provides no information on the model's ability to accurately predict future contaminant concentrations in the Great Miami Aquifer. DOE should address the model's ability to predict future conditions in the Great Miami Aquifer.

Response: Every pit in the Waste Pit Area has specific contaminant loading terms associated with contaminant migration through the underlying soil layers in the fate and transport model. The additional direct leaking loading terms only were used around Waste Pit 4 and the Burn Pit to match measured concentrations in specific monitoring wells close to these two contaminant sources. In general, the modeled concentrations around other waste pits, are in agreement with the field conditions without using direct leaking terms. Considering the results of the modeling and the objectives of the RI, the predictive capability of the overall model for the Waste Pit Area is acceptable.

Action: See action in response to Comment 252.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.3.7.2 Page #: D-3-29 Line #: 8 Code:
Original Comment #: 288 (OSC #121)

Comment: This section states that contaminants were added to 10 model cells within Operable Unit 1. However, the report should state which 10 cells were used and the rationale for selecting them. In addition, the report should provide the rationale for the loading rates used in the model.

Response: Agree. The locations of the 10 cells used for direct leaking around Waste Pit 4 and Burn Pit have been added to the report. (Also, see response to Comment 280.)

Action: Figure D.3-14A showing the locations of the 10 cells used for direct leaking around Waste Pit 4 and Burn Pit has been added to Appendix D. The Figure has been referenced in the revised text incorporated in response to Comment 281.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.3.7.2 Page #: D-3-29 Line #: 8 Code:
Original Comment #: 289 (OSC #122)

Comment: The average measured values for barium and uranium present in this section are close but not the same as those average values presented in Tables 4-27 and 4-29. This discrepancy should be clarified. In addition, the average measured values for strontium 90 and technetium 99 are presented in parts per billion; however, in Table D-27, these contaminants' concentrations are presented in picoCuries per liter (pCi/L). This discrepancy should be addressed.

Response: Agree. The average measured values for barium, strontium-90, technetium-99 and uranium have been revised to reflect the actual measured value as reported in Section 4. The values for radionuclides are reported in pCi/L in Section 4 since these are standard units for reporting radionuclide concentrations. The units, ppb, are used in Section 5 and Appendix D since the fate and transport models are based upon mass transport rather than activity transport.

Action: Section D.3.7.2, page D-3-29, line 16 - The measured barium concentration has been changed form "0.4 ppm" to "0.33." Line 21- The measured Strontium-90 concentration has been changed form "5.25×10^{-9} ppb" to "5.3×10^{-9} ppb." Line 26 - The measured technetium-99 concentration has been changed from 1.92×10^{-1} ppb" to "1.71×10^{-1} ppb." Lines 29-33 has been revised as presented in response to Comment 284.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: D.3.7.2 Page #: D-3-30 Line #: 22 Code:
Original Comment #: 290 (OSC #123)

Comment: The figures showing the SWIFT results are misleading, especially Figure D-3-15. It appears that these results do not include the contamination currently present in the Great Miami Aquifer. Therefore, each of the figures for uranium underestimates the uranium concentration in the Great Miami Aquifer. The text and each of the figures should clearly describe what information is being presented.

Response: The figures include contamination currently present in the Great Miami Aquifer. The direct, short-term leak source terms and long-term (ODAST) loading terms from all the pits are included in the model simultaneously. Figure D.3-14C, added in response to Comment number 284 shows the U-238 concentration contours in the Great Miami Aquifer following the 40th year in the transport simulation. After the 40th year, the direct leak source term was assumed to end as explained in response to Comment Number 9 and 10. Figures D.3-15 through D.3-17 show the U-238 concentration contours for years 100, 500 and 1000. As presented in the figures, contribution from the direct leak source dispenses and decreases between years 40 and 100. The natural

migration then becomes the dominant source , yielding elevated concentrations much beyond those of the direct leak source term by year 630 as shown in Figure D.3-16.

Action: Figure D.3-14C has been added and referenced in the text revisions incorporated in response to Comment 284.

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: D.4 Page #: D-4-1 and D-4-2 Line #: NA Code: M
Original Comment #: 291 (OC #17)

Comment: This section entitled "Estimation of Radion (sic) Emission Flux - Raecom Model" has numerous flaws in the stated equations, such as unbalanced units and typographical errors. The extent of the errors undermines the credibility of the calculations performed to estimate the radon emission flux for the Waste Pits. Please review this section, correct the errors, and revise radon emission calculations as appropriate.

Response: Agree. Appendix D.4.1, entitled "Estimation of Radon Emission Flux - RAECOM Model" has been revised to correct the typographical errors and the radon flux terms have been recalculated for each waste pit.

Action: Appendix D.4.1, Page D-4-2, beginning with equation D-2, has been revised to read:

$$"J_t = 10^4 R \rho_t E [(\lambda)(DC_t)]^{1/2} \tanh[(\lambda/DC_t)^{1/2} x_t] \quad \text{(D-2)}$$

where

J_t	=	radon flux (pCi/m^2-sec)
R	=	Radium 226 activity for Pit 3 = 451 pCi/g Pit 5 = 160 pCi/g Pit 6 = 4.3 pCi/g
ρ_t	=	dry bulk density = 1.6 g/cm^3
E	=	radon emanation coefficient = 0.22 (unitless)
λ	=	radiological decay constant for radon
	=	2.1×10^{-6} sec^{-1}
DC_t	=	radon diffusion coefficient (cm^2/sec)
x_t	=	thickness of the tailings = 100 cm for each pit

The average dry bulk density(ρ_t) of radium-bearing materials in Waste Pits 3, 5, and 6 is 1.3 g/cm^3. A value of 1.6 g/cm^3 was used for conservatism.

DC_t must be calculated from the following empirical equation:

$$DC_t = 0.07 \exp[-4(m-mp^2+m^5)] \quad \text{(D-3)}$$

where

m	=	fraction of saturation (unitless)
p	=	soil porosity assumed at 0.41 from Figure ES-1 in the document entitled "Radon Attenuation Handbook for Uranium Mill Tailings Cover Design"

The value for m can be determined from the following simple engineering correlation:

$$m = [0.124(p)^{1/2} - 0.0012E_l - 0.04 + 0.156f_{cm}] \quad \text{(D-4)}$$

where

p	=	annual precipitation = 40 inches
E_l	=	annual lake evaporation = 34 inches
f_{cm}	=	fraction of soil passing a 200 mesh sieve assumed to be 60%

$m = 0.797$

then $DC_t = 1.4 \times 10^{-3}$ cm²/sec

The source terms for Waste Pits 3, 5, and 6 in pCi/m²-sec are:

Pit 3 = 85.66 pCi/m²-sec
Pit 5 = 30.39 pCi/m²-sec
Pit 6 = 0.83 pCi/m²-sec"

These radon flux terms were then used in the revised air transport modeling.

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: D.4 Page #: D-4-1 Line #: 20 Code: C
Original Comment #: 292 (OC #18)

Comment: For equation D-1, which calculates the radon flux exiting from a bare source, it is unclear how the units balance to produce a result in "pCi/m²-sec." Using the units provided for the variables produces a result in "pCi/cm²-sec;" converting "pCi/cm²-sec" to "pCi/m²-sec" requires multiplication by "(10^4)" rather than "(10^{-1})." A typographic flaw with the equation is that the parentheses do not balance, a possible indication of additional missing terms. Please review and revise, indicating how this equation was derived. It is stated on line 30 that this equation was used to calculate the radon emission flux for each waste pit. Being that equation D-1 as stated is in error, clarify whether this error affects the radon emission flux calculations performed for the RI report.

Response: Agree. There are typographical errors regarding unbalanced parenthesis and exponents of conversion factors for equation D-1. Appendix D.4.1 has been revised to correct these errors and the radon emission flux terms have been recalculated for each waste pit. The recalculation of radon flux terms resulted in net reductions of 7, 8, and 37 percent for Waste Pits 3, 5, and 5, respectively, in comparison to the values reported in the RI report. These revised radon emission flux terms were be applied to the dispersion modeling results to obtain revised ambient concentrations of radon for on-site, off-site and discrete receptors.

Action: Appendix D.4.1, Equation D-1, has been revised to read:

$$"J_t = 10^4 R \rho_t E [(\lambda)(DC_t)]^{1/2} \tanh[(\lambda/DC_t)^{1/2} x_t] \quad \text{(D-1)}$$

where

J_t	=	radon flux (pCi/m^2-sec)
R	=	Radium 226 activity
		for Pit 3 = 451 pCi/g
		Pit 5 = 160 pCi/g
		Pit 6 = 4.3 pCi/g
ρ_t	=	dry bulk density = 1.6 g/cm^3
E	=	radon emanation coefficient = 0.22 (unitless)
λ	=	radiological decay constant for radon
	=	2.1 x 10^{-6} sec^{-1}
DC_t	=	radon diffusion coefficient (cm^2/sec)
x_t	=	thickness of the tailings = 100 cm for each pit"

The radon flux rates for each waste pit have been recalculated and are contained in the response to Comment 291 (OC #17).

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: D.4 Page #: D-4-1 Line #: 32 Code: C
Original Comment #: 293 (OC #19)
Comment: It is stated that a calculation work sheet, showing the derivation of each Waste Pit's radon emission flux, is included with this appendix; please indicate in text where exactly this calculation work sheet is.
Response: The statement in line 32 of page D-4-1 regarding a calculation work sheet is incorrect. The actual derivation used to calculate radon flux terms for each waste pit was given on page D-4-2 and contained sufficient information to show how the radon emission flux was calculated for each waste pit. Because there were typographical errors in equation D-1, Appendix D.4.1 has been revised to correct these errors and the radon flux terms have been recalculated for each waste pit. The revised Appendix D.4.1 contains calculations showing the derivation of the radon emission flux rates for each waste pit.
Action: Section D.4.1, Page D-4-1, lines 32 and 33, have been revised to read, "The remainder of this section presents the derivation of emission flux for each of the waste pits."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: D.4 Page #: D-4-2 Line #: 10 Code: C
Original Comment #: 294 (OC #20)
Comment: Please explain the basis for assuming P_t, the dry bulk density, to be 1.6 g/cm^3.
Response: The RAECOM model assumes radon generation from radium-bearing materials in Waste Pits 3, 5, and 6 in the future scenario Pit 3 was assumed to have 30% of the pit material exposed. Pits 5 and 6 were considered in the calculation since they are assumed to be only one-half covered by water.

Table D.3-1 lists the dry bulk density of materials contained in the waste pits. The average density for materials in Waste Pits 3, 5, and 6 is 1.3 g/cm^3. Since the resultant radon flux is directly proportional to the dry bulk density of the radium-bearing material, the radon flux will increase if a higher dry bulk density "RHO" is used. A value of 1.6 g/cm^3 was used for conservatism.

Action: The following text was added after Equation D-2: "The average dry bulk density (ρ_b) of radium-bearing materials in Waste Pits 3, 5, and 6 is 1.3 g/cm^3. A value of 1.6 g/cm^3 was used for conservatism."

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: D.4 Page #: D-4-2 Line #: 16 Code: C
Original Comment #: 295 (OC #21)
Comment: For equation D-3, please define the variables "M" and "P" and provide their units.
Response: The variables "M" and "P" in empirical correlation equation D-3 of Appendix D.4.1 are defined as the fraction of saturation and the total soil porosity, respectively. Both variables are dimensionless
Action: These parameters were defined and their units provided in response to Comment 291.

Commenting Organization: U.S. EPA Commentor: Region 5, Radiation Section
Section #: D.4 Page #: D-4-2 Line #: 20 Code: C
Original Comment #: 296 (OC #22)
Comment: Equation D-4, which provides the fraction of saturation, is in error with its unbalanced brackets and incompatible units. Please review and revise, providing a complete description of all variables and their units.
Response: Agree. There are typographical errors in equation D-4 which provides an empirical correlation regarding the fraction of saturation (m). Because the empirical relationship is a correlation, the fraction of saturation term (m) has no units. Equation D-4 has been revised to correct typographical errors and calculation errors.
Action: Equation D-4 has been revised as presented in the response to Comment 291. Complete description of all variables and their units are provided with the corrected equation.

OEPA COMMENTS

APPENDIX D

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: D.3.6.2 Page #: D-3-24 Line #: 21 Code:C
Original Comment #: 297 (OC 137)
Comment: In Table D.3-14 the source loading concentrations are reported in mg/l. Subsequently, the predicted concentrations in Table D.3-17 are also reported in mg/l. Of interest is the dilution ratio in the Great Miami aquifer. For example:

Component	From Table D.3-14 Maximum Loading Concentration (mg/l)	From Table D.3-17 Maximum Concentration in Groundwater (mg/l)	Calculated Dilution Ratio
Tc-99	4.11e-4	1.935e-4	2.1
U-238	1228.	12.475	98.4
Vinyl Chloride	.0103	.001459	7.06

Please clarify why there are different apparent dilution ratios.

Response: The simulated groundwater concentrations in the GMA are also controlled by the chemical-specific solid-liquid partition coefficients (kd). Contaminants with higher Kd values will tend to have higher apparent dilution ratios since more mass will be absorbed to the solid phase during the migration through the overburden and the GMA. Among the listed three contaminants, U-238 has the highest Kd and Tc-99 has the lowest. Therefore, U-238 has the highest apparent dilution ratio and Tc-99 has the lowest.

Action: None.

Commenting Organization: OHIO EPA Commentor: Geo Trans
Section #: D.3.6.1 Page #: D-3-21 Line #: 5-7 Code:C
Original Comment #: 298 (OC 138)
Comment: The Darcy calculation for the Clearwell does not appear to be correct. There is no layer 1 (low permeability), only a 23.7 ft section of Great Miami aquifer (from Table D.3-2). The reported vertical hydraulic conductivity is 45 ft/day and the vertical flow rate is 2.29e-3 ft/day. Given this information, the depth of pond liquid can be calculated to be 0.0012 ft as per Page D-3-20. In other words, for 10.1 inches per year, the ponded depth needs only to be 0.0012 feet. The field data cannot support such a low value of ponded depth. Surely there is more standing water present in Clearwell than 0.0012 feet. From Figures 3-47 and 3-48, the water elevation is approximately 574 feet. From Figure 1-18, the bottom of the pit elevation is 548 feet. This would indicate standing water depth is approximately 26 feet. There is an approximate 1 foot clay liner (Figure 3-24). Please clarify the calculations in Table D.3-2.

Response: Agree. The numbers as presented might lead to confusion. There is an 11-foot thick sludge layer at the bottom of the Clearwell. Also, there is an approximate 1-foot clay liner underlying the Clearwell. These two layers and a 17-foot deep water on top of the sludge in the Clearwell were used in the calculation of the infiltration rate outside of

ODAST. The conductivities used for the sludge and clay are 1e-6 and 1e-7 cm/sec, respectively. The unsaturated GMA sand and gravel layer was not used in the infiltration calculation. The calculated infiltration rate (i.e., 10.1 inches per year) from the Clearwell into the top of the unsaturated Great Miami Aquifer was then used as input to ODAST. Since the pit sludge and clay liner were not modeled under ODAST, no credit was taken for the retardation effects of these materials. Since the input to the ODAST model was the calculated infiltration rate from the bottom of the pit into the top of the unsaturated Great Miami Aquifer, the layer 1 thickness was specified as zero.

Action: The following footnote has been added to Table D.3-2: "The thicknesses specified are for ODAST simulations only."

USEPA COMMENTS

APPENDIX E

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1.1.2 Page #: E-1-5 Line #: 25 Code:
Original Comment #: 299 (OSC 7)
Comment: This line suggests that the former production area and waste disposal area are shown on Figure E.1-3. In fact, these areas are shown on Figure E.1-2. The text should be revised accordingly.
Response: Agree.
Action: The reference to "Figure E.1-3" on page E-1-5, line 25, has been changed to "Figure E.1-2."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1.1.2 Page #: E-1-6 Line #: 3 & 4 Code:
Original Comment #: 300 (OSC 8)
Comment: These lines state that several residences are located along Paddys Run Road about 0.5 mile south of the facility's property boundary and that residences are located along New Haven Road. However, Figure E.1-3 shows several residences or barns along Paddys Run Road immediately west of Fernald Environmental Management Project (FEMP); the figure also shows no residences along New Haven Road. Figure E.1-3 should be reviewed and the text revised to accurately and consistently reflect what actual conditions exist at and near FEMP.
Response: Agree. The description presented in this section is inconsistent with Figure E.1-3.
Action: The accuracy of Figure E.1-3 was verified. Section E.1.1.2 was corrected by replacing: "Several residences are located...of the property boundary" with "Several businesses are located along Paddys Run Road, approximately one-half mile south of the property boundary. The nearest residence is located approximately one-quarter mile southwest along Willey Road."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1.2.1 Page #: E-1-9 Line #: NA Code:
Original Comment #: 301 (OSC 9)
Comment: This section briefly summarizes each of the waste pits, the Burn Pit, and the Clearwell. However, the descriptions do not always match the descriptions in Table E.1-1. For example, the table lists volumes for each of the waste pits; however, the text for Waste Pit 1 does not include information about the pit's volume. The text should be revised to match the information presented in Table E.1-1. Also, Table E.1-1 includes a description of the Experimental Treatment Facility. However, the text in Section E.1.2.1 does not include a summary of this facility. This section should be revised to include a summary of the Experimental Treatment Facility.
Response: Agree. Not all of the text descriptions gave waste volumes. Also, table E.1-1 presented volume in metric units first with engineering units as parenthetical information. The Experimental Treatment Facility was dismantled and closed during Removal Action Number 11, completed March, 1992. This was part of an early version of the table and was inadvertently retained.
Action: Table E.1-1 was revised to delete metric units. Reference to the Experimental Treatment Facility was deleted from the table.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1.2.2 Page #: E-1-10 Line #: 1 Code:
Original Comment #: 302 (OSC 10)

Comment: This line (continued from the previous page) states that the RA reflects conditions resulting from interim actions completed as of April 1993. However, the description of Removal Action 22, Study Area Contaminant Improvement, states that this action was completed in June 1993. Line 1 should be revised to state that the RA reflects actions completed as of June 1993.

Response: Agree.

Action: "April 1993" on page E-1-10, line 1, has been replaced by "June 1993."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1.2.3.1 Page #: E-1-11 Line #: NA Code:
Original Comment #: 303 (OSC 11)

Comment: This section summarizes data collection efforts conducted during the Roy F. Weston, Inc. (Weston) Characterization Investigation Study (CIS) in 1986 and 1987. However, the section does not define the term "CIS," or cite references for these data collection efforts; specifically Volumes 1, 2, and 3. The section should be revised to define the term "CIS" and include citations to references for all the investigative efforts discussed.

