5-106.16 1049

Department of Energy

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OCT 16 1997

DOE-0061-98

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

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

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF CHANGE PAGES FOR THE INTEGRATED ENVIRONMENTAL MONITORING PLAN

Reference: Letter to J. Reising, DOE-FEMP, from J. Saric, U.S. EPA, "Final IEMP," dated September 24, 1997.

This letter serves to transmit change pages to the Integrated Environmental Monitoring Plan (IEMP) which address the U.S. Environmental Protection Agency (U.S. EPA) comments (Reference) and a U.S. Department of Energy (U.S. DOE) sponsored correction to Table 4-2. The correction of Table 4-2 was necessary due to a formatting error. A cover sheet summarizing the changes and providing direction on page replacement is included. These change pages are being provided to all holders of the final IEMP (i.e., August 1997).

If you have any questions concerning the enclosed change pages, please contact Robert Janke at (513) 648-3124, or Kathleen Nickel at (513) 648-3166.

Sincerely,

Johnny Reising

FEMP:Nickel

Johnny W. Reising
Fernald Remedial Action
Project Manager

Enclosures: As Stated

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CHANGE PAGES FOR THE INTEGRATED ENVIRONMENTAL MONITORING PLAN

PLEASE DO NOT USE PREVIOUS COPY OF THIS LETTER AND IT'S ATTACHMENTS, THE REPLACEMENT PAGES WERE NOT TWO-SIDED COPIES.

USE THIS COPY AND REPLACEMENT PAGES ATTACHED.

THANK YOU

CHANGE PAGES IN RESPONSE TO U.S. EPA COMMENTS ON THE AUGUST 1997 INTEGRATED ENVIRONMENTAL MONITORING PLAN

CHANGE PAGE INSTRUCTIONS AND SUMMARY OF CHANGES FOR THE AUGUST 1997 INTEGRATED ENVIRONMENTAL MONITORING PLAN

(Note: Due to double sided copying, it was necessary in some cases to include pages from the August 1997 version before and after the actual change page)

Section 3.0

Replace pages 3-49 through 3-52

Revised the "List of Groundwater Elevation Monitoring Wells" on page 3-50 and Figure 3-13 on page 3-51. Figure 3-13 was revised to be consistent with the list on page 3-50. Note that Monitoring Well 3648 has not been added to the revised list/figure as it was originally called out in error. Monitoring Well 3648 does not exist.

Section 4.0

Replace pages 4-11 through 4-14

Table 4-2 was revised to correct a formatting error (columns 4, 5, and 6).

Section 6.0

Replace pages 6-25 through 6-32

Pages 6-25, 6-28, and 6-32 revised to provide clarification on the terms "ASL B" and "ASL D" as proposed in response to comment number 9. Revised page 6-30 and 6-31 to correct the terms and equations used in the evaluation of radon data. Clarification and corrections to the term "standard deviation (at 95%)" were also made.

Replace pages 6-43 through 6-45

Revised pages 6-43 and 6-45 to include phrasing discussed in June 25, 1997 conference call. Figure 6-8 revised to correct an error in the placement of footnote "e".

Appendix C

Replace pages C-15 and C-16

Deleted repetitive lines on page C-15 as proposed in response to Comment 23.

Water samples will be collected semi-annually from the four locations and analyzed for the six constituents which have been characterized as >MP in Zone 3. In addition, samples will be collected annually from the four locations and analyzed for the 14 constituents characterized as >N and the seven constituents categorized as <MP in Zone 3 (Table 3-2). Section 3.4.2.3 and Appendix A provide additional information on the parameter selection process. Since no active pumping will be taking place in the area and the restoration module will not be installed for several years, semi-annual monitoring should be adequate to monitor the >MP constituents. It is anticipated that a year or two before the Plant 6 Area Module becomes operational, the frequency of the six >MP analyses will be increased to quarterly. The 27 constituents to be monitored in this area are listed below.

LIST OF CONSTITUENTS WHICH WILL BE SAMPLED
IN THE PLANT 6 AREA MONITORING WELLS

Constituents Categorized as >MP Shown in **Bold** are Analyzed Semi-Annually
All Other Constituents Analyzed Annually

General Chemistry	Inorganic	Radionuclide	Organic
Fluoride	Antimony	Neptunium-237	Alpha-chlordane
Nitrate/Nitrite	Arsenic	**Strontium-90**	Bromodichloromethane
	Beryllium	Technetium-99	Carbon Disulfide
	Boron	Thorium-228	1,2-Dichloroethane
	Cadmium	**Total Uranium**	Vinyl Chloride
	Total Chromium		
	Cobalt		
	Lead		
	Manganese		
	Mercury		
	Molybdenum		
	Nickel		
	Selenium		
	Vanadium		
	Zinc		

3.5.1.6 Routine Water-Level Monitoring Program

The location of the water-table in the Great Miami Aquifer and the water-table response to seasonal fluctuations has been well characterized in the Operable Unit 5 Remedial Investigation Report. Water-level data have been collected routinely for the FEMP since 1988. Water-level data are used to determine groundwater flow and direction. This is accomplished by preparing hydrographs and maps of the water-level surface in the Great Miami Aquifer. During the remediation phase of the CERCLA process, water levels will be monitored across the site to assess the effects of extraction and injection operations on flow conditions within the Great Miami Aquifer.