Response: Agree. The acronym "CIS" stands for "Characterization Investigation Study." This study is fully described in Section 2 of the RI.

Action: "Characterization Investigation Study" was added to the Section E.1.2.3.1 title. The insert "An extensive description of this study is presented in Section 2.0 of the RI" was added to the end of the same paragraph.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1.2.3.2 Page #: E-1-11 Line #: NA Code:
Original Comment #: 304 (OSC 12)

Comment: This section summarizes remedial investigation/feasibility study (RI/FS) sampling activities conducted between 1987 and 1993. However, the text does not cite references for any of this information. The text should be revised to include references to all of the RI/FS sampling activities discussed.

Response: Agree. The reader will be referred to in Section 2.0 of the RI where a full description of the sampling effort is presented.

Action: "This sampling effort is fully described in Section 2.0 of the Operable Unit 1 RI report" was added to the end of Section E.1.2.3.2.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1.2.3.3 Page #: E-1-12 Line #: NA Code:
Original Comment #: 305 (OSC 13)

Comment: This section discusses the 1992 RI/FS sampling investigation of Waste Pits 5 and 6, and the Clearwell. However, the text does not cite any references for this information. The section should be revised to include citations to references for the 1992 RI/FS.

Response: Agree.

Action: The following sentence has been added to page E-1-12, line 9: "(See Section 2.3.2 of this remedial investigation for a detailed description of RI/FS sampling.)"

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1.2.4.4 Page #: E-1-14 Line #: 11 & 12 Code:
Original Comment #: 306 (OSC 14)
Comment: The last line in this section states that significant contamination exists in Well 1031. However, the text does not describe the contamination found in this well. The text should be revised to briefly describe the contaminants and their respective concentrations found in Well 1031.
Response: Agree.
Action: The major contaminants that were present in Well 1031 were listed. Text was added to page E-1-14, line 12, state, "Well 1031...showed significant contamination with organic constituents including trichloroethane at 540 μg/L and tetrachloroethane at 290 μg/L."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1.3.2 Page #: E-1-16 Line #: 26 to 31 Code:
Original Comment #: 307 (OSC 15)
Comment: The fourth bulleted item on this page discusses slope factors for radionuclides. The justification for taking slope factors from the Health Effects Summary Tables (HEAST) is confusing as written. Specifically, the citation for the Integrated Risk Information System (IRIS) (EPA 1993), is mistakenly placed after a reference to the HEAST. The justification should be rewritten, possibly as follows: "... the IRIS database (EPA 1993), so the Operable Unit 1 Baseline Risk Assessment uses the most up-to-date HEAST available (EPA 1992b)..."
Response: Agree.
Action: Also, the HEAST reference was updated to (EPA, 1993g). Text has been changed to state "Radionuclides are not included in the IRIS database (EPA 1993a), so the Operable Unit 1 Baseline Risk Assessment uses the most up-to-date HEAST available (EPA 1993g) at the time that the quantitative assessment was performed."

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.1.3.2 Page #: E-1-16 Line #: 26-31 Code:(C)
Original Comment #: 308 (OC 3)
Comment: I am not certain which HEAST Table was used for radionuclides. The reference indicates Annual fiscal Year 1992; the most recent HEAST update is March 1993. The latter Table should be used in this report.
Response: Agree. This is a typographical error.
Action: Revised text to "HEAST, Annual Fiscal Year 1993" and changed the EPA 1992b reference to the 1993 edition.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.1.3.2 Page #: E-1-17 Line #: 1-5 Code:(C)
Original Comment #: 309 (OC 4)
Comment: Regarding Central Tendency Values, you should have a copy of the May 1993 DRAFT "Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure."
Response: Regarding the draft guidance included in the USEPA Risk Assessment comments which provides additional information related to both the RME and the CT exposures a good-faith attempt was made to factor in the relative and pertinent portions of the guidance. Given the fact that the guidance is viewed as draft and the fact that many portions of the

document lack final positions and or parameter values, the degree to which the BRA could be modified using this new guidance was limited. It is the position of DOE that since the decisions associated with remediation are to based on the risk information resulting from the RME calculations the overall impact associated with the recalculation of the CT is considered to be small. The CT as defined and evaluated in the OU1 RI - BRA is consistent with that provided in the OU4RI - BRA and therefore constitutes a solid and defensible basis for developing consistent risk information to support decision making at the FEMP.

Action: Continue to review and implement the draft guidance to the maximum extent practical for the remaining Operable Unit Baseline Risk Assessments to be performed at the FEMP while ensuring that the risk information developed is consistent and useful in support of the decision making process at the DOE - Fernald Site. This draft guidance was added to the reference section and referenced accordingly. U.S. Environmental Protection Agency (EPA) 1993h, "Superfund Standard Default Exposure Factors for Central Tendency and Reasonable Maximum Exposure, Preliminary Draft, May 5, 1993."

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.1.3.2 Page #: E-1-17 Line #: 28-33 Code:(C)
Original Comment #: 310 (OC 5)

Comment: ECAO can provide provisional toxicity values for some chemicals. Some contaminants should be discussed qualitatively or semiqualitatively - e.g., lead, dermal exposure to PAHs, etc.

Response: Agree. Information is requested from ECAO when it cannot be found in IRIS or HEAST. This was not explicitly stated in the text.

Action: Add "in IRIS, HEAST, or from ECAO" after "available".

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1 Page #: E-1-22 Line #: TABLE E.1-1 Code:
Original Comment #: 311 (OSC 16)

Comment: This table includes physical descriptions of the six waste pits. However, the text does not adequately describe the materials covering each of the waste pits. For example, Waste Pits 1 through 3 are covered by soil. The descriptions of these pits should be revised to reflect this fact and should state how thick the soil cover is. Waste Pit 4 is covered by a layer of compacted clay and a polyethylene cover; the description of this pit should be revised to reflect this information. Finally, Waste Pit 5 and 6 are covered by water; the description of these pits should be revised to reflect this fact and to state how deep the water is in each pit.

Response: Agree.

Action: The following text was added to the physical description in Table E.1-1:

Pit	Add to Physical description
Pit 1	.5-foot soil cover
Pit 2	1 to 4-foot soil cover
Pit 3	Soil/flyash cover up to 14 feet deep
Pit 4	6-foot layer of compacted clay with a polyethylene cover
Pit 5	Covered with water
Pit 6	Covered with water
Clearwell	Covered with water
Burn Pit	Not covered

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.1 Page #: E-1-25, E-1-27 Line #: Code:
Original Comment #: 312 (OSC 17)

Comment: The fence lines on Figures E.1-2 and E.1-4 do not match. For example, Figure E.1-2 shows a fence that surrounds the K-65 Silos; however, in Figure E.1-4, the fence line around the silos is open at the south end. Moreover, Figure E.1-2 shows a fence line running north to south almost immediately east of the Lime Sludge Ponds; however, on Figure E.1-4, this fence line stops south of the railroad tracks to the north and just south of the ponds to the south, but on Figure E.1-2, this fence line is shown to continue farther to the north and south of these points. Figures E.1-2 and E.1-4 should be compared and should be revised to accurately depict site conditions.

Response: Agree. The fencelines shown in Figures E.1-2 and E.1-4 are not exact. However, the intent of Figure E.1.2 is to depict the location of Operable Unit 1 within the FEMP site, not to accurately describe fences and other markers. Figure E.1-4 is intended to describe salient features of Operable Unit 1. Figure E.1-4, titled "Operable Unit 1 Site Map," was included to give points of reference to the reader who may not be familiar with the site. None of the errors noted were within the Operable Unit 1 perimeter.

Action: Figure E.1-4 was checked for accuracy, and information not pertinent to Operable Unit 1 was deleted to avoid confusion.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.2.2.1 Page #: E-2-5, E-2-6 Line #: 28-35, 1-15 Code:
Original Comment #: 313 (OSC 18)
Comment: Tentatively identified compounds (TIC) were not reviewed in the analytical data validation process. TICs should be reviewed and evaluated further if a significant number of TICs are present or if the TICs may historically be connected to the site.
Response: Comment acknowledged. Tentatively identified compounds (TICs) were reviewed during the analytical data validation process. TICs were generally qualified "R" (unusable) or "NJ" (tentatively identified estimated). These chemicals were not positively identified. They were not carried through the quantitative risk assessment.
Action: None.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.2.2.2 Page #: E-2-6 Line #: 27-35 Code:(C)
Original Comment #: 314 (OC 6)
Comment: I did not see the Interim Bulletin Volume 1, Number 1 "Supplemental Guidance to RAGS: Calculating the Concentration Term" in this reference list. This is the reference for the methodology in this section.
Response: Agree. EPA 1992c will be added.
Action: Add "Supplemental Guidance to Risk Assessment Guidance for Superfund: Calculating the Concentration Term, Interim Bulletin Volume 1, Number 1." (EPA 1992c) to the reference list.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.2.2.2.1 Page #: E-2-7 Line #: Code:(C)
Original Comment #: 315 (OC 7)
Comment: [Equation D.2-2] Why was a two-sided t. distribution value used to calculate the UCL ($t_{1-\alpha/2}$)? What is the alpha value that was used here? Please explain.
Response: Agree. The equation is in error. However, the analysis used the proper value for a one-sided t-distribution (i.e., $t_{1-\alpha,n-1}$).
Action: The equation on page E-2-7 for calculation of the UCL for a normal distribution (i.e., D.2-1) was changed to the following (Gilbert, 1987) for consistency:

$$UCL_{(.95)} = \overline{x} + t_{(.95,n-1)} \times \left(\frac{s}{\sqrt{n-1}}\right)$$

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.2.2.2.1 Page #: E-2-7 Line #: 13-20 Code:
Original Comment #: 316 (OSC 19)
Comment: A reference for the equation used to calculate the upper 95 percent confidence limit (UCL) is not cited in the RA. A reference should be cited for this equation.
Response: Agree.
Action: "(Gilbert, 1987)" is cited in Section E.2.2.2.1 and has been added to the Appendix E reference list.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.2.3.1.1 Page #: E-2-8 Line #: 24 Code:
Original Comment #: 317 (OSC 20)

Comment: The explanation of the Mann-Whitney U Test procedure states that if two data sets are from the same distribution, these sets are the same "(in other words, the site data is the same as background data)." This should be changed to state that the two data sets may be from the same distribution, but not equal. The explanation of the Mann-Whitney U Test also states that if "two data sets are from the same distribution, the ranked concentrations would be evenly distributed." However, according to the Mann-Whitney U Test, the data are evenly distributed and are, therefore, from the same distribution, if the average ranks of the concentrations are about equal (Siegel and Castellan 1988). This explanation should be included in the text report.

Response: Agree. The text discussing the Mann-Whitney U Test needs further clarification. This description was also fortified to give a clearer picture of the background comparison method used.

Action: The text from section E.2.3.1.1 describing comparison to background was deleted and replaced with:

"The first step in selecting CPCs is to compare the site related data to background concentration levels. To conduct the comparison between the site-related measurements and the background data for a constituent, two tests were used in sequence: (1) a "location" test (Student's t-test or Wilcoxon Rank Sum test) and (2) followed by the "95th Percentile Test" (see below for details). If either of the test results rejects the null hypothesis (i.e., the distribution of measurements at the site appears to be shifted to the right (to higher measurements) of the background distribution), the constituent is considered to be a possible CPC and is submitted to toxicological screening. The constituent is not included as a possible CPC only if both test results indicate that there was not a "significant difference" between the two distributions. For cases where the location tests could not be performed due to small sample sizes or large portion of nondetects and the 95th Percentile Test suggests that the site-related data are not different from the background data, professional judgement by risk assessors was used to make the final determination.

The "location" test can be either the t-test, a parametric statistical method (assuming a normal distribution), or the Wilcoxon Rank Sum (WRS) test (or the Mann-Whitney U-test, a direct corollary to the WRS) which is the counterpart of the t-test in a nonparametric approach. The t-test was used to compare the mean of the site-related data with the mean of the background data. The WRS test compares two distributions of rank ordered data (equivalent distribution of ranks would indicate the data came from similar data sets). For instances in which the t-test cannot be applied to the data, the WRS test was conducted. Details of these procedures can be obtained from Gilbert,1987.

The 95th Percentile Test determines if any sample measurements for a given constituent exceed the upper 95th percentile for the background distribution. If so, the test indicates that the data contains at least one relatively high concentration and the constituent should be considered as a CPC. The 95th percentile for the background distribution can be computed as follows:

For background data with a normal distribution:

$$P_{95} = \bar{x} + z_{0.95} * s \qquad \text{(E.2-4)}$$

where:

$\bar{x}$	=	sample arithmetic mean
s	=	sample standard deviation
$z_{0.95}$	=	1.645

For background data with a lognormal distribution:

$$P_{95} = \exp(\bar{y} + z_{0.95} * s_y) \qquad \text{(E.2-5)}$$

where:

$\bar{y}$	=	sample arithmetic mean of the log-transformed data ($y = \ln x$; $\bar{y} = \Sigma y/n$)
s_y	=	sample standard deviation of the log-transferred data
$z_{0.95}$	=	1.645

For background data with an undefined distribution:
If the distribution of the background data could not be adequately determined a non-parametric method was used to estimate the 95th percentile. The initial step in determining the 95th percentile concentration is to order the data such that

$$x_1 \le x_2 \le \ldots \le x_i$$

where

$x_{j,\,(j=1\ to\ i)}$ = *sample concentrations*
i = *the number of background samples*

The 95th percentile concentration is then determined to be

$$C_{(.95)} = x_k \qquad \text{(E.2-6)}$$

such that

$$k \ge i \times 0.95 \ (i = \textit{number of samples})$$

where

$$C_{(.95)} = 95th\ Percentile\ Concentration$$

$$k = The\ Identification\ Number\ of\ the\ Sample\ Selected$$

Because organic chemicals, some fission product radionuclides, and activation product radionuclides are not naturally occurring at measurable levels, background concentrations are assumed to be zero. Consequently, if these organic chemicals, fission products, or activation products are selected as CPCs, they are not based on comparison to background.

Inorganic and radiological constituents not significantly above background levels were excluded from the CPC list and assigned symbol "A" in Attachment E.II.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.2.3.1.2 Page #: E-2-9 Line #: 6 Code:(C)
Original Comment #: 318 (OC 8)
Comment: I did not understand the reference to the detection of contaminants at "unusually high (unrealistic) concentrations." What is the logic here?
Response: Comment acknowledged.
Action: This particular bullet was removed from the list of items presented in Section E.2.3.1.2.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.2.3.1.2 Page #: E-2-9 Line #: 12 Code:(C)
Original Comment #: 319 (OC 9)
Comment: Does this indicate that carcinogenic PAHs could not be evaluated as a class? Please explain.
Response: Comment acknowledged. The intent of this screening tool is to eliminate general information supplied in the analytical results that are either too general to be useful for risk assessment (e.g., "Total Organic Carbon") or for which more specific and useful results are presented in the same analysis (e.g., polynuclear aromatic hydrocarbons [PAHs] and chlorinated hydrocarbons). For instance, since dose-response for PAHs is chemical specific, the concentration of total PAHs is of less interest than the concentrations of specific compounds.
Action: Changed bullet on lines 11-13 (now sixth bullet under E.2.3.1.2) to "Nonspecific chemical classes that are either too general to be useful for risk assessment (e.g., "Total Organic Carbon") or for which chemical-specific results are presented in the same analysis (e.g., polynuclear aromatic hydrocarbons and chlorinated hydrocarbons) were excluded from the CPC list and assigned the deletion symbol "G" in Attachment E.II.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.2.3.1.2 Page #: E-2-9 Line #: 14 Code:
Original Comment #: 320 (OSC 22)
Comment: According to the RA, some of the compounds found in Operable Unit 1 may be derived from an off-site source; however, the RA does not state on what information this

assumption is based. The RA should justify this assumption and cite references that support this assumption.

Response: The data for Operable Unit 1 is assumed to reflect the contents of the waste pits and residual contamination of the associated soils. None of the chemicals detected in OU1 are assumed to come from offsite sources. Therefore, this bullet was removed from the list of items presented in Section E.2.3.1.2.

Action: This particular bullet was removed from the list of items presented in Section E.2.3.1.2.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.2.3.1.2 Page #: E-2-9 Line #: 16 Code:
Original Comment #: 321 (OSC 23)

Comment: The text states that compounds were not deleted if their contribution to site risk is "significant." However, it is unclear what contributions were considered "significant." The RA should better define the term "significant" as it applies to site risk.

Response: Comment acknowledged.

Action: The CPC screening procedure was re-written for consistency with the OU4 baseline risk assessment and recent guidance (Refer to comment 326).

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.2.3.1.2 Page #: E-2-9 Line #: 11-13 Code:
Original Comment #: 322 (OSC 21)

Comment: No explanation is provided for the exclusion of nonspecific classes of compounds. If these classes of compounds can be linked to the site using historical information, further investigations should be conducted. If these compounds are not expected to be present on site, a justification for excluding these compounds as contaminants of potential concern and references should be provided.

Response: Agree. The intent of this screening tool is to eliminate general information supplied in the analytical results that are either too general to be useful for risk assessment (e.g., "Total Organic Carbon") or for which more specific and useful results are presented in the same analysis (e.g., polynuclear aromatic hydrocarbons [PAHs] and chlorinated hydrocarbons). For instance, since dose-response for PAHs is chemical specific, the concentration of total PAHs is of less interest than the concentrations of specific compounds.

Action: Changed bullet on lines 11-13 (now sixth bullet under E.2.3.1.2) to "Nonspecific chemical classes that are either too general to be useful for risk assessment (e.g., "Total Organic Carbon") or for which chemical-specific results are presented in the same analysis (e.g., polynuclear aromatic hydrocarbons and chlorinated hydrocarbons) were excluded from the CPC list and assigned the deletion symbol "G" in Attachment E.II.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.2.3.1.2 Page #: E-2-9 Line #: 14-16 Code:(M)
Original Comment #: 323 (OC 10)

Comment: How did you know that contaminants were from off-site sources? Where is the discussion? Need to direct the reader to justifications if an explanation is not provided here.

Response: The data for Operable Unit 1 is assumed to reflect the contents of the waste pits and residual contamination of the associated soils. None of the chemicals detected in OU1

are assumed to come from offsite sources. Therefore, this bullet was removed from the list of items presented in Section E.2.3.1.2.

Action: This particular bullet was removed from the list of items presented in Section E.2.3.1.2.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.2.3.1.2 Page #: E-2-9 Line #: 22-23 Code:
Original Comment #: 324 (OSC 24)

Comment: The text states that compounds known to degrade to nontoxic products were excluded from the RA. However, an acceptable time interval for the degradation process has not been established. Therefore, an acceptable time interval should be established, and those compounds that do not readily degrade or that are expected to exceed the acceptable time interval for degradation should be included as constituents of potential concern.

Response: This tool was not used to eliminate constituents as CPCs for the risk assessment. Therefore, this bullet was removed from the list of items presented in Section E.2.3.1.2.

Action: This particular bullet was removed from the list of items presented in Section E.2.3.1.2.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.2.3.1.2 Page #: E-2-9 Line #: 22-25 Code:(C)
Original Comment #: 325 (OC 11)

Comment: Many compounds will degrade to non-toxic compounds, given the right conditions and enough time. This is a baseline risk assessment, and assumes no pump and treat, etc. The compounds may present a risk to trespassers or other receptors under the current land use. This elimination requires more explanation.

Response: This tool was not used to eliminate constituents as CPCs for the risk assessment. Therefore, this bullet was removed from the list of items presented in Section E.2.3.1.2.

Action: This particular bullet was removed from the list of items presented in Section E.2.3.1.2.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.2.3.1.2 Page #: E-2-9 Line #: 28-29 Code:
Original Comment #: 326 (OSC 25)

Comment: The ninth bulleted item on this page states that the list of contaminants was compared with the values in U.S. EPA Region III guidance. The values that were used in the comparison are not defined and a reference to the guidance document from which these values were obtained is not cited. The values should be defined and a citation to the guidance document from which values were derived should be provided.

Response: Agree. These values should be provided and referenced.

Action: The bullet in question was revised as follows:
"•Chemicals that present a HQ less than 0.1 or ILCR lower than 10^{-7} when evaluated by Region III screening criteria (EPA, 1993c) were removed from the CPC list and assigned the deletion symbol "J" in Attachment E.II. Solid samples were compared to residential surface soil and liquid samples were compared to tap water." A table presenting these values was added to section E.2.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.2.3.2 Page #: E-2-10 Line #: Code: (E)
Original Comment #: 327 (OC 12)

Comment: [Tables, Section E2.3.2] Why are the units for the organic contaminants in the table given in g/kg instead of the usual mg/kg? This may mislead some readers.

Response: Agree that units were incorrect. Units of μg/kg were used for this section because the results were reported in μg/kg. These results were later converted to mg/kg for exposure assessment.

Action: Units were correctly reported as μg/kg.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.2 Page #: E-2-46 Line #: TABLE E.2 Code:
Original Comment #: 328 (OSC 26)

Comment: The representative concentration of Uranium-238 for the CIS data was incorrectly chosen in Table E.2-22 as the higher value of the maximum detected and the upper confidence limit (UCL). The concentration should be changed to the lower of the two values.

Response: Comment acknowledged. This was inconsistent with the prior concentration term calculation procedure.

Action: Due to changes in the concentration term calculation method (See comment 452), the maximum concentration for U-238 was 670pCi/g for the CIS data, but the representative concentration came from the RI/FS data. This information is now presented in Table E.2-12.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.0 Page #: NA Line #: Code:
Original Comment #: 329 (OGC 6)

Comment: This section discusses exposures that result from the ingestion of milk; however, this section often refers to exposures to dairy products. Because the ingestion of milk was the only exposure route evaluated, all general references to dairy products should be revised to refer specifically to milk.

Response: Agree. The exposure factor used was for milk and milk product ingestion (300 ml per day) which includes all products made from milk (EPA 1991a). It was noted that inconsistent terminology may cause confusion.

Action: This sentence was revised to read: "...such as beef and milk products (consumption of milk, milk products and dairy products refer to consumption of all products made from milk and are used interchangeably throughout the text)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.0 Page #: NA Line #: NA Code:
Original Comment #: 330 (OGC 5)

Comment: This section presents the exposure assessment but does not cite or refer to Attachment E.III, which presents sample exposure calculations and intake values. Section E.3.0 should be revised to refer to Attachment E.III.

Response: Agree.

Action: After first paragraph of Section E.3.0, the following text was inserted: "Attachment E.III presents example calculations for intake and risk based on the exposure models presented in this section. This attachment also gives chemical specific exposure values used to calculate intakes and risk for all receptors."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.0 Page #: NA Line #: NA Code:
Original Comment #: 331 (OGC 7)
Comment: Section E.3.0 and Attachment E.III include many exposure-related equations. These equations include many different parameters. The RA should be revised to clearly cite sources for all of the parameters used in the RA's equations. Without such citations, the calculations are impossible to verify.
Response: The source of these equations was the Risk Assessment Work Plan (DOE 1992a) and is cited in E.III-1. Parameters are presented in Section E-3 and referenced correctly.
Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-63 Line #: TABLE E.3-2 Code:
Original Comment #: 332 (OSC 55)
Comment: This portion of Table E.3-2 states that the on-property RME child will not be exposed to sediment and, therefore, exposure is not applicable (NA). However, Figure E.3-3 says that exposure to sediment by the on-property RME child will be evaluated. Table E.3-2 should be revised to be consistent with Figure E.3-3.
Response: Agree. Soil and sediment ingestion were combined in Figure E.3-3 to conserve space. Sediment ingestion was not considered for the RME child receptor.
Action: Soil and sediment exposure pathways was separated for the conceptual model presented in Figure E.3-3.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #:E-3-71 & E-3-72 Line #:TABLE E.3-6 & 3-7 Code:
Original Comment #: 333 (OSC 56)
Comment: Tables E.3-6 and E.3-7 include the symbol "---." Both tables should be revised to define this symbol.
Response: Agree. Symbol was not defined. Table E.3-7 is also confusing as currently presented.
Action: The following table footnote has been added to the bottom of Table E.3-6 (now E3-7): "Water covered" Table E.3-7 (now E.3-8) has been revised as follows:

TABLE E.3-7
MICROSHIELD INPUT PARAMETERS FOR FUTURE LAND USE OF OPERABLE UNIT 1

	Pit 1	Pit 2	Pit 3	Pit 4	Pit 5	Pit 6	Burn Pit
Geometry	Cylinder	Cylinder	Cylinder	Cylinder	Rectangular Cube	Rectangular Cube	Cylinder
Source dimensions (m)	49.4 x ∞	36.4 x ∞	84.4 x ∞	49.8 x ∞	86.6 x 86.6 x 8.5	38.9 x 38.9 x 24	25.5 x ∞
Source density (g/cm^3)	1.94	0.682	0.735	1.58	0.411	1.22	1.13
Shield 2							
Density (g/cc)	1.5	1.5	0	1.5	0	0	1.5
Thickness (m)	0.3	0.38	0	1.33	0	0	0.19
Air gap thickness (m)	0	0	0.001	0	0.01	0.01	0
Distance from source (m)	0	0	0.001	0	0.01	0.01	0
Source term [a]	Pit 1 material	Pit 2 material	Pit 3 material	Pit 4 material	Pit 5 material	Pit 6 material	Burn pit material

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-72, 73 Line #: TABLE E.3-7 & 3-8 Code: Original
Original Comment #: 334 (OSC 57)

Comment: Table E.3-8 presents dose rates for Waste Pits 1, 2, 4, and the Burn Pit. However, Table E.3-7 does not present any Microshield input parameters for these pits. Without input parameters, it is impossible to determine how dose rates were calculated. Tables E.3-7 and E.3-8 should be reviewed and revised as necessary to be consistent with each other. Either Microshield input parameters should be added to Table E.3-7 or dose rates should be removed from Table E.3-8.

Response: Agree that the presentation of Tables E.3-7 (now E.3-8) and E.3-8 (now E.3-9) is confusing.

Action: See Comment 333 for revisions to Table E.3-7.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-75 Line #: TABLE E.3 Code:
Original Comment #: 335 (OSC 58)

Comment: Table E.3-10 presents the surface area of Waste Pit 5 as 7.50 x 10^4 square meters (m^2). However, the total surface area and the exposure point concentrations are calculated based on a surface area for Waste Pit 5 of 7.50 x 10^3. Table E.3-10 should be revised to report the surface area of Waste Pit 5 as 7.50 x 10^3 m^2.

Response: Agree that 10^4 is a typographical error.

Action: Change "7.50 x 10^4" to "7.50 x 10^3" in the first line of Table E.3-10 (new table number E.3-11).

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-81 Line #: TABLE E.3-13 Code:
Original Comment #: 336 (OSC 59)
Comment: Table E.3-13 presents constituents reported as 2,3,7,8-Tetrachlorodibenzo-p-furan (TCDF);2,3,7,8-Heptachlorodibenzo-p-dioxin(HpCDD);2,3,7,8-Heptachlorodibenzo-p-furan (HpCDF); 2,3,7,8-Hexachlorodibenzo-p-dioxin (HxCDD); 2,3,7,8-Hexachlorodibenzo-p-furan (HxCDF); Octachlorodibenzo-p-dioxin (OCDD); Octachlorodibenzo-p-furan (OCDF); and Pentachlorodibenzo-p-furan (1,2,3,7,8-PeCDF and 2,3,4,7,8-PeCDF). These constituents have not previously been defined. Table E.3-13 should be revised to define these constituents.
Response: Agree. Common shorthand notation was used for these dioxins and furans because there was not room to write the chemical name in its entirety.
Action: The following reference list was added to the table (now E.3-14) as a footnote:
[b] TCDF = 2,3,7,8-Tetrachlorodibenzofuran
HpCDD = 2,3,7,8-Heptachlorodibenzo-p-dioxin
HpCDF = 2,3,7,8-Heptachlorodibenzofuran
HxCDD = 2,3,7,8-Hexachlorodibenzo-p-dioxin
HxCDF = 2,3,7,8-Hexachlorodibenzofuran
OCDD = Octachlorodibenzo-p-dioxin
OCDF = Octachlorodibenzofuran
PeCDF = Pentachlorodibenzofuran
Reference b was added after TCDF in the table.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-86 Line #: TABLE E.3-16 Code:
Original Comment #: 337 (OSC 60)
Comment: Table E.3-16 reports the age of the trespassing child as 7 to 18; Section E.3.3.2.4 reports the age to be 6 to 17. The entire Operable Unit 1 RA should be reviewed and revised as necessary to report the age of the trespassing child accurately and consistently. This comment also applies to Table E.3-17 (page E-3-89).
Response: Agree.
Action: As stated in Comment 372: Changed text in Section E.3.3.2.4, page E-3-24, line 29 to "...child age 6 to 18."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-86 Line #: TABLE E.3 Code:
Original Comment #: 338 (OSC 61)
Comment: Table E.3-16 appears to present exposure input parameters for incidental ingestion of and dermal contact with soil and sediment together. It is not clear if the parameter values presented are totals for both soil and sediment, or if the same values were used to evaluate exposure to soil and sediment separately. Table E.3-16 should be revised to clarify how these input parameters were used. This comment also applies to Table E.3-17 (pages E-3-90 and E-3-91).
Response: Agree. Table is confusing.
Action: The word sediment was removed from Table E.3-16 (now E.3-17) because no receptor is contacting sediment under current land use. Table E.3-17 (now E.3-18) was revised to include new receptors, and parameter values for dermal exposure and incidental ingestion to these media were broken out separately.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-87 Line #: TABLE E.3-16 Code:
Original Comment #: 339 (OSC 62)

Comment: Table E.3-16 uses the parameter "SH." This parameter has not yet been defined; therefore, the table should be revised to define this parameter. The parameter values ingestion rate (IR) and fraction ingested (FI) for ingestion of vegetables, fruits, meat, fish, and milk are presented as a product (IR x FI). Table E.3-16 should be revised to present values for IR and FI separately. This comment also applies to Table E.3-17 (pages E-3-91 and E-3-92).

Response: Agree. There is a mislabeled parameter in Equation E.3-4 and its associated parameter.

Action: Change S_i to SH_i in Equation E.3-4.
Change S_o to SH_o in Equation E.3-4.
Change S_i to SH_i in parameter list of Equation E.3-4.
Change S_i to SH_i in parameter list of Equation E.3-4.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-88 Line #: TABLE E.3 Code:
Original Comment #: 340 (OSC 63)

Comment: Footnotes "r" and "h" for Table E.3-17 refer to guidance from U.S. EPA Region V without citing this guidance. These footnotes should be revised to present specific citations to specific guidance documents, meetings, or discussions. This comment also applies to Table E.3-17 (page E-3-92).

Response: Comment acknowledged. References to this table were re-ordered because receptors were added. Vague references were eliminated. This is now table E.3-18.

Action: All reference to "U.S. EPA Region V was removed. [continued in typed text.] Added the following citations to the reference list: "U.S. Department of Energy, 1993d. Responses/Actions to U.S. EPA and Ohio EPA Technical Comments on Part II for the SWCR Response Document issued November, 1992." "U.S. Environmental Protection Agency (EPA) 1993h "Superfund Standard Default Exposure Factors for Central Tendency and Reasonable Maximum Exposure", Preliminary Draft, May 5, 1993."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E.3-3-92 Line #: NA Code:
Original Comment #: 341 (OSC 64)

Comment: Footnote "q" refers to Section E.3.6.6.5. However, this section does not exist in the RA. This footnote should be revised to refer to the appropriate section.

Response: Comment acknowledged. This particular reference was eliminated.

Action: Not applicable.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-93 Line #: FIG. E.3-1 Code:
Original Comment #: 342 (OSC 65)

Comment: Footnote 3 to Figure E.3-1 refers to the RI OU 4 report. This citation should either be full and complete or should be in a format consistent with the remainder of the report. This footnote should be revised.

Response: Agree.

Action: Removed Footnote 3.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3 Page #: E-3-94 Line #: FIG. E-3-2 Code:
Original Comment #: 343 (OSC 66)
Comment: Exposure via ingestion, inhalation, and dermal contact by the visitor and trespassing child to contaminants related to recreational use of surface water in the pits is labeled with Footnote 4. However, such exposures (though accidental) may still occur; Figure E.3-2 should be revised to report these exposures with Footnote 2 also.
Response: Agree.
Action: Footnote 2 added to Footnote 4 for the trespassing child and groundskeeper (this receptor replaced the visitor) receptors as requested.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.2.3 Page #: E-3-5 Line #: 1-12 Code:
Original Comment #: 344 (OSC 27)
Comment: This section discusses the soils at FEMP, specifically those at Operable Unit 1. However, the section does not cite any references for this information. The section should be revised to include citations to references for the soils information discussed.
Response: Agree.
Action: The following sentence was added to the end of E.3.2.3: "For a discussion of pit berms, refer to Section 1.0 of the RI."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.2.6 Page #: E-3-7 Line #: 23 Code:
Original Comment #: 345 (OSC 28)
Comment: This line states that FEMP is located approximately 18 miles northwest of Cincinnati. However, Section E.1.1 says the distance is 17 miles. The text should be revised to consistently report the distance of FEMP from Cincinnati.
Response: Agree. Eighteen miles is the approximate distance from Cincinnati to the FEMP. The distance on this page is correct as stated.
Action: A global review was made to ensure that all such references state "18 miles."

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.3.3 Page #: E-3-10, E-3-11 Line #: Code: (E)
Original Comment #: 346 (OC 13)
Comment: Throughout this section, the term "future exposure scenario" is used in several different ways. It sometimes refers to the "Future Land Use" and sometimes to the current land use in the future with the "Future Source Term." It would be less confusing if the use of "future exposure" were restricted to the Future Land Use. The basis of the baseline risk assessment is that the type of controls seen in this OU will fail in the future. The current land use without institutional controls using the current source term is the unlikely scenario.
Response: Agree. The term "future exposure scenario" was intended to describe future land use and future source term concentrations, but was not used consistently.
Action: The phrase "future exposure scenario" will be substituted by the appropriate term throughout the risk assessment.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.3.1 Page #: E-3-11 Line #: 32 & 33 Code:
Original Comment #: 347 (OSC 29)
Comment: These lines state that Waste Pits 1 through 4 are covered with soil caps of varying thicknesses. However, Waste Pit 4 is covered by a polyethylene cap over compacted clay. The lines should be revised to correctly describe Waste Pit 4.
Response: Agree.
Action: Text changed to: "...Waste Pits 1, 2, and 3 are covered by soil caps of varying thicknesses, and Waste Pit 4 is covered by a polyethylene cap on top of 6 feet of compacted clay."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.3.1 Page #: E-3-12 Line #: 11 Code:
Original Comment #: 348 (OSC 30)
Comment: This line states that Waste Pit 4 has a cap of polyethylene over 4 feet of compacted clay. However, Section E.1.2.1 states that the compacted clay over Waste Pit 4 is 6 feet thick. The RA should be revised to accurately and consistently state the thickness of the clay cap over Waste Pit 4.
Response: Agree. According to Section 1.2.1.4 of the Operable Unit 1 report, Waste Pit 4 has 6 feet of cover material.
Action: This sentence was revised to read, "(polyethylene over six feet of clay)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.3.1.4 Page #: E-3-16 Line #: 9 & 10 Code:
Original Comment #: 349 (OSC 31)
Comment: The off-property reasonable maximum exposure (RME) farmer is described as being located just west of the property boundary; however, the RA does not explain how this location was selected. The text should be revised to briefly explain how the location of the off-property RME farmer was selected. If appropriate, the location being referred to should be described as the maximum off-site receptor for air, as well, as shown in Figure E.3-4.
Response: Agree. The sentence describing the location of the RME was misleading.
Action: The sentence that begins with, "At the present time,..." was deleted.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.3.1.6 Page #: E-3-17 Line #: 14 Code:
Original Comment #: 350 (OSC 32)
Comment: According to this line, the location of the off-property RME farmer was selected based on modeling described in Appendix D. This statement would be more informative if the RA clearly stated that the word modeling referred to air modeling. The line should be revised to replace modeling with air modeling.
Response: Agree. The word "modeling" was revised to "air modeling." This text is now found in Section E.3.3.6.1.
Action: The term "modeling" was replaced by "air modeling."

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.3.3.1.7 Page #: 3-18 Line #: 28-34 Code:(C)
Original Comment #: 351 (OC 14)

Comment: I agree that the trespassing youth is unlikely to swim in the Clearwell. The pertinent question is does the Clearwell contain frogs, tadpoles, cattails, or other things that might interest this age group and cause them to have contact with the surface water? I have not seen the Clearwell, so please explain for me and the reader.

Response: Acknowledged.