The Great Miami Aquifer is an unconfined aquifer and responds rapidly to recharge events. Data collected at the FEMP and reported in the Operable Unit 5 Remedial Investigation Report documents that no strong vertical gradients exist in the area of the FEMP. However, with the implementation of the remedy and the stresses placed on the aquifer by the additional pumping, water level monitoring during the remediation will use both Type 2 wells which are screened at the water table surface as well as Type 3 wells which are screened deeper within the aquifer.

The monitoring wells which were selected for water level monitoring in 1997 and 1998 are shown in Figure 3-13 and listed below.

LIST OF GROUNDWATER ELEVATION MONITORING WELLS

2002	2093	2402	2679	3044	3398
2009	2095	2417	2702	3045	3402
2011	2096	2421	2733	3046	3417
2014	2097	2423	2821	3049	3421
2015	2098	2424	2880	3054	3423
2016	2106	2426	2881	3065	3424
2017	2107	2429	2897	3066	3426
2020	2108	2430	2898	3067	3429
2027	2118	2431	2899	3068	3431
2032	2119	2432	2900	3069	3432
2033	2125	2434	2949	3070	3550
2034	2126	2436	21033	3091	3551
2043	2128	2446	21063	3092	3552
2044	2166	2544	21064	3093	3624
2045	2383	2545	21065	3095	3636
2046	2384	2546	21194	3096	3679
2048	2385	2548	21198	3097	3733
2049	2386	2549	3009	3098	3821
2051	2387	2550	3011	3106	3880
2052	2389	2551	3014	3108	3881
2054	2390	2552	3015	3125	3897
2065	2394	2553	3017	3126	3898
2066	2396	2624	3020	3128	3899
2068	2397	2625	3027	3385	3900
2070	2398	2636	3032	3387	31217
2091	2399	2648	3034	3390	31565
2092	2400	2649	3043	3396	