Action: This paragraph was changed to read, "Potential exposure to surface water in the Clearwell is considered, but was not included in the final quantitative exposure assessment because it is highly unlikely that the Clearwell would attract a trespasser. Although cattails grow near the Clearwell and frogs possibly exist, which might attract a youth to the area, the sides of the Clearwell are very steep and its water contains heavy algal growth, making it unsuitable for swimming or wading. Exposures would most likely be accidental. Based on such exposure times and intake rates, these acute exposures were judged to be insignificant in the total risk experienced by this receptor."

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.3.3.2 Page #: 3-19 Line #: Code: (M)
Original Comment #: 352 (OC 15)

Comment: [section 3.3.2] Am I mistaken here? I thought that previous OU risk assessments gave the future source term under the current land use (i.e., used Land Use as the major separation), while this OU report list both current and future land use under the future source term (uses Source Term as the separation). I am aiming for consistency in presentation between OU reports, so that we can progress from one OU to another without rethinking the process each time. All labels and presentations should be consistent. Again, the future land use by definition implies no controls and no intact runoff system.

Response: Agree. The risk assessment presentation was modified so that land use is the major delimiter.

Action: Section E.3.3, add:

- "Land use"

After bullets, remove remaining paragraph and replace with the following sentence after the bullets:

"Land use was the main delimiter used for risk presentation. As depicted in Table E.3-1, current and future land use scenarios are considered for this risk assessment. Under the current land use scenario, the site remains an industrial area. This situation is evaluated both with and without access controls. Two future land use configurations are evaluated. In one configuration, access restrictions continue and the area becomes a government reserve. The second scenario assumes that access controls are removed and the land returns to agricultural use."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.3.2 Page #: E-3-20 Line #: 8 Code:
Original Comment #: 353 (OSC 33)

Comment: This line describes the cap over Waste Pit 4 as being constructed of a 4-foot thick layer of clay with a polyethylene liner. However, Section E.1.2.1 states that the cap is comprised of 6 feet of compacted clay with a polyethylene liner. The RA should be revised to accurately and consistently describe the cap over Waste Pit 4.

Response: Agree. According to Section 1.2.1.4 of the Operable Unit 1 report, Waste Pit 4 has 6 feet of cover material.

Action: On page E-3-12, line 11 was revised to read, "(polyethylene over six feet of clay)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.3.2.4 Page #: E-3-25 Line #: 11 - 25 Code:
Original Comment #: 354 (OSC 34)

Comment: The first two bulleted items under Receptors Considered Under Future Land Use describe exposures for the on-property RME resident adult and child. However, these descriptions are incomplete. In addition to the exposures described, both the resident adult and child are expected to receive exposure via inhalation of volatiles and particulates and ingestion of and dermal contact with surface soil and sediment (see Figure E.3-3). These bullets should be revised to be consistent with Figure E.3-3.

Response: Agree. The extraneous information provided was incomplete and misleading.

Action: Deleted, "This adult uses water from an on-property well for drinking and domestic purposes, and consumes vegetables, fruit, meat and dairy products produced on site" from On property RME Resident Adult description. The sentence, "This hypothetical child is assumed to use water from an on-property well for drinking...produced on site," was deleted from page E-3-25, lines 18-20.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.3.2.6 Page #: E-3-25 Line #: 35 Code:
Original Comment #: 355 (OSC 35)

Comment: This line includes the phrase "current source term." The line would be less confusing if this phrase were replaced with "current land use with access controls." The line should be revised as suggested for clarity.

Response: Comment acknowledged. This section was re-written under comment 352 to specify land use and access controls.

Action: See action provided in response to comment 352.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.3.2.7 Page #: E-3-28 Line #: NA Code:
Original Comment #: 356 (0SC 36)

Comment: This section describes the exposure pathways evaluated as part of the future land use. However, the description omits the inhalation of particulates and volatiles, as shown in Figure E.3-3. The section should be revised to describe the inhalation pathway.

Response: Agree.

Action: Bullet was modified in new Section E.3.3.5.5 to state:

- "Inhalation of radon, volatiles and PM-10 particulates - The presence of radon and particulates could result in a quantifiable exposure. The air concentrations to which a receptor could be exposed are based on the modeling discussed in Appendix D."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.4.2.2 Page #: E-3-32 Line #: 19 & 20 Code:
Original Comment #: 357 (OSC 37)
Comment: These lines include the phrase "the three waste pits of concern." This phrase should be replaced with "Waste Pits 3, 5, and 6."
Response: Agree.
Action: The phrase "the waste pits of concern" has been replaced with "Waste Pits 3, 5, and 6...."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.4.5 Page #: E-3-33 Line #: 26 Code:
Original Comment #: 358 (OSC 38)
Comment: This line begins with the phrase, "Three open waste ponds..." The waste management units in Operable Unit 1 have consistently been called pits or the Clearwell. For consistency and clarity, the opening phrase in this line should be replaced with "Waste Pits 5 and 6, and the Clearwell..."
Response: Agree.
Action: The phrase "Three open waste ponds..." has been replaced with "Waste Pits 5, 6, and the Clearwell...."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.4.8.1 Page #: E-3-36 Line #: 9 Code:
Original Comment #: 359 (OSC 39)
Comment: This line states that the maximum risk is predicted to occur in about 680 years. However, Table E.3-13 says that the maximum risk will occur in 630 years. The RA should be corrected to consistently state when the maximum risk will occur.
Response: Comment acknowledged. Risks due to groundwater uranium were recalculated for this iteration. The estimated time until maximum risk for the on-property receptor was estimated to occur in 500 years.
Action: Time of maximum risk in lines 9 has been changed from "680 years" to "500 years." Changed table E.3-13 (now Table E.3-14) to 500 years.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5 Page #: E-3-37 Line #: NA Code:
Original Comment #: 360 (OSC 40)
Comment: This section describes the approach and methods used to quantify exposures. However, this section does not refer to Attachment E.III, which presents sample calculations and various parameter values. This section should be revised to cite and provide a brief discussion of Attachment E.III.
Response: Agree.
Action: After first paragraph of Section E.3.0, the following text was inserted: "Attachment E.III presents example calculations for intake and risk based on the exposure models presented in this section. This attachment also gives chemical specific exposure values used to calculate intakes and risk for all receptors."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5. Page #: E-3-37 Line #: 30 to 32 Code:
Original Comment #: 361 (OSC 41)

Comment: These lines discuss the use of the central tendency (CT) analysis. However, the CT analysis is not clearly defined in the Operable Unit 1 RA. Section E.3.5 should be revised to clearly explain how the CT analysis was conducted, including what exposure point concentrations were used.

Response: Agree. The CT analysis was not clearly explained.

Action: The last two sentences of this paragraph were replaced with: "Exposures for the on-property resident, evaluated under future land use scenario without access controls, were also evaluated under CT conditions. The CT resident adult farmer is presented as a separate receptor. Exposure pathways were equivalent to the on site RME resident farmer, but some exposure parameters were reduced to represent more realistic average exposure."

On Table E.3-2 (now E.3-3), "On Property CT Farmer" was added following the "On-property RME Resident Farmer" scenario. The "On Property CT Resident Farmer" receptor description was deleted as a discrete scenario/receptor.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.1.2 Page #: E-3-39 Line #: 19 Code:
Original Comment #: 362 (OSC 42)

Comment: This line lists the parameter, absorption factor (ABS) used in Equation E.3-3. Presumably each ABS is chemical specific. The section should be revised to describe how the chemical-specific ABS values used in the Operable Unit 1 RA were derived.

Response: Acknowledged. Chemical-specific absorption factors and the manner they were derived were presented in Table E.4-6 and referenced accordingly.

Action: None.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.3.5.2.2 Page #: E-3-41 Line #: 11-13 Code:(M)
Original Comment #: 363 (OC 16)

Comment: I agree with this statement. However, volatile organics in groundwater will be released during showering, and these may constitute a significant risk. Need to be certain all contaminants are adequately discussed.

Response: Agree.

Action: These sentences were revised to state "For volatile compounds, volatilization from groundwater can be an important exposure pathway from showering and other household uses of groundwater. However, for most heavy metals and, hence, most radionuclides at the FEMP, volatilization is not a significant pathway because they do not vaporize at room temperature. The notable exceptions to this are the isotopes of radon. Therefore, this exposure pathway will only be evaluated for radon and those organic chemicals with a Henry's Law constant greater than 1×10^{-5} and with a molecular weight of 200 g/mole or less (EPA, 1991f)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.2.3 Page #: E-3-42 Line #: 3, 6, & 8 Code:
Original Comment #: 364 (OSC 43)

Comment: Line 3 presents the permeability constant parameter (K_p). The RA should be revised to state how the K_p values used in the Operable Unit 1 RA were derived. Line 6 presents the time of event parameter (t_{event}). This line should be revised, if appropriate, to explain that t_{event} is the same as the parameter exposure time (ET) (used in Equation E.3-10). Line 8 presents the time to equilibrium parameter (t^*). This line should be revised to explain how the t^* values used in the Operable Unit 1 RA were derived.

Response: Agree. The source of those values (EPA, 1992e) was not mentioned.

Action: The following sentence was added on line 9 after the variable list: "These variables are defined in EPA, 1992c." Changed (t_{event}) to ET in equation E.3.10 and E.3.11 and subsequent text.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.4.1 Page #: E-3-43 Line #: 13 to 25 Code:
Original Comment #: 365 (OSC 44)

Comment: These lines present various parameters that were used in the equations to calculate the concentration of contaminants in vegetables and fruits. This section should be revised to clearly explain how the values for these parameters were derived.

Response: Acknowledged. Section E.3.5.4.1 presents the equations used. Parameter values used are described in E.III.

Action: As noted in Action 330: After first paragraph of Section E.3.0, the following text was inserted: "Attachment E.III presents example calculations for intake and risk based on the exposure models presented in this section. This attachment also provides chemical specific exposure values used to calculate intakes and risk for all receptors."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.4.1 Page #: E-3-44 Line #: 9 Code:
Original Comment #: 366 (OSC 45)

Comment: The title of this subsection reads in part "Vegetables Contaminated." This should be revised to "Vegetables and Fruits Contaminated."

Response: Agree.

Action: Title was changed from "Vegetables Contaminated by Aerial Deposition" to "Vegetables and Fruits Contaminated by Aerial Deposition."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.4.1 Page #: E-3-44 Line #: 18 to 30 Code:
Original Comment #: 367 (OSC 46)

Comment: These lines present the various parameters that were used to calculate the concentration of contaminants in vegetables and fruits as a result of aerial deposition. This section should be revised to clearly explain how these parameters were derived.

Response: Disagree. This section is intended to present the equations used. Parameter values used are described in E.III.

Action: As noted in Action 330: After first paragraph of Section E.3.0, the following text was inserted: "Attachment E.III presents example calculations for intake and risk based on the exposure models presented in this section. This attachment also gives chemical specific exposure values used to calculate intakes and risk for all receptors."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.4.2 Page #: E-3-46 Line #: 21 to 28 Code:
Original Comment #: 368 (OSC 47)
Comment: These lines present various parameters used to calculate the concentration of contaminants in animal products. This section should be revised to clearly explain how the values for these parameters were derived.
Response: This section is intended to present the equations used. Parameter values used are described in E.III.
Action: As noted in Action 330: After first paragraph of Section E.3.0, the following text was inserted: "Attachment E.III presents example calculations for intake and risk based on the exposure models presented in this section. This attachment also gives chemical specific exposure values used to calculate intakes and risk for all receptors."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.4.2 Page #: E-3-47 Line #: 2 to 17 Code:
Original Comment #: 369 (OSC 48)
Comment: These lines present various parameters used to calculate the concentration of contaminants in plants as a result of irrigation with contaminated water. This section should be revised to clearly explain how the values for these parameters were derived.
Response: This section is intended to present the equations used. Parameter values used are described in E.III.
Action: As noted in Action 330: After first paragraph of Section E.3.0, the following text was inserted: "Attachment E.III presents example calculations for intake and risk based on the exposure models presented in this section. This attachment also gives chemical specific exposure values used to calculate intakes and risk for all receptors."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.4.4 Page #: E-3-48 Line #: 17 to 20 Code:
Original Comment #: 370 (OSC 49)
Comment: These lines present various parameters used to calculate the concentration of contaminants in fish. This section should be revised to clearly explain how the values for these parameters were derived.
Response: This section is intended to present the equations used. Parameter values used are described in E.III.
Action: As noted in Action 330: After first paragraph of Section E.3.0, the following text was inserted: "Attachment E.III presents example calculations for intake and risk based on the exposure models presented in this section. This attachment also gives chemical specific exposure values used to calculate intakes and risk for all receptors."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.5 Page #: E-3-50 Line #: 6 to 12 Code:
Original Comment #: 371 (OSC 50)
Comment: These lines present various parameters used to calculate radon concentrations in indoor air. This section should be revised to clearly explain how the values for these parameters were derived.
Response: This section is intended to present the equations used. Parameter values used are described in E.III.

Action: As noted in Action 330: After first paragraph of Section E.3.0, the following text was inserted: "Attachment E.III presents example calculations for intake and risk based on the exposure models presented in this section. This attachment also gives chemical specific exposure values used to calculate intakes and risk for all receptors."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.7.1 Page #: E-3-51 Line #: 13 Code:
Original Comment #: 372 (OSC 51)
Comment: This line states that the age of the trespassing child is assumed to be between 6 and 18 years of age. However, Section E.3.3.2.4 states the age to be 6 to 17 years of age. This inconsistency should be resolved.
Response: Agree. The trespassing child is exposed for 12 years (from the 6th birthday up until the 18th birthday).
Action: Changed text in Section E.3.3.4.2 to "...child age 6 to 18."

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.3.5.7.1 Page #: E-3-51 Line #: 19-22 Code:(E)
Original Comment #: 373 (OC 17)
Comment: EPA Region V has no requirement for a trespassing youth over a duration of 12 years. This was mutually agreed upon as a reasonable and convenient scenario for evaluation of this site.
Response: Agree. This duration was agreed upon during comment resolution for the Site-Wide Characterization Report (SWCR).
Action: Change "EPA Region V requires this activity to be evaluated over a period of 12 years" to "U.S. EPA suggests this activity to be evaluated over a period of 12 years (DOE 1992d)." Add the following citation to the reference list: "U.S. Department of Energy, 1992d. Responses to U.S. EPA and Ohio EPA Technical Comments on the Site-Wide Characterization Report Response Document, November 1992."

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.3.5.7.1 Page #: E-3-51 Line #: 19-22 Code:(M)
Original Comment #: 374 (OC 18)
Comment: I am confused here. If the currents in the Great Miami River are so strong as to prevent swimming, why consider this scenario? Exposure during boating, fishing, diving or some other activity would be more appropriate. Why is the exposure limited to a 30-year period if the resident lives in the area for 70 years?
Response: Agree. Text is confusing. The river currents are not so strong as to prevent contact from recreational use of the river. The current receptor, Great Miami River User, was assumed to be exposed to river water based on recreational use of the river which is assumed to include all activities such as: swimming, fishing, boating, diving and wading.
Action: The text was revised to remove reference to the statement that the river currents are too strong as to prevent swimming or other activities that involve direct contact from recreational exposure.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E Page #: E-3-52 Line #: 4-7 Code:(C)
Original Comment #: 375 (OC 19)

Comment: I do not understand the exposure duration of 500 hours or 10 hours a day for the home builder scenario. Builders in the Chicago area will not guarantee delivery of a home in less than 6 months after the groundbreaking date; I believe that this is also the time frame used by the Army Corp of Engineers in their contracting. It also seems unlikely that the tradespeople will work a 10 hour day; it is more likely to be 6.5-7 hours. Explain this source.

Response: The exposure duration assumption of 500 hours is taken from "*De Minimis,* Waste Impacts Analysis Methodology," U.S. Nuclear Regulatory Commission 1984, NUREG/CR-3585. p. 6-10.

Action: Change new Section 3.5.7.2 as follows. "The home builder is evaluated to assess the health impacts of exposures incurred while building a home on the property. For this activity, the total time spent building the house is assumed to be 500 hours. This is equivalent to a construction period of 3 months, which is believed to be reasonably conservative for typical construction. It is believed to be very conservative for activities involving the use of heavy construction equipment. (NRC, 1984b.) Therefore, assuming a worker spends 10 hours per day during construction, the exposure frequency for the home builder is 50 days per year."

Add to reference section: *De Minimis,* Waste Impacts Analysis Methodology, U.S. Nuclear Regulatory Commission (NRC) 1984b, NUREG/CR-3585.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.7.3 Page #: E-3-52 Line #: 22 Code:
Original Comment #: 376 (OSC 52)

Comment: This line states that guidance assumes that the CT farmer is exposed outdoors for 48 days out of 275 days on site. However, the farmer would need to be outdoors 24 hours per day during each of these 48 days. Because this scenario is unlikely, this line should be revised to more clearly explain that the relevant guidance (with an appropriate citation) assumes that the CT farmer will be outside about 1,152 (48 days x 24 hours per day) hours over a time period of 275 days.

Response: Agree.

Action: Replaced "U.S. EPA Region V assumes the CT resident adult farmer is exposed outdoors for 48 days out of the 275 days spent on a site. This is equivalent to an exposure time of 4.2 hours per day" with "It is assumed that the CT resident adult farmer is exposed outdoors for 1,152 hours (equal to 48 days of continuous exposure) out of the 275 days spent within the boundaries of the operable unit each year (EPA, 1993h). This is equivalent to an exposure time of 4.2 hours per day of exposure."

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.3.5.7.3 Page #: E-3-54 Line #: 4-25 Code:(M)
Original Comment #: 377 (OC 20)

Comment: There appear to be conflicts in the exposure parameters derived for the on-site farmer in these two sections. The first section discusses a RME exposure of 2000 hrs/year outdoors, which is equivalent to 5.7 hrs/day over 350 days/year, and a CT exposure of 48/275 days/year, which is said to be equivalent to 4.2 hrs/day over 275 days/year. This

scenario on page E-3-54 describes the practice of the average farmer from US Conservation Services data as 800 hours/year in actual farming. This would appear to describe a CT (average) farmer exposure, not a RME exposure. What would the reasonable exposure times for the RME exposure be? What if the farmer plants more than 10 percent of his land in hay? Is he at greater risk? This entire exposure scenario needs more thought. I also did not understand the reference to EPA Region V for the 48 day CT exposure.

Response: Agree. The use of an exposure time (ET) of 2,000 hours per year (Section E.3.5.7.3, page E-3-52) is to identify the total amount of time a farmer would be outdoors exposed to particulates from inhalation exposure due to **all** outdoor activities. The exposure time (ET) of 800 hours per year discussed on page E-3-54 was assumed to be the total amount of time that the farmer would be actively farming and contacting the soil at a higher rate (i.e., discing, plowing, harvesting crops) or involved in those specific activities that would warrant consideration of a higher average soil ingestion rate for farming activities versus non-farming activities (i.e, 480 mg/day versus 100 mg/day). It was assumed that the remaining 1,200 hours the farmer would be exposed to soil from incidental ingestion at 100 mg/day. Therefore, while the exposure times discussed imply an inconsistent use of exposure time for the RME on-property farmer, they actually refer to two different types of activity: total outdoor exposure via inhalation (2,000 hours/year) and total outdoor-farming exposure via soil incidental ingestion (800 hours/year). The former value was used to calculate risk from inhalation of particulates and external radiation exposure outdoors while the latter value was used only to derive an average daily soil incidental ingestion rate for the farmer.

For the central tendency (CT) value, the ET value of 48 days (1152 hours) per year was obtained from phone conversations between EPA Region 5 toxicologist Pat Van Leeuwen and Mike Bollenbacher. This exposure time was used to determine the total outdoor exposure for inhalation and external radiation exposure for the CT farmer. It was further assumed that exposure frequency for the CT farmer was 275 days/year. This results in an equivalent exposure time of 4.2 hours/day for the CT farmer (versus 5.7 hours/day for the RME farmer).

This methodology and these particular values are consistent with those used in the approved OU4 Baseline Risk Assessment. Therefore, these values are considered appropriate for use in the Operable Unit 1 baseline risk assessment.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.7.4 Page #: E-3-53 Line #: 16-18 Code:
Original Comment #: 378 (OSC 53)

Comment: These lines explain that an inhalation value of 0.83 cubic meters per hour (m^3/hour) was used for all adult exposures. However, this is an average value based on a 24-hour time period, including sleeping hours. The construction worker will not be on site 24 hours per day and will be doing moderate to heavy activities much of the time on site. The Operable Unit 1 RA should be revised to use a more appropriate inhalation rate for the construction worker. A value similar to the value of 2.0 m^3/hour for the on-site visitor would be acceptable.

Response: Comment acknowledged.

Action: The standard default value of 2.5 m^3, taken from OSWER directive 9285.6-03, was used for the construction worker. This value is the rate for an individual engaged in heavy

activities so it is expected to provide a conservative estimate of inhalation exposures for a construction worker.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.3.5.7.5 Page #: E-3-54 Line #: 9 Code:
Original Comment #: 379 (OSC 54)
Comment: This line refers to the U.S. Soil Conservation Service Field Office Technical Guide. However, the section does not include a citation for this document. The section should be revised to include a citation for this document.
Response: Agree.
Action: Citation was added for U.S. Department of Agriculture, Soil Conservation Service (USSCS, 1992), Revised Field Office Technical Guide, Columbus, Ohio.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E-3.5.7.9 Page #: E-3-56 Line #: Code:(C)
Original Comment #: 380 (OC 21)
Comment: The body surface area values discussed here appear to be CT values (based on the 50th percentile) rather than RME values (based on 95th percentile). This is a recurring comment. See also OU4 comments.
Response: Agree.
Action: The values cited in this section and used in the risk calculations for body surface area were revised to use the 95th percentile values, as requested.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4 Page #: E-4-87 & E-4-88 Line #:Table E.4-1 Code:
Original Comment #: 381 (OSC 74)
Comment: No references are cited for the radionuclide data presented. The data, including inhalation, gastrointestinal (GI) absorption factor, ingestion, and penetrating external exposure, should be cited and references provided in the reference section.
Response: Agree. Radionuclide constants were taken from the 1993 version of HEAST.
Action: Reference of HEAST (EPA 1993g) was added to table.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4.1.2 Page #: E-4-5 Line #: 24 to 26 Code:
Original Comment #: 382 (OSC 67)
Comment: The second bullet should be rewritten. As noted in the following paragraph, all 2,3,7,8-chlorinated dioxins and furans are considered carcinogenic; however, not all (unqualified) dioxins and furans are considered carcinogenic, as is stated currently.
Response: Agree.
Action: Text in Section E.4.1.2 (now E.1.4) was modified to state, "These TEFs were determined with the basic assumption that selected dioxins and furans are carcinogenic."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4.4.2 Page #: E-4-10 Line #: 24 & 25 Code:
Original Comment #: 383 (OSC 68)
Comment: The fourth bullet should be rewritten. It is well established (not an assumption) that arsenic in drinking water is a human carcinogen. As discussed below in the comment discussing Section E.4.3.5.3, the current controversy surrounding arsenic in drinking

water involves deriving the slope factor from available epidemiological studies. The existence of an effect is not disputed.

Response: Agree. This bullet also contradicts the Toxicity Profile for Arsenic presented later in this section. We do not question the carcinogenicity of arsenic. Also, it was noticed that this section is redundant as uncertainties are presented in Section E.6.

Action: Section E.4.2 (Uncertainty Analysis for Toxicity Assessment) was removed.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.4.3 Page #: E-4-11 Line #: Code: (E)
Original Comment #: 384 (OC 22)

Comment: [Section 4.3, Toxicological Profiles. It would improve the readability of this section if the names of the chemicals were in capital letters or in bold print.]

Response: Agree. This would improve the readability of the "Toxicological Profiles" section (now E.4.2).

Action: Chemical titles for toxicity profiles, currently underlined, will be underlined and bolded to improve readability.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4.3.29 Page #: E-4-30 Line #: 4 to 11 Code:
Original Comment #: 385 (OSC 69)

Comment: This list of specific congeners and homologues should be corrected. First, 1,2,3,4,7,8,9-heptachlorodibenzo-p-dioxin (1,2,3,4,7,8,9-heptaCDD) is identical to 1,2,3,4,6,7,8-heptaCDD. The latter name is preferred over the former (lower sum of the digits), so the former should be dropped. Also, the list omits the two most potent chemicals: 2,3,7,8-tetrachlorodibenzo-p-dioxin and 1,2,3,7,8-pentachlorodibenzo-p-dioxin. These chemicals should be added to the list. U.S. DOE should consider specifying all 2,3,7,8-chlorinated derivatives rather than listing them.

Response: Agree.

Action: Removed paragraph from E.4.3.29 (now E.4.2.29) and replaced with: "Specific congeners and homologues of these classes of interest at this site include all 2,3,7,8-chlorinated derivatives, unspecified tetrachlorodibenzofurans, and unspecified hexachlorodibenzofurans.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.4.3.47.2 Page #: E-4-40, 41 Line #: 6; 1-4, 10-13 Code:(M)
Original Comment #: 386 (OC 23)

Comment: [Lead Profile] There appear to be a number of erroneous statements in this profile. Line 6: The NAAQS standard for lead cannot be used in lieu of an inhalation RfC for lead; this contaminant has multiple exposure routes and cannot be calculated as a single pathway chemical. Page E-4-41, lines 1-4: There has been an interim version of the UBK Model (Version 0.5/0.6) in use for some time. It has been widely applied at CERCLA sites. Lines 10-13: The guidance referred to here (EPA 1991) recommends the use of the UBK Model at CERCLA/RCRA sites. The use of the OSWER directive is more applicable at this site which does not afford current measures of residential exposure (e.g., water, indoor dust, paints, etc.)

Response: Agree that the NAAQS standard for lead cannot be used in lieu of an inhalation RfC. The NAAQS reference is from Table 1 of the 1993 HEAST document. This value is not used in the Operable Unit 1 Risk Assessment. Agree that OSWER directive 9355.4-02 (EPA 1989k) is more applicable to this site than the IUBK model.

Action: In Section E.4.3.47.2 (now E.4.2.47.2) change "EPA (1992b)" to "HEAST (EPA 1993g)." Delete lines 6-9 on page E-4-40 beginning with "The NAAQSs..." and add "However, the NAAQS standard was not used in the Operable Unit 1 baseline risk assessment." Lead concentrations were evaluated using the OSWER directive for surface soil and not the IUBK model.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4.3.47.2 Page #: E-4-41 Line #: 1 to 4 Code:
Original Comment #: 387 (OSC 70)
Comment: FEMP says it will not use U.S. EPA's Uptake/Biokinetic (UBK) model until final guidance for the model is issued. Nevertheless, the model remains one of the best currently available for estimating the risk associated with lead. The cited range (500 to 1,000 parts per million in surface soil) ignores exposure to groundwater and was derived using procedures and assumptions that differ from those currently used during standard assessment procedures. The RA should be revised to use U.S. EPA's UBK model for evaluating the risk associated with lead.
Response: Acknowledged. This comment contradicts guidance given in Comment 386.
Action: As stated in Comment 386: Line 6: Change "EPA (1992b)" to "HEAST (EPA 1993g)." Delete lines 6-9 on page E-4-40 beginning with "The NAAQSs..." and add "However, the NAAQS standard was not used in the Operable Unit 1 baseline risk assessment." Lead concentrations were evaluated using the OSWER directive for surface soil and not the IUBK model.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4.3.58.1 Page #: E-4-48 Line #: 13 Code:
Original Comment #: 388 (OSC 71)
Comment: Molybdenum poisoning is called "teart" not "heart disease." This section should be revised to use the term "teart" to describe molybdenum poisoning.
Response: Agree. This was a typographical error.
Action: Change text from "heart disease" to "teart" as requested.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4.3.59 Page #: E-4-48 Line #: 31 Code:
Original Comment #: 389 (OSC 72)
Comment: The text refers to a (n,8) nuclear reaction. There is no such reaction, since there is no "8-particle." FEMP should check its reference and correct the text, as appropriate.
Response: Agree.
Action: Change "(n,8)" to "(β)".

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4.3.64.1 Page #: E-4-52 Line #: 15 Code:
Original Comment #: 390 (OSC 73)
Comment: The text says "the dinitro phenols are administrative." The text should be revised to clarify what this phrase means.
Response: Agree. The phrase is confusing and does not contribute to this section discussing the pharmacokinetics of 4-Nitrophenol.
Action: Delete sentence "EPA (1980) stated that the dinitrophenols were administrative."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4 Page #: E-4-89 to 3-4-91 Line #: Table E.4-2 Code:
Original Comment #: 391 (OSC 76)
Comment: No units of measurement are provided for the data presented in the "Inhalation Slope Factor or Unit Risk Source" column. The appropriate units of measurement should be added to this column heading.
Response: Agree.
Action: The unit $(mg/kg/day)^{-1}$ was added to the table.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4 Page #: E-4-89 to E-4-91 Line #: Table E.4-2 Code:
Original Comment #: 392 (OSC 75)
Comment: Many errors were found in the 20 percent of the data that was checked. The majority of these errors consisted of discrepancies between the source cited and the presented value. The references for this table should be checked and the inconsistencies should be corrected.
Response: Acknowledged.
Action: A thorough quality check of this table was performed.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4 Page #: E-4-90 Line #: Table E.4-2 Code:
Original Comment #: 393 (OSC 77)
Comment: The table lists an inhalation slope factor of 3.4×10^{-1} $(mg/kg \bullet day)^{-1}$ for 4,4'-DDT and cites IRIS as a reference for this information. The IRIS database also lists a value of 3.4×10^{-1} $(mg/kg \bullet day)^{-1}$, but for the oral slope factor. The inhalation slope factor was substantiated by HEAST 1992. The citation for the inhalation slope factor should be changed to HEAST 1992. Additionally, the appropriate data from IRIS should be recorded under the oral slope factor and properly cited.
Response: Agree. The reference for the inhalation slope factor for 4.4'-DDT was incorrect.
Action: Changed reference for the inhalation slope factor to HEAST.

Commenting Organization: US EPA Commentor: Van Leeuwen
Section #: E.4 Page #: E-4-93 Line #: Code: (E)
Original Comment #: 394 (OC 24)
Comment: [Table E4.4] The TEF values listed here for carcinogenic PAHs should be rounded to one significant digit. The values listed imply an accuracy which is not present.
Response: Agree.
Action: TEF values have been rounded to one significant digit.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.4 Page #: E-4-96 Line #: Table E.4-5 Code:
Original Comment #: 395 (OSC 78)
Comment: Note "a" references Section E.4.4.4 in the report; no such section exists. This reference should be checked and corrected.
Response: Comment acknowledged.
Action: Table was changed to E.4-2. Cancer slope factors were referred to by original references.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.0 Page #: NA Line #: NA Code:
Original Comment #: 396 (OGC 9)

Comment: Summation errors were identified in several of the E.IV- tables. For example, in Table E.IV-1 the total of the inhalation column for radionuclides is reported as 1.1×10^{-5}; in fact, the figures presented sum to 2.6×10^{-5}. Moreover, in several instances, the numbers presented in these tables did not correspond with numbers presented in the text and in Tables E.5-1 to E.5-12. For example, in Section E.5.3.1 under the heading Chemical Carcinogens, the total chemical carcinogenic risk for the trespassing child from dermal contact with soil is reported as 3×10^{-5}; Table E.IV-9 reports this total as 6.6×10^{-5}. Furthermore, in Table E.5-2, the value presented for a trespassing child ingesting surface soil (0.02) does not correspond with the hazard index presented in Table E.IV-2 (0.14). U.S. Department of Energy (U.S. DOE) should review the tables and eliminate any inconsistencies between the tables and the text. Moreover, revisions made to the detail tables should be carried through all appropriate summary tables. Furthermore, all carcinogenic risks should be presented with one significant figure and all noncarcinogenic risks with two significant figures, per U.S. EPA guidance.

Response: Agree. There were several inconsistencies in the summary tables.

Action: Risk assessment calculations were performed and results presented in linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate results.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.0 Page #: NA Line #: NA Code:
Original Comment #: 397 (OGC 10)

Comment: There appears to be inconsistent page numbering in the document. This may cause confusion for reviewers who are unfamiliar with the document and for identifying referenced passages. The document should be reviewed and revised so the page numbering is consistent.

Response: Agree.

Action: Page numbering has been revised to achieve consistency.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.0 Page #: NA Line #: NA Code:
Original Comment #: 398 (OGC 8)

Comment: This section adequately presents land use-specific, exposure scenario-specific, pathway-specific, route-specific, and chemical-specific risks. However, the summary of this data is inadequate. The report should be revised to include a set of tables, charts, figures, or some combination of these that clearly presents the pathways, routes, radionuclides, and chemicals posing a significant risk of each exposure.

Response: Disagree. This chapter presents a summary of risks similar to the tables in the risk assessment for OU4. Chemical and route-specific risks are presented in Appendix E-IV and referenced accordingly.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.1.2.1 Page #: E-5-2 Line #: 27 Code:
Original Comment #: 399 (OSC 79)
Comment: DOE presents risk levels that it states are generally considered acceptable or unacceptable by U.S. EPA. However, DOE does not cite a reference for the source of the risk levels. The report should be revised to include a reference for the risk levels presented.
Response: Agree.
Action: Change "... and risks greater than 1 x 10^{-4} (1 in 10,000) are generally considered to be unacceptable by the agency" to "... and risks greater than 1 x 10^{-4} (1 in 10,000) are generally considered to be unacceptable by the agency (EPA 1990e)." Add the following reference to the reference list: U.S. Environmental Protection Agency, 1990. "40 CFR Part 300, National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule" as presented in the Federal Register, Vol. 55, No. 46, pg. 8848."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.2.1 Page #: E-5-4 Line #: 28 to 31 Code:
Original Comment #: 400 (OSC 80)
Comment: U.S. DOE states that air modeling was used to find the grid location of maximum risk. However, the report does not discuss why all grid locations of significant risk (greater than 1 x 10^{-6}) were not identified. The report should be revised to (1) provide such a discussion or (2) include all grid locations of significant risk.
Response: Acknowledged. As with past FEMP risk assessments, specific RME locations were selected such that, if the concentrations was acceptable under maximum air containment exposure, it would be acceptable for other locations. Deposition contours were presented in Appendix D for uranium, arsenic and radon. However, generation of risk isopleths for all air pathways, including biotransfer to plants and livestock is beyond the scope of this baseline risk assessment.
Action: None required.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.2.1.1 Page #: E-5-5 Line #: 27 to 29 Code:
Original Comment #: 401 (OSC 81)
Comment: The text is inconsistent with the data presented in Table E.IV-2. For example, a hazard index of 0.1 is predicted for ingestion of soil, not dermal contact with soil. Also, arsenic poses a significant risk of the same magnitude as uranium and antimony and should, therefore, be cited with uranium and antimony in the text. The report should be revised to eliminate all inconsistencies between the text and tables.
Response: Comment acknowledged.
Action: After recalculation of the risks, the results were re-evaluated and the constituents and pathways of greatest concern were determined. Text and tables were revised.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.2.1.2. Page #: E-5-6 Line #: 11 to 14 Code:
Original Comment #: 402 (OSC 82)
Comment: The text states that uranium and thorium isotopes and radon (Rn)-222 are the primary contributors to the inhalation risk. However, radium (Ra)-226 and lead (Pb)-210 are also significant and in the same magnitude (10^{-6}). Therefore, the text should be revised to include Ra-226 and Pb-210. The text also states that uranium, thorium, and radium

isotopes are most significant in external gamma exposure. However, cesium (Cs)-137 is also significant and within the same order of magnitude. Therefore, the text should be revised to include Cs-137.

Response: Comment acknowledged.

Action: After recalculation of the risks, the results were re-evaluated and the constituents and pathways of greatest concern were determined. Text was revised to incorporate appropriate comments.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.2.2.1 Page #: E-5-7 Line #: 10 to 12 Code:
Original Comment #: 403 (OSC 83)

Comment: The report states that the carcinogenic risks are primarily associated with the presence of thorium and uranium isotopes and Rn-222. However, Ra-226 and Pb-210 are also significant and within the same order of magnitude (10^{-6}). Therefore, the text should be revised to include Ra-226 and Pb-210.

Response: Comment acknowledged.

Action: After recalculation of the risks, the results were re-evaluated and the constituents and pathways of greatest concern were determined. Text was revised to incorporate appropriate comments.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.2.2.2 Page #: E-5-8 Line #: 24 Code:
Original Comment #: 404 (OSC 84)

Comment: This line refers to the surface water and groundwater pathways for the off-property resident adult farmer. However, Table E.IV-8 only presents risks for the soil and air pathways. Either the text or the table should be revised to eliminate this inconsistency.

Response: Comment acknowledged.

Action: Risks were calculated and presented with linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate calculation and presentation.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.2.3 Page #: E-5-9 Line #: 31 to 32 Code:
Original Comment #: 405 (OSC 85)

Comment: This line states that the high risks associated with arsenic, chromium, cadmium, and Aroclor 1254 (a polychlorinated biphenyl [PCB]) illustrate the conservative nature of the scenario assumptions and exposure parameters used. In essence, this statement could follow any estimated risk. However, its placement here seems to recommend that the reader disregard the risks from metals and PCBs. Therefore, the report should be either revised to include a more thorough discussion of the risks associated with arsenic, chromium, cadmium, and Aroclor 1254 or the statement should be removed.

Response: Agree. This statement is relevant to the uncertainties section of the document.

Action: Statement was removed.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.1 Page #: E-5-10 Line #: 33 Code:
Original Comment #: 406 (OSC 86)
Comment: The report states that inhalation of fugitive dust and dermal contact with soil result in the greatest individual pathway risks to off-property residents. However, the risk from incidental ingestion for off-property residents presented in Table E.IV-9 is greater than that for dermal contact. The report should be revised to eliminate this inconsistency.
Response: comment acknowledged.
Action: After re-calculation of the risks, the results were re-evaluated and the constituents and pathways of greatest concern were determined. Text was revised appropriately.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.2 Page #: E-5-11 Line #: 16 to 18 Code:
Original Comment #: 407 (OSC 87)
Comment: The report states that a point of maximum risk was determined using groundwater modeling. However, the report does not state why all the points of significant risk were not identified. The report should be revised to (1) provide such a discussion or (2) include all points of significant risk.
Response: Agree. Risk isopleths were presented in attachment E.IV, but not discussed or referenced in this section.

Action: Risk isopleths for carcinogenic risk and hazard index for Uranium in groundwater (representing 99% of the carcinogenic risk for the off-property RME farmer) are presented as Figures E.5-1 and E.5-2 and also in Section 6.0 of the RI.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.2.1 Page #: E-5-11 Line #: 33 Code:
Original Comment #: 408 (OSC 88)
Comment: This line states that the most significant routes of exposure for the off-property resident are the inhalation of fugitive dust and the ingestion of drinking water. However, ingestion of vegetables and fruits poses a risk in the same order of magnitude (10^{-5}) as inhalation and ingestion. Therefore, the report should be revised to include the ingestion pathway.
Response: Comment acknowledged.
Action: After re-calculation of the risks, the results were re-evaluated and the constituents and pathways of greatest concern were determined.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.2.1 Page #: E-5-12 Line #: 2 Code:
Original Comment #: 409 (OSC 89)
Comment: This line states that the risk associated with inhalation of uranium and thorium isotopes and Rn-222 is about 99 percent of "the total." However, it is not clear whether the total referred to is the total inhalation risk or the total risk from all pathways. The text should be revised to clarify which total is referred to. Also, the estimation that these radionuclides pose 99 percent of the risk is not consistent with Table E.IV-11. This difference should be reconciled.
Response: Comment acknowledged.

Action: After re-calculation of the risks, the results were re-evaluated and the constituents and pathways of greatest concern were determined.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.2.1 Page #: E-5-12 Line #: 4 Code:
Original Comment #: 410 (OSC 90)
Comment: This line states that the total risk is an overestimation. However, the actual risk is not known. Therefore, the text should be revised to state that the total risk is likely to be overestimated by the RA.
Response: Comment acknowledged. This section, discussing risks to the off property resident adult farmer, was moved to E.5.5.5.
Action: Not applicable.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.2.2 Page #: E-5-12 Line #: 26 Code:
Original Comment #: 411 (OSC 91)
Comment: This line refers to modeling conducted for the facility. However, the source of the modeled data is not cited. The text should be revised to include a citation to the section of the report that contains the results of the modeling.
Response: Comment acknowledged.
Action: This section was completely re-written. Reference to modeling was removed.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.2.2 Page #: E-5-12 Line #: 29 & 30 Code:
Original Comment #: 412 (OSC 92)
Comment: This line refers to a generally acceptable risk range. However, the report does not cite a reference for the source of the acceptable range. The report should be revised to cite the source of the acceptable range.
Response: Comment acknowledged.
Action: This section was completely re-written.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.2.3 Page #: E-5-13 Line #: 22 Code:
Original Comment #: 413 (OSC 93)
Comment: This line refers to risks associated with benzene in on-site water-filled pits. However, Table E.IV-14 presents beryllium, but not benzene. The RA should be revised to eliminate this inconsistency.
Response: Comment acknowledged.
Action: This section was completely re-written.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.2.4 Page #: E-5-14 Line #: 2 Code:
Original Comment #: 414 (OSC 94)
Comment: This line refers to risks considered "as unacceptable." The word "as" should be removed from the text.
Response: Comment acknowledged.
Action: This section was completely re-written.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.3.2 Page #: E-5-16 Line #: 4 Code:
Original Comment #: 415 (OSC 95)
Comment: This line refers to health effects closer to the average or mean incidence rate. However, because the actual incidence rate is not known, this line should be revised to refer to the expected average or mean incidence rate.
Response: Agree. Text was modified to state the "expected average."
Action: Changed line 4 to read, "While the central tendency evaluation calculates an incidence of health effects that is closer to the expected average or median incidence rate, it is important to note that many of the parameter values used exceed the median or average values."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.3.3 Page #: E-5-17 Line #: 15 Code:
Original Comment #: 416 (OSC 96)
Comment: This line states that 25 percent of the total risk is caused by direct exposures to surface soil and exposed waste pit materials. However, the risks from all chemical carcinogens via these pathways is presented as "NA" in Table E.IV-20. The report should be revised to eliminate this inconsistency.
Response: Comment acknowledged. This is now E.IV-21.
Action: The "NA" in Table E.IV-21 was changed to total risk numbers that are appropriate for these exposure pathways.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.3.3.3 Page #: E-5-17 Line #: 24 to 26 Code:
Original Comment #: 417 (OSC 97)
Comment: These lines refer to an interim soil cleanup level for lead that was recommended for use at Superfund sites by U.S. EPA in 1989. However, the lead UBK model has been developed since 1989 by U.S. EPA to assess the risk from lead. Therefore, DOE should use the lead UBK model to assess the risk from lead at FEMP.
Response: Comment acknowledged. However, this comment contradicts guidance given in Comment 386.
Action: No action taken.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.5.4 Page #: E-5-20 Line #: 30 & 31 Code:
Original Comment #: 418 (OSC 98)
Comment: The last sentence in this paragraph does not make sense as it is presented. The text should be revised to construct a complete sentence.
Response: Comment acknowledged.
Action: After re-calculation of the risks, the results were re-evaluated and the constituents and pathways of greatest concern were determined.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.0 (GENERAL) Page #: E-6-1-16 Line #: NA Code:
Original Comment #: 419 (OSC 107)
Comment: Under the remark header for the item titled "Assumptions for source terms," the phrase "Waste Pit 3 cap" should be changed to "Waste Pit 4 cap."

Response: Comment acknowledged. However, the waste Pit 3 cover is assumed to fail for the future source term.
Action: Changed "cap" to "cover" to reduce confusion (Table E.6-3 in current revision).

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.0 (GENERAL) Page #: E-6-1-17 Line #: NA Code:
Original Comment #: 420 (OSC 108)
Comment: The footnotes on this page cannot be identified with regard to which is footnote "a" and which is footnote "b." The footnotes on this page should be revised to be clearly identified by letter.
Response: Agree. Footnotes were truncated off page.
Action: The footnotes on the referenced page have been revised to avoid misidentification.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E (GENERAL) Page #: NA Line #: NA Code:
Original Comment #: 421 (OGC 4)
Comment: The RA discusses various uncertainties and their potential effects on the exposures and risks estimated for Operable Unit 1. However, some of these uncertainties are discussed without giving specific examples of conditions at Operable Unit 1. For example, Section E.6.0 states that the Linear Multistage Model may overestimate slope factors for constituents that have a cancer threshold. However, this discussion is incomplete and somewhat misleading. The RA should specifically state how many, if any, of the constituents of potential concern at Operable Unit 1 have, or may have, a cancer threshold, and which slope factors may have been overestimated. The RA should be revised to include specific examples relevant to Operable Unit 1 for each of the uncertainties discussed.
Response: Disagree. The purpose of an uncertainty section is to identify potential sources of uncertainty. This particular example, the linearized multistage model, is an example of potential uncertainty inherent in all carcinogenic risk assessments. This section qualitatively summarizes potential sources of uncertainty that may impact the Operable Unit 1, baseline risk assessment. One significant source of uncertainty is the assumption that, at low doses, the dose-response curve is of a particular shape, the most conservative of which is the assumption of a linear, nonthreshold relationship, termed the linearized multistage model (Amdur et al., 1991). Assumptions must be made regarding a chemical's dose-response to compensate for the unresolvable differences in the most appropriate way in order to compensate for a lack of definitive knowledge of the mode of action for carcinogenicity from exposure to a particular compound (Amdur et al., 1991). This assumption must be considered, along with the carcinogenicity weight-of-evidence classification for each constituent, to determine the overall uncertainty associated with the carcinogenic risk assessment. However, it is considered inappropriate and beyond the scope of a qualitative uncertainty analysis to re-evaluate the available studies for each constituents to determine if the available data is adequate to determine whether a constituent poses a threshold response for carcinogenicity for each route of exposure. Generally, data is inadequate to classify a chemical as a known human carcinogen as evident by the few Class A carcinogens. The majority of carcinogenic compounds are classified as possible or probable human carcinogens based on a review of inadequate data for a clear determination. Often, data is adequate to develop a causation but still inadequate to quantify the exact dose-response for some Class A carcinogens (i.e., oral dose-response for arsenic). Thus, data is usually inadequate for Class B and C carcinogens to determine the exact dose-response relationship. Thus, data is

typically not adequate to determine which of these compounds exhibit a threshold to carcinogenicity.
Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.1 Page #: E-6-2 Line #: 17 to 20 Code:
Original Comment #: 422 (OSC 99)
Comment: The last sentence in this paragraph discusses risks that fall between 10^{-6} and 10^{-4}. However, the paragraph does not discuss risks that fall above 10^{-4}. This paragraph should be revised to discuss risks that exceed 10^{-4}.
Response: Agree.
Action: Text modified to state in parenthesis, "(e.g., exceed an ILCR of 10^{-4})...".

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.2.1 Page #: E-6-4 Line #: 3 Code:
Original Comment #: 423 (OSC 100)
Comment: This line includes the phrase "...the following sources." However, this section does not and cannot discuss all sources of uncertainty. The phrase should be revised to read, "...the following major sources."
Response: Agree.
Action: Text modified as to state "major sources."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.2.2 Page #: E-6-5 Line #: 13 Code:
Original Comment #: 424 (OSC 101)
Comment: This line includes the phrase "from selection of calculation of." This phrase does not make sense in the context in which it is found. The phrase should be revised to read, "...from calculation of..."
Response: Agree.
Action: Changed text from "from selection of calculation of" to "...from calculation of...".

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.2.2.1 Page #: E-6-7 Line #: 24 Code:
Original Comment #: 425 (OSC 102)
Comment: This line suggests that only four systemic toxicants were evaluated during RA, all of which are polyaromatic hydrocarbons (PAH). However, the Operable Unit 1 RA also evaluated various metals and organics, such as Chromium III and toluene, which are also systemic toxicants. This line should be revised to reflect the actual number of systemic toxicants evaluated during the RA.
Response: Agree.
Action: Sentence changed to: "The application of this procedure in a risk assessment primarily affects four of the systemic toxicants that were evaluated in the Operable Unit 1 Baseline risk assessment..."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.2.3 Page #: E-6-10 Line #: 23 & 24 Code:
Original Comment #: 426 (OSC 103)

Comment: These lines discuss the fact that many chlorinated organics are considered Group B2 carcinogens based on tests conducted using mice having a high background incidence of cancer. While this is interesting to consider, it is not directly relevant to the Operable Unit 1 RA. The lines should be revised to discuss which, if any, of the constituents of potential concern at Operable Unit 1 may fall into this category.

Response: Agree. This is not directly relevant to the Operable Unit 1 RA.

Action: Passage "A unique source...fall into this category" was deleted.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.2.3 Page #: E-6-11 Line #: 6 to 9 Code:
Original Comment #: 427 (OSC 104)

Comment: These lines state that the use of the linearized multistage model is conservative when dealing with chemicals that exhibit a threshold for carcinogenicity. This may or may not be relevant to the Operable Unit 1 RA. The uncertainty section should not discuss general sources of uncertainty without identifying specific examples within the RA that may be relevant. These lines should be revised to list those potential carcinogens that may exhibit a threshold for carcinogenicity.

Response: Comment acknowledged. However, the purpose of an uncertainty section is to identify potential sources of uncertainty. This particular example, the linearized multistage model, is an example of potential uncertainty inherent in all carcinogenic risk assessments. This section qualitatively summarizes potential sources of uncertainty that may impact the Operable Unit 1, baseline risk assessment. One significant source of uncertainty is the assumption that, at low doses, the dose-response curve is of a particular shape, the most conservative of which is the assumption of a linear, nonthreshold relationship, termed the linearized multistage model (Amdur et al., 1991). Assumptions must be made regarding a chemical's dose-response to compensate for the unresolvable differences in the most appropriate way to compensate for a lack of definitive knowledge of the mode of action for carcinogenicity from exposure to a particular compound (Amdur et al., 1991). This assumption must be considered, along with the carcinogenicity weight-of-evidence classification for each constituent, to determine the overall uncertainty associated with the carcinogenic risk assessment. However, it is considered inappropriate and beyond the scope of a qualitative uncertainty analysis to re-evaluate the available studies for each constituents to determine if the available data is adequate to determine whether a constituent poses a threshold response for carcinogenicity for each route of exposure. Generally, data is inadequate to classify a chemical as a known human carcinogen as evident by the few Class A carcinogens. The majority of carcinogenic compounds are classified as possible or probable human carcinogens based on a review of inadequate data for a clear determination. Often, data is adequate to develop a causation but still inadequate to quantify the exact dose-response for some Class A carcinogens (i.e., oral dose-response for arsenic). Thus, data is usually inadequate for Class B and C carcinogens to determine the exact dose-response relationship. Thus, data is typically not adequate to determine which of these compounds exhibit a threshold to carcinogenicity.

Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.2.3 Page #: E-6-12 Line #: 39 Code:
Original Comment #: 428 (OSC 105)
Comment: This line includes the reference citation "(EPA, 1990d)." Such a reference does not exist in the reference section. This line should be revised to cite the appropriate reference, or the reference section should be revised to include the appropriate reference.
Response: Agree. Footnote was incorrect.
Action: Footnote changed from "(EPA, 1990d)" to "(Clement International, 1990)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.6.2.4 Page #: E-6-13 Line #: 20 to 25 Code:
Original Comment #: 429 (OSC 106)
Comment: These lines discuss the uncertainty associated with adding risks from multiple compounds across multiple pathways. While it is true that the assumption of additivity is made to be conservative, it is also true that this RA deliberately did not separate and sum the risks from noncarcinogens having different effects (as suggested by U.S. EPA guidance) because significant risks were identified for individual compounds. This decision and the reasons for making it should be summarized here. The text should also note that, in regard to noncarcinogens, the uncertainties associated with summing risks are insignificant for Operable Unit 1. Otherwise, this discussion of uncertainties is misleading.
Response: Agree. The discussion of uncertainty associated with additivity in risk characterization was revised to state that this particular source of uncertainty is insignificant for Operable Unit 1 because the majority of cancer risk and hazard index is due to only a few constituents of potential concern (CPCs).
Action: Added after line 25: "This particular source of uncertainty is insignificant for Operable Unit 1 because the majority of cancer risk and hazard index is due to only a few constituents of potential concern (CPCs)."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.7 Page #: E-7-1-5 Line #: TABLE E.7-1 Code:
Original Comment #: 430 (OSC 109)
Comment: Table E.7-1 presents incremental lifetime cancer risks associated with the current source term for four different receptors. The table does not identify which of these receptors are associated with access controls and which are associated without access controls. The table should be revised to clearly identify which receptors are associated with or without access controls.
Response: Agree.
Action: Added footnote "b" to table as follows: [b] Valid for current land use without access controls only.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.7 Page #: E-7-1-7 Line #: TABLE E.7-3 Code:
Original Comment #: 431 (OSC 110)
Comment: Table E.7-3 has a header labeled "Current Land Use." This header is confusing and somewhat misleading. The header should be changed to "Current Land Use Without Access Controls."
Response: Comment acknowledged.
Action: The presentation format was altered in response to Comment 352.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.2.2 Page #: E-III-4 Line #: NA Code:
Original Comment #: 432 (OSC 112)
Comment: Equation E.III-8 is used to calculate values for the leaching coefficient. This equation is missing a sigma in the denominator. Equation E.III-8 should be corrected.
Response: Agree.
Action: Sigma was added to the denominator of this equation.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.2.2 Page #: E-III-4 Line #: 8 Code:
Original Comment #: 433 (OSC 111)
Comment: This line presents Equation E.III-7. The text should be revised to cite Table E.III-1, which presents the values of the variables in Equation E.III-7 that were used in the Operable Unit 1 RA.
Response: Agree. Table E.III-1 is cited as a general reference for calculations in this attachment in the second paragraph of E.III.1.
Action: Table E.III-1 was cited on page E.III-4, line 20, as a reference for variables in these equations.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.3.3 Page #: E-III-14 Line #: 29 Code:
Original Comment #: 434 (OSC 113)
Comment: This line refers to Section E.III.39; however, such a section does not exist. The line should be corrected to refer to Section E.III.3.9.
Response: Agree.
Action: Reference to Section "E.III.39" was changed to "E.III.3.9."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.3.9 Page #: E-III-27 Line #: 1 - 10 Code:
Original Comment #: 435 (OSC 114)
Comment: These lines present two equations for calculating the absorbed dose per event (DA_{event}). Since t_{event} is always less than t^*, as defined, the second of the two equations (line 2) is not needed and should be eliminated.
Response: Agree.
Action: Change "The intake for this receptor, pathway, and chemical is determined by substituting the constants listed above into Equation E.III-77" to "Since t_{event} is less than t^* for this exposure, the intake of this chemical by this receptor via this pathway is calculated by substituting the constants listed above into Equation E.III-77."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.3.9 Page #: E-III-28 Line #: 11 Code:
Original Comment #: 436 (OSC 115)
Comment: This line presents a calculated excess cancer risk of 3×10^{-3}. As shown in line 9 on this page, the correct value is 8×10^{-2}. Line 11 should be revised to present the correct value.
Response: Agree.
Action: Change text on line 11 from "3×10^{-3}" to "8×10^{-2}."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.4.2 Page #: E-III-30 Line #: 12 Code:
Original Comment #: 437 (OSC 116)
Comment: This line states that the example calculations are being performed for U-238, a metal. However, calculations are also presented for several organics, including vinyl chloride. This line should be revised to state that example calculations are also presented for selected organic compounds.
Response: Disagree. All example calculations for soil related exposures are done with U-238. No organics are used in this example. Vinyl chloride was used as an example for water pathway calculations.
Action: None.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.4.3 Page #: E-III-30 Line #: 24 & 25 Code:
Original Comment #: 438 (OSC 117)
Comment: Line 24 includes a premature line break. Lines 24 and 25 should be combined on a single line.
Response: Agree.
Action: Lines 24 and 25 were combined on a single line.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.4.3 Page #: E-III-30 Line #: 34 Code:
Original Comment #: 439 (OSC 118)
Comment: This line states that 720 hours are assumed to pass between the time a fruit is harvested and the time that fruit is ingested. The time assumed for vegetables is only 24 hours. This section should be revised to clarify why such a long time is assumed for fruit ingestion.
Response: Agree. As stated on the first page of Attachment E.III, "All parameters and equations are drawn from the FEMP Risk Assessment Work Plan Addendum (DOE 1992a) unless noted otherwise." This work plan was approved by the EPA. The value of 720 hours is based on earlier work presented in USNRC, 1977.
Action: To line 34, add "EPA, 1992a)" after the text "...720 hours for fruit."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.4.3 Page #: E-III-31 Line #: 5 Code:
Original Comment #: 440 (OSC 119)
Comment: This line ends with the number 1.93. According to line 2 on this page, the number should be 1.71. Line 5 should be revised to present the correct number.
Response: Agree.
Action: Text changed from "1.93" to "0.00171 pCi/g."

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III.4.5 Page #: E-III-35 Line #: 21 Code:
Original Comment #: 441 (OSC 120)
Comment: This line presents the units for the slope factor as grams per picoCurie-year (g/Pci-y); these units are incorrect. This line should be corrected to present the units as risk per gram per picoCurie-year (r-g/Pci-y).
Response: Agree.
Action: Change:

$ILCR_e$ = Incremental Lifetime Cancer Risk (ILCR/lifetime)
C_s = concentration in surface soil (pCi/g)
SF_{ext} = HEAST Slope Factor (ILCR - g/pCi -y)

to:

$ILCR_e$ = Incremental Lifetime Cancer Risk (r/lifetime)
C_s = concentration in surface soil (pCi/g)
SF_{ext} = HEAST Slope Factor (r - g/pCi -y)

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III Page #: E-III-38 Line #:TABLE E.III-1 Code:
Original Comment #: 442 (OSC 121)
Comment: This page has footnotes a and b. However, on pages E-III-41 and E-III-42 at the end of Table E.III-1, there are footnotes a through h. The footnotes on page E-III-38 should be moved to the end of Table E.III-1 and relettered as appropriate.
Response: Agree.
Action: Delete the two footnotes at the bottom of the first page of Table E.III-1.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.III Page #: E-III-41 & E-III-42 Line #:Table E.III-1 Code:
Original Comment #: 443 (OSC 123)
Comment: These two pages present footnotes "a" through "h" for Table E.III-1. However, this table does not include any footnote citations. Table E.III-1 should be revised to include citations for all footnotes listed at the end of this table.

Response: Agree.
Action: Column heading were changed to include footnotes a through h.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.IV Page #: E-IV-39 Line #: TABLE E-IV Code:
Original Comment #: 444 (OSC 123)
Comment: Footnote "b" to this table refers to the source area. However, the table itself refers to surface area. Therefore, the table or footnote should be revised to eliminate this inconsistency.
Response: Agree.
Action: Throughout Tables E.IV-35 to Table E.IV-42, the first column heading was changed to "Source Surface Area (m^2)." Second column heading to be changed to:
Fraction of Time
Exposed to
Source Material[b]

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.IV Page #: E-IV-43 Line #: TABLE E.IV-34 Code:
Original Comment #: 445 (OSC 124)

Comment: The footnotes to Table E.IV-34 are confusing and do not appear consistent with the table. For example, footnote "c" discusses both the RME and CT adult; the time presented in the footnote for farming Waste Pits 1 and 2 (800 hours per year for 9 years) does not correspond with the total times presented in the table for exposure to Waste Pits 1 and 2 (4,758 and 2,583 hours, respectively). Also, the total exposure to Pit 1 presented in the table (114 millirems per hour) is not equal to the product of the values given in footnote "e." The table or footnotes should be reviewed and revised to clearly indicate how the table values were calculated. In addition, the word "build" in footnote "c" should be changed to "built."

Response: No value is currently assigned to the CT exposure time, so the exposure time for the RME adult is used and cited in the footnote. The times spent over Pits 1 and 2 also include a contribution from wandering randomly over the operable unit for 1800 hours. Footnote "e" is in error and will be changed, but the word build is not included in this footnote.

Action: Change footnote "e" to, "The product of the dose rate (mrem/hr) and the total time exposed (hr/lifetime)," in new Table E.IV-41.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: E.IV Page #: E-IV-45 Line #: TABLE E.IV-36 Code:
Original Comment #: 446 (OSC 125)

Comment: The total time spent exposed to Waste Pit 4 presented in Table E.IV-36 (548,000 hours per lifetime) does not correspond to the value given in footnote "c" (500 hours) for the time required to build a house on Waste Pit 4. The table or the footnote should be revised so that the footnotes clearly cite the reference for the values presented in the table.

Response: Agree.

Action: Changed new Table E.IV-42 from:

Source	Surface Area (m^2)	Fraction of Time Spent Exposed Over Source[b] (unitless)	Total Time Spent Exposed to Source[c] (hr/Lifetime)	Dose Rate[d] (mRem/hr)	Total Exposure[e] (mRem/Life)	Risk[f] (risk/Life)
Pit 4	7790	1.000	548000	7.8×10^{-6}	4.3	2.7×10^{-6}
					Total Risk	2.7×10^{-6}

to:

Source	Source Surface Area (m^2)	Fraction of Time Exposed To Source[b] Material (unitless)	Total Time Spent Exposed to Source[c] (hr/Lifetime)	Dose Rate[d] (mRem/hr)	Total Exposure[e] (mRem/Life)	Risk[f] (risk/Life)
Pit 4	7790	1.0	500	7.8×10^{-6}	3.9×10^{-3}	2.4×10^{-9}
					Total Risk	2.4×10^{-9}

OEPA COMMENTS

APPENDIX E

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.1.2.4.2 Page #: E-1-13 Line #: 13-22 Code:C
Original Comment #: 447 (OC 139)

Comment: The section should discuss which of the samples discussed within Section 2.6 are used for the risk assessment and why those which weren't used were excluded.

Response: Disagree. This section briefly summarizes the nature and extent of surface soil contamination within Operable Unit 1. The level of detail requested by the reviewer is provided in Section E.2 (Identification of Constituents of Potential Concern) and Attachment E.II (Screening of Constituents of Potential Concern).

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.1.2.4.2 Page #: E-1-13 Line #: 18-22 Code:C
Original Comment #: 448 (OC 140)

Comment: (a) VOCs and SemiVOCs were collected during the Waste Pit Area Storm Water Runoff Control Removal Action but were not included within the risk assessment. DOE should discuss the basis for this decision. (b) Lines 21-22 state that Aroclor-1260 was detected but Table E.2-2 does not include this contaminant as a CPC. DOE should provide a justification for this exclusion.

Response: Agree. (a) Sixteen of the 17 surface soil samples analyzed for volatile and semivolatile chemicals were included in the risk assessment data base after the July version of the database was evaluated by the modeling and risk assessment teams. DOE intends to use this new database to present all available data in the risk assessment. (b) The text was in error. Aroclor - 1260 was not detected in surface soil.

Action: (a) All usable validated surface soil data has been used in the risk assessment. (b) removed text "and Aroclor - 1260" from line 22.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.1.2.4.6 Page #: E-1-15 Line #: 1-10 Code:C
Original Comment #: 449 (OC 141)

Comment: This section should include a discussion of the vegetation samples collected during the ETF removal action and the data from those samples.

Response: Disagree. This section of the Risk Assessment provides an overview of the sampling programs used to calculate human risk. Detailed discussions of sampling programs are in Section 2 of the Remedial Investigation report. Results from these samples were not used in the risk assessment because:

(1) Two vegetative samples were analyzed during the Experimental Treatment Facility Removal Action. These samples were collected to ascertain whether the vegetation surrounding the facility had to be treated as radioactive waste or could be disposed of in a landfill. The data quality objectives of this sampling and analysis effort were designed to support this decision.

(2) Data from the removal action sampling program was not validated.

(3) The samples consisted of plants which are not commonly found in local human diets. The addition of these two samples to the available data base would have little impact on the human health risk assessment of Operable Unit 1.

Action: Section E.1.2.4.6 Biological Data has been deleted because it is not relevant to the human health risk assessment for Operable Unit 1.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.1.3.2 Page #: E-1-16 Line #: 19-25 Code:C
Original Comment #: 450 (OC 142)

Comment: As stated previously, DOE must provide additional information to justify excluding risks from consuming perched groundwater. Information regarding the perched aquifer productivity vs. the yield required for residential usage must be included.

Response: Agree. We did assess perched water as a possible drinking water source for the resident farmer but did not include it in other pathways. It was presented as a risk that could be added to the resident farmer scenario. It was not included in the total risks because the Great Miami Aquifer is a more likely water source, since it is easily accessible and provides a copious supply of good quality water. Use of perched water for household use by the on-property resident farmer was evaluated in this iteration of the risk assessment and presented as an additional receptor for consistency with the OU4 baseline risk assessment.

Action: The following text has been included in the referenced section: "Risk from household use of perched water was evaluated for the on-property RME adult farmer, but perched water was not considered as a possible source for irrigation or livestock consumption."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2.1.9 Page #: E-2-4 Line #: 12-18 Code: C
Original Comment #: 451 (OC 143)

Comment: It is unclear how the organic samples discussed here relate to the statement in section E.1.2.4.2 that, "...volatile and semivolatile organic analyses were not performed on surface soils...". DOE must clarify which surface soil data, as discussed in section 2.6, are included in the risk assessment and which are not. The sampling discussed within section E.2.1.9 does not match that discussed in sections E.1.3.4.2 or 2.6.

Response: Agree. The statement in E.1.2.4.2 does not agree with section 2.6. or E.2.1.9. There was no analysis for volatiles or semivolatiles for surface soil. See Comment 430.

Action: The second sentence of Section E.2.1.9, Line 14 was changed to read: "Seventeen surface soil samples were collected and analyzed for inorganic and organic chemicals on the HSL during the Waste Pit Area Storm Water Runoff Removal Action portion of the RI/FS sampling program."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2.2.2.1 Page #: E-2-7 Line #: 8-24 Code: C
Original Comment #: 452 (OC 144)

Comment: DOE fails to provide any justification for the use of 4 detects to determine usage of the MDV. The approved OU4 RI used 7 detects to make this determination. The use of 4 detects to support the assumption that the population is normally distributed is questionable at best. The necessity of using nonparametric statistics to make comparisons to background further detracts from the normal distribution assumption. DOE should consistently apply the methodology included in the OU4 Baseline Risk Assessment or supply detail justification for a deviation. DOE's reduction of the number of detects required in OU1 significantly affects the source term concentrations and subsequent risk calculations.

Response: Agree. This concentration term calculation method was in-consistent with the OU4 baseline risk assessment.

Action: Text from Section E.2.2.2.1 was replaced with: "The concentration term is assumed to be the 95 percent Upper Confidence Limit (UCL) of the mean. If the distribution for an analyte was determined to be either normal or lognormal, the appropriate equation was used to calculate the 95 percent UCL. In cases where the calculated 95 percent UCL exceeded the maximum detected value, then the concentration term was assigned to the maximum detected value. If a distribution could not be determined a non-parametric approach was adopted. For cases where there were less than seven samples, the maximum detected value was used.

Concentration Term from a Normal Distribution

When the distribution of concentration data was determined to be normal the concentration term was calculated as the UCL of the mean. The following formula was used to estimate the UCL (Gilbert, 1987):

$$UCL_{(.95)} = \bar{x} + t_{(.95,n-1)} \times \frac{s}{\sqrt{n-1}} \qquad \text{(E.2-1)}$$

where

n = number of samples

$\bar{x}$ = sample mean concentration

$t_{(.95,n-1)}$ = percentage point from the t distribution

s = sample standard deviation

$$= \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i-\bar{x})^2}$$

Concentration Term from a Lognormal Distribution

When the distribution of concentration data was determined to be lognormal the concentration term was calculated as the UCL of the mean. The following formula was used to estimate the UCL:

$$UCL_{(.95)} = e^{\bar{y} + \frac{S_y^2}{2} + \frac{S_y \times H_{.95}}{\sqrt{n-1}}} \qquad \text{(E.2-2)}$$

where

n = number of samples

$\bar{y}$ = sample mean of the log-transformed data

$H_{(.95)}$ = quantities obtained from tables provided by Land(1975)

S_y = sample standard deviation of the log-transformed data

$$= \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(y_i-\bar{y})^2}$$

Concentration Term from an Undetermined Distribution

If the distribution of the background data could not be adequately determined a non-parametric method was used to estimate the concentration term. In this case the non-parametric 95th percentile concentration is used as the concentration term. The initial step in determining the 95th percentile concentration is to order the data such that

$$x_1 \leq x_2 \leq \ldots \leq x_i$$

where

$$x_{j,\ (j=1 \text{ to } i)} = \text{sample concentrations}$$
$$i = \text{the number of background samples}$$

The 95th percentile concentration is then determined to be

$$C_{(.95)} = x_k \qquad \text{(E.2-3)}$$

such that

$$k \geq i \times 0.95 \ (i = \text{number of samples})$$

where

$$C_{(.95)} = 95\text{th Percentile Concentration}$$

$$k = \text{The Identification Number of the Sample Selected}$$

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2.3.1.2 Page #: E-2-9 Line #: Code: C
Original Comment #: 453 (OC 145)

Comment: a) In order to evaluate DOE's application of these screening processes for developing CPCs, DOE should define which screening character as displayed in Attachment E.II apply to each of the bullets listed in section E.2.3.1.2 (e.g., E.2.3.1.2 2nd bullet = C in E.II). b) DOE should reference guidance documents supporting each bulleted screening criteria. c) DOE should provide an example contaminant eliminated by each bulleted screening criteria.

Response: (a) Agree. (b) Disagree. The screening criteria that were used for selection of CPCs for OU1 were based on EPA Superfund Risk Assessment Guidance, using professional judgement where appropriate. (c) Agree. Example constituents were provided for applicable screening criteria.

Action: The text describing the toxicological screening procedure was revised to conform with the descriptions provided in the Attachment E.II screening criteria. Example chemical were provided when possible.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2 Page #: E-2-14 Line #: TABLE E.2-3 Code: E
Original Comment #: 454 (OC 146)
Comment: The units for the organics (g/kg) appear to be incorrect.
Response: Agree.
Action: Units of measure for organics were changed to (μg/kg).

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2 Page #: E-2-14 Line #: TABLE E.2-3 Code: C
Original Comment #: 455 (OC 147)
Comment: It would seem DOE has failed to incorporate data from location WPA16 within the table. If the data from this location were incorporated the maximum detection for antimony, arsenic, etc., would be higher (see section B.1.1.3). DOE must incorporate the data from WPA16 and revise the calculations to obtain the correct UCL.
Response: Agree.
Action: All usable validated surface soil data was used in the risk assessment.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2 Page #: E-2-16 Line #: TABLE E.2-5 Code: E
Original Comment #: 456 (OC 148)
Comment: a) The units for the organics (g/kg) appear to be incorrect. b) CIS Data Aroclor-1254 Representative concentration should be "9980."
Response: a) Agree. b) Comment acknowledged. The concentration term calculation method was changed for consistency with the OU4 baseline risk assessment. Six detected values are no longer adequate to determine distribution type.
Action: a) Units of measure in Table E.2-5 have been changed to (μg/kg) b) the CIS Data representative concentration used for Aroclor-1254 was changed to 11,500 μg/kg.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2 Page #: E-2-28 Line #: TABLE E.2-11 Code:E
Original Comment #: 457 (OC 149)
Comment: The units for the organics (g/kg) appear to be incorrect.
Response: Agree.
Action: Units of measure in Table E.2-11 have been changed to (μg/kg).

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2 Page #: E-2-33 Line #: TABLE E.2-13 Code:E
Original Comment #: 458 (OC 150)
Comment: The units for the organics (g/kg) appear to be incorrect.
Response: Agree.
Action: Units of measure in Table E.2-13 have been changed to (μg/kg).

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2 Page #: E-2-38 Line #: TABLE E.2-17 Code:C
Original Comment #: 459 (OC 151)
Comment: The units for the organics (g/kg) appear to be incorrect.
Response: Agree.
Action: Units of measure in Table E.2-17 for organics have been changed to (μg/kg).

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2 Page #: E-2-43 Line #: TABLE E.2-21 Code:C
Original Comment #: 460 (OC 152)
Comment: a) The CPC concentration for Acenapthene should be "1100" not "810." b) The units for the organics (g/kg) appear to be incorrect.
Response: a) Comment acknowledged. This was inconsistent with the prior concentration term calculation procedure.
b) Agree.
Action: a) Due to revision of the CPC screening procedure, per EPA guidance, acenapthene was screened out at a representative concentration of 1100. (see comment 466).
b) Units of measure were changed to (μg/kg).

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.2 Page #: E-2-47 Line #: TABLE E.2-23 Code:E
Original Comment #: 461 (OC 153)
Comment: The units for the organics (g/kg) appear to be incorrect.
Response: Agree.
Action: Units of measure for organics in Table E.2-23 have been changed to (μ/kg).

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.3.2.4 Page #: E-3-6 Line #: 7-14 Code: C
Original Comment #: 462 (OC 154)
Comment: This section should relate the data discussed to the potential yield of the perched aquifer for a residential user.
Response: Agree.
Action: Text from E.3.2.4 has been replaced with the following: "Slug test data from FEMP investigations indicate that the perched water yields less than 5 gpm. However, at this gpm, it was not determined if this yield could be sustained over a period of time. It is not likely that any well in the perched groundwater zone could sustain a yield for a prolonged period of time (i.e., years of constant use), because the lateral extent of the most permeable zones is limited. Relative to the Great Miami Aquifer, the perched water does not have a significant yield. The yield of the Great Miami Aquifer is typically capable of more than 18.4 mgd (million gallons per day), between 2 to 5 orders of magnitude greater than that of the glacial overburden."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.3.2.9 Page #: E-3-10 Line #: 7-13 Code:C
Original Comment #: 463 (OC 155)
Comment: Another site which should be added to this section is the Chemical Lehman site located in Ross. The site is on CERCLIS and has undergone an Expanded Site Inspection.
Response: Agree.
Action: Text was added at the end of the paragraph: "Chemical Lehman, another site on CERCLIS, is located in Ross, Ohio, approximately 2 miles from the FEMP."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.3.3.1.6 Page #: E-3-17 Line #: 13-16 Code:C
Original Comment #: 464 (OC 156)
Comment: The section should include or reference a figure defining the location of the RME receptor.
Response: Agree that the figure showing RME receptor locations was not added to the verbal description given in the text. This receptor location is depicted on Figure E.3-4 and marked "maximum off-site location air."
Action: The following text was added to E.3.3.5 after "...of the Burn Pit "(Figure E.3-4, marked as "Maximum Off-site Location Air")."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.3.3.2.2 Page #: E-3-22 Line #: 32-38 Code:C
Original Comment #: 465 (OC 157)
Comment: See previous OEPA comments regarding the need for additional justification to support statements concerning the useability of the perched aquifer.
Response: Agree as stated in Response Comment 420, we did assess perched water as a possible drinking water source for the resident farmer but did not include it in other pathways. It was presented as a risk that could be added to the resident farmer scenario. It was not included in the total risks because the GMA is a more likely water source, since it is easily accessible and provides a copious supply of good quality water.
Action: Text from E.3.2.4 has been replaced with the following: "Slug test data from FEMP investigations indicate that the perched water yields less than 5 gpm. However, at this gpm, it was not determined if this yield could be sustained over a period of time. It is not likely that any well in the perched groundwater zone could sustain a yield for a prolonged period of time (i.e., years of constant use), because the lateral extent of the most permeable zones is limited. Relative to the Great Miami Aquifer, the perched water does not have a significant yield. The yield of the Great Miami Aquifer is typically capable of more than 18.4 mgd (million gallons per day), between 2 to 5 orders of magnitude greater than that of the glacial overburden."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.3.4.8 Page #: E-3-35 Line #: 15-30 Code:C
Original Comment #: 466 (OC 158)
Comment: DOE should provide the basis for being inconsistent with the selection process used in the OU4 Baseline Risk Assessment. At what point was the use of the EPA Region III screening values approved for screening at the FEMP?
Response: This reference source was recommended during our risk assessment group telephone conference with Ms. Pat Van Leeuwen on 06/28/93. However, this information was not used for the OU4 RI risk assessment because the CPCs for OU4 were selected before this suggestion was made.
Action: The following bullet was added to E.1.3.2:

- Toxicological screening was performed using risk based screening criteria (EPA, 1993b). Chemicals presenting a HQ less than 0.1 or ILCR lower than 10^{-7} [one order of magnitude less than the value presented in the risk based screening tables (EPA, 1993c)] were removed from the CPC list. Solid samples were

compared to residential surface soil and liquid samples were compared to tap water.

Justification: This scheme provides a consistent, repeatable and regularly updated method for performing toxicological screening."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.3 Page #: E-3-68 Line #: TABLE E.3-5 Code: C
Original Comment #: 467 (OC 159)
Comment: The future exposure point concentration for silver is incorrect. It should be "5.31×10^{2}" (see Table 2-11). Risk assessment values should be recalculated using the correct concentration. There were several inconsistencies in the tables.
Response: Agree.
Action: Risk assessment calculations were performed and the data presented in linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate results.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.6.2.1 Page #: E-6-4 Line #: Code: C
Original Comment #: 468 (OC 160)
Comment: This section should include a discussion of the lack of surface soil organic data and surface soil samples from the pits themselves. These missing data decrease conservatism of the baseline risk assessment.
Response: Agree.
Action: The text in the eighth bulleted item in Section E.6.2.1 was expanded to state the following: "A limited number of samples exist for some media for some waste pits. In particular, there is a limited database for surface soils within the pit covers, and there are no analyses for volatile and semi-volatile organic compounds in the surface soil samples. A limited database has the potential to introduce either false positive results (i.e., introducing constituents as CPCs that are not site related) or false negative results (i.e., eliminating compounds that may be CPCs that are site related and could contribute to site risks). It is anticipated that the limited database for OU1 may introduce false negative results and, that as a result, underestimate potential human health risks from exposure to organic chemicals may be underestimated."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.6.2.2.1 Page #: E-6-7 Line #: 38-41 Code: C
Original Comment #: 469 (OC 161)
Comment: Ohio EPA disagrees with the impact of this assumption to be low. Based upon the discussions of waste being transferred from Pit 3 to 1 and 2, it is likely some of the surface materials on the pits is waste. This is further supported by the findings of Removal Action 22, which reported exposed waste on the pits. The removal covered these areas, but their existences suggests the cover material is limited and may contain waste. The assumption discussed in this bullet may result in underestimate the baseline risks posed by the unit.
Response: Agree.
Action: Text was revised for the last sentence in the eleventh bulleted item to state, "The impact of this assumption is assumed to be low to moderate."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.6 Page #: E.6-16 Line #: TABLE E.6-1 Code:C
Original Comment #: 470 (OC 162)

Comment: The magnitude of uncertainty associated with the adequacy of the database should be higher. The deficiencies associated with organic data and the lack of surface soil samples from the waste pits impact the number of CPCs as well as the baseline risks. Additionally, these organic data deficiencies and the lack of data from the base of the pits will affect the Feasibility Study risk assessment and the development of PRGs.

Response: Agree that the limited amount of data could result in a higher degree of uncertainty than presented in Table E.6-1. In addition, note that data uncertainties are presented in Table 7-7, Data Limitations and Recommended Actions. Partially agree about the impact of conservative assumptions on the feasibility study. Conservative assumptions are not affecting the alternative selection underway in the feasibility study. All four alternatives undergoing detailed analysis involve excavating the pit waste, driven by current conclusions regarding radiological risk. If more data were to become available, it should be examined and evaluated in terms of their impact on what is already known about the nature and extent of contamination in Operable Unit 1.

Action: The magnitude of uncertainty associated with the adequacy of the database in Table E.6-1 was changed from "low" to "low to moderate."

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.6 Page #: E.6-16 Line #: TABLE E.6-1 Code: C
Original Comment #: 471 (OC 163)

Comment: The calculated exposure in concentrations uncertainty may decrease conservatism due to the lack of surface soil samples from the waste pits. The concentrations of contaminants are likely to be higher on top of the pits than in the surrounding soils.

Response: Disagree. This comment refers to uncertainty associated with the method employed to calculate exposure point concentrations. Use of the 95 percent UCL or maximum concentration as the exposure point concentration, the positive bias in sampling, and conservative assumptions and methods for fate and transport assessment suggest an increase in the degree of conservatism. A lack of data for surface soils is assumed to affect the uncertainty associated with the adequacy of the database (i.e., low to moderate to increase or decrease conservatism). The method employed to calculate exposure point concentrations is still assumed to be moderate to high uncertainty to increase conservatism in the risk assessment.

Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.II Page #: E-II-1 Line #: Code:C
Original Comment #: 472 (OC 164)

Comment: a) DOE must provide additional justification for these screens. Relevant guidance documents supporting these screens should be cited. Additionally, when the tables following are compared it appears the screens have been inconsistently applied (i.e., keeping some contaminants of equal concentration that were excluded from another pit). These screens should be revised to be consistent with those discussed in section E.2.3 and previous Ohio EPA comments on that section. b) "B" should only be used consistent with U.S. EPA's RAGS guidance and the 10X or 5X rules. c) "D" - provide specific cutoffs must be for "low toxicity compound." d) "E" - Clarify if the compound was used

for uranium extraction at the FEMP. e) "I" - provide specific cutoffs for "insufficient data." If in doubt the compound should be kept.

Response: Comment acknowledged.

Action: The CPC screening procedure was re-written for consistency with the OU4 baseline risk assessment and recent guidance. CPC screening was re-done in a consistent manner.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.II Page #: E-II-5 - 13 Line #: TABLE E.II-1 Code:C
Original Comment #: 473 (OC 165)

Comment: a) Aroclor-1260 should be retained. It was detected twice thus "A" is not an appropriate screen. b) Bis(2-ethylhexyl)pthalate should not be screened out unless the concentrations are less than the 10X rule. This compound has both a slope factor and an reference dose. c) 1,4 Dioxane should not be screened out. This contaminant has a slope factor.

Response: Comments acknowledged.

Action: Aroclor-1260 was retained as a CPC. The CPC screening procedure was re-written for consistency with the OU4 baseline risk assessment and recent guidance. CPC screening was re-done in a consistent manner.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.II Page #: E-II-14 - 25 Line #: TABLE E.II-2 Code:C
Original Comment #: 474 (OC 166)

Comment: a) The screening of the first 15 contaminants based upon "I" is unacceptable. DOE's failure to obtain sufficient data is not an acceptable reason for screening out a contaminant. All but one of these contaminants were detected; however, many times they were sampled. The contaminants detected should be retained. b) Dimethyl phthalate, carbon disulfide, and carbon tetrachloride should be deleted due to "A."

Response: Comment acknowledged.

Action: The CPC screening procedure was re-written for consistency with the OU4 baseline risk assessment and recent guidance. CPC screening was re-done in a consistent manner.

The text describing the toxicological screening procedure has been revised to include only those criteria that are applicable for OU1. The footnotes provided in Attachment E.II have been revised to conform with the descriptions provided in the bullet list in the text. This bullet was removed. The CPC screening procedure was rewritten to more accurately reflect the screening procedure used.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.II Page #: E-II-27 Line #: TABLE E.II-3 Code:E
Original Comment #: 475 (OC 167)

Comment: Deleted "A" from phosphorous, sulfate, and sulfide.

Response: Comment acknowledged.
Previously applied screening criteria are no longer applicable.

Action: These constituents were screened out for reason "D" under the new screening criteria.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.II Page #: E-II-95 Line #: TABLE E.II-18 Code:C
Original Comment #: 476 (OC 168)

Comment: a) Are the data collected under the Waste Pit Area Storm Water Runoff RA (WPASWRRA) included in the RI/FS data? It must be made clear which of the data discussed in Section 2.6 of the RI are included within this table. b) The PAH data from the WPASWRRA are not included in the table. These data should be included. c) A number of contaminants have been deleted inconsistently with the other tables. Cyanide, mercury and thallium should be included as they were for Pit 1.

Response: (a) Agree. Table E.II-18 (now Table E.II-7) contains results from all surface samples (depth = 0 to 0.5 feet) in the database as of July, 1993. The only source of organic analytical results for surface soil is data collected under the Waste Pit Area Storm Water Runoff Removal Action. (b) The Waste Pit Area Storm Water Runoff Removal Action analytical effort did not include PAH in its list of analytes for surface soil samples. Please note that subsurface soil samples (depth = 0.5 to 2.0 feet) were inadvertently included in Appendix B.1.1.4 of the RI. This may be what is confusing the reviewer. (c) Disagree. The constituent is not carried forward for detailed risk evaluation for the reason denoted by Item "D" in the Attachment E.II key (i.e., the compounds are present in concentrations less than 1 ppm.)

Action: (a) The second sentence of Section E.2.1.9 was changed to read, "Seventeen surface soil samples were collected and analyzed for inorganic and organic chemicals on the HSL during the Waste Pit Area Storm Water Runoff Removal Action portion of the RI/FS sampling program." (b) A sample depth description has been added to the title of this table (now Table E.II-7). (c) None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.IV Page #: E-IV-2 Line #: TABLE E.IV-1 Code:C
Original Comment #: 477 (OC 169)

Comment: The sum for the air, inhalation, radionuclide column should be 2.6×10^{-5} (see Ra-226). The table should be corrected and all subsequent representations of the data.

Response: Agree. There were some inconsistencies in the summary tables.

Action: Risk assessment calculations were performed and results presented in linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate results.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.IV-9 (ATT) Page #: E-IV-10 Line #: Code: C
Original Comment #: 478 (OC 170)

Comment: The sum for the sediment, external exposure, radionuclide column should be 1.3×10^{-5} (see Th-232). The table should be corrected and all subsequent representations of the data.

Response: Agree. There were some inconsistencies in the summary tables.

Action: Risk assessment calculations were performed and results presented in linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate results.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.IV Page #: E-IV-15 Line #: TABLE E.IV-12 Code:C
Original Comment #: 479 (OC 171)
Comment: The sum for the air, dermal contact w/ drinking water column should be 4.0 X 10^{-1} (see Uranium). The table should be corrected and all subsequent representations of the data.
Response: Agree. There were some inconsistencies in the summary tables.
Action: Risk assessment calculations were performed and results presented in linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate results.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.IV Page #: E-IV-19 Line #: TABLE E.IV-16 Code:C
Original Comment #: 480 (OC 172)
Comment: The sum of the soil, external exposure, radionuclide column should be 3.6 X 10^{-2} (see Ra-226 & Th-232). The table should be corrected and all subsequent representations of the data.
Response: Agree. There were some inconsistencies in the summary tables.
Action: Risk assessment calculations were performed and results presented in linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate results.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.IV Page #: E-IV-22 Line #: TABLE IV-18 Code: C
Original Comment #: 481 (OC 173)
Comment: Why are the Inhalation of VOCs and Dermal Contact columns both "NA" under groundwater? These would seem to be appropriate pathways.
Response: Agree. These pathways are appropriate exposure pathways. An NA was used in the tables for Attachment E.IV to identify any CPC that is not a CPC for that particular medium for that particular exposure pathway. NA indicates that the constituent was not a CPC for groundwater.
Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.IV Page #: E-IV-28 Line #: TABLE E.IV-21 Code:C
Original Comment #: 482 (OC 174)
Comment: a) The sum of the air, ingestion of vegetable/fruit column should be 2.6 X 10^{4} (see tin). The table should be corrected and all subsequent representations of the data. b) The sum of the air, ingestion of meat column should be 2.4 X 10^{1} (see As, Cu, U). The table should be corrected
Response: Agree. There were some inconsistencies in the summary tables.
Action: Risk assessment calculations were performed and results presented in linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate results.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: E.IV Page #: E-IV-30 Line #: TABLE E.IV-22 Code:C
Original Comment #: 483 (OC 175)

Comment: The sum of the soil, dermal contact column should be 9.1 X 10^{-4} (see tetrachloroethane, TCDD, HxCDD, both PECDFs). The table should be corrected and all subsequent representations of the data.

Response: Agree. There were some inconsistencies in the summary tables.

Action: Risk assessment calculations were performed and results presented in linked spreadsheets to eliminate entry errors. These spreadsheets were extensively checked to assure accurate results.

USEPA COMMENTS

GENERAL

Commenting Organization: U.S. EPA Commentor: Saric
Section #: GENERAL Page #: ALL Line #: NA Code:
Original Comment #: 484 (OGC #6)

Comment: Comments made on the text for each waste pit, the Burn Pit, and the Clearwell, and addressed by U.S. DOE, should also be incorporated into the relevant portions in the summary sections of the document for each waste pit, the Burn Pit, and the Clearwell.

Response: Agree. Revisions to text for each of the pits will also be incorporated into the relevant portions of the summary sections.

Action: The U.S DOE responses to specific comments on the Waste Pits, the Burn Pit, and the Clearwell have been incorporated into the relevant portions of the revised summary sections.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: GENERAL Page #: ALL Line #: NA Code:
Original Comment #: 485 (OGC #7)

Comment: U.S. DOE should review all figures to ensure that samples discussed in the text are presented on the appropriate figure. U.S. DOE should also carefully check the text to confirm that the appropriate figures are referenced in the text.

Response: Agree. A final QA check has been performed to ensure that samples discussed in the text are presented in the appropriate figures. The QA check included verification of proper figure references.

Action: QA check performed.

OEPA COMMENTS

GENERAL

Commenting Organization: OHIO EPA Commentor: DERR
Section #: GENERAL Page #: Line #: Code: C
Original Comment #: 486 (OC 3)
Comment: The placement of tables at the end of each section is inconvenient and makes document review difficult. All tables, figures, and other supporting documents should be placed directly after the reference in the text.
Response: Acknowledge that placement of tables is a deviation from our normal style and that, to some extent, it affects the review of the document. The decision to deviate from our normal style, however, grew out of consideration for the reader.

This document contains a large number of tables, so many in some sections that they interfere with the comfortable reading of the document. In deciding how to improve readability, we considered two generally acceptable alternatives—placing the tables in a separate volume and placing them at the ends of the sections. In the first instance, the reader could open the separate volume of tables and turn through it as the document is reviewed; but it physically separates the tables from their sections, and it was decided that for this draft, the justification for such a wide deviation from the normal style was not warranted. The other alternative, putting all tables at the end of the sections (standard in documents where the number of tables far exceeds the pages of text), was chosen because it allows the reader continuous access to the text without the interruption of voluminous tables and, at the same time, keeps the tables attached to their sections.

Since this document is bound in a loose-leaf notebook binder, the reader may avoid turning back to tables as they are called out by removing them from the back of the section and placing them on the table next to the document.
Action: None.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: GENERAL Page #: Line #: Code: C
Original Comment #: 487 (OC 5)
Comment: DOE needs to keep unit values the same in tables (e.g., cu. ft., cu. yds.).
Response: Agree.
Action: A final QA of the tables and figures has been performed to ensure the consistent use of unit values.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: GENERAL Page #: Line #: Code: E
Original Comment #: 488 (OC 6)
Comment: Several minor errors were noted throughout the text. These consisted of spelling errors, grammatical errors, and misidentified references to figures and tables. Some of these are noted in specific comments. We anticipate that most of these errors will be corrected by internal QA review and response to comments.
Response: Agree.
Action: A final internal QA has been performed.

Commenting Organization: OHIO EPA Commentor: DERR
Section #: GENERAL Page #: Line #: Code: C
Original Comment #: 489 (OC 7)

Comment: The report indicates that conservative assumptions were relied upon to compensate for data limitations (due to heterogeneity of materials, limited sampling, and risks of drilling in and below the waste pits). As a result, the FS process may retain and/or select remedial technologies that are overly conservative and not the most cost effective. If additional data becomes available through the ongoing remedial process to reduce uncertainty regarding contaminant migration and associated risks, these data should be examined to determine whether or not less conservative remedial measures are more cost effective.

Response: Agree.

Action: None.

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