DGIS/SCRW2/DGN/MAP/HOR/DPTH/C51MPELV.DGN FER OUS 2/28/97 STATE PLANAR COORDINATE SYSTEM 1927

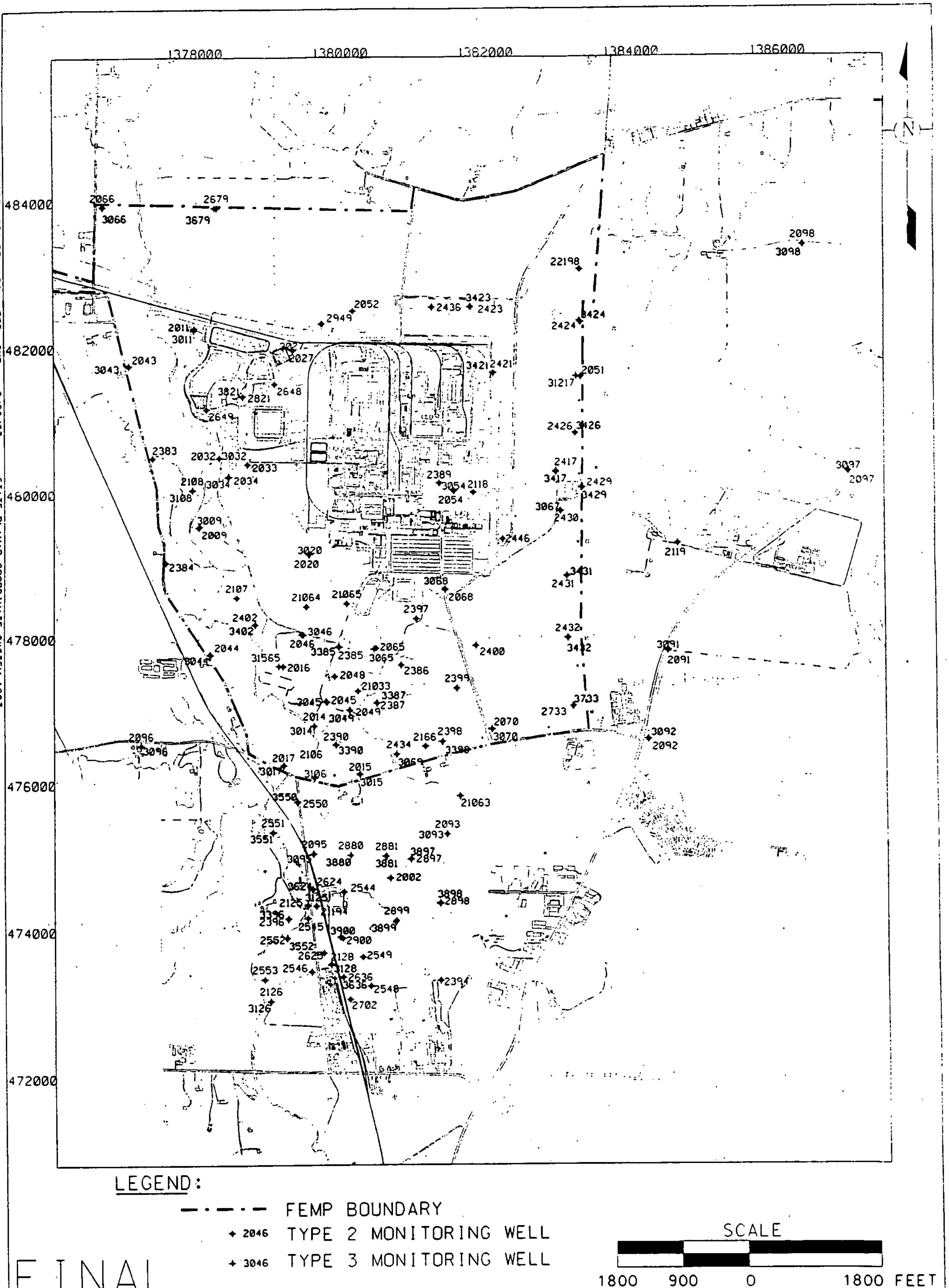

FIGURE 3-13. GROUNDWATER ELEVATION MONITORING WELLS

These locations were selected to provide areal coverage across all areas of the FEMP site with an increasing density of wells in areas surrounding active aquifer restoration modules. Groundwater elevations will be measured quarterly in these wells, following approval of the IEMP, to provide data for construction of water table elevation maps. These maps will be used to determine the location of flow divides, capture zones, and stagnation zones created by the operation of remediation modules. Additional monitoring wells and more frequent measurement intervals may be used near aquifer remediation modules as they become operational and as sensitive capture zones or stagnation zones are identified, or if unpredicted fluctuations in contaminant concentrations are observed.

A continuous model performance evaluation process is critical to ensure that model predictions are accurate and reliable. Therefore, water table maps with capture zones, flow divides and stagnation zones will be produced from the collected field data and will be compared to annual model predictions to determine how well the groundwater model is predicting actual aquifer responses during remediation. If the model predictions of groundwater elevations consistently (two or more consecutive quarters) do not match the observed groundwater elevations to within five feet (one-half the approximate seasonal variation in groundwater elevations as defined by historical data) for at least two thirds of the monitoring wells within the capture zone of the remedial system, the need for model recalibration will be evaluated.

3.5.2 Compliance Based Monitoring

3.5.2.1 Private Well Monitoring

The oldest monitoring effort (still ongoing) is the Radiological Environmental Monitoring (private well) Program. As explained below, the existing formal program will be modified upon approval of the IEMP.

Sampling of private wells began on a routine basis in 1982, but the program was not formalized until 1984. In the past, at a property owner's request, any drinking water well near the site would be sampled for uranium. The one-time results were reported to the well owner. If any "special request" sample showed a questionable or significant total uranium concentration, or if the well was believed to be representative of an area based on its location, the property owner had the option to participate in the routine sampling program. This program grew to 33 wells in 1996. Wells were either sampled

TABLE 4-2

SURFACE WATER PARAMETER SELECTION CRITERIA SUMMARY[a]

Constituent	No. of Analyses	Final Remediation Levels[b] (FRL)	FRL Basis[b]	No. of Analyses Above FRL[c]	Benchmark Toxicity Value (BTV)	No. of Analyses Above BTV[c]	No. of Areas Failed Modeling	95th Percentile Background Level in Surface Water[d]	
								Paddys Run	Great Miami River
Radionuclides (pCi/L)									
Cesium-137+1d	78	1.0×10^1	R	0	-	-	-	3.1	ND
Neptunium-237+1d	143	2.1×10^2	R	0	-	-	-	-	ND
Lead-210+2d	0	1.1×10^1	R	-	-	-	-	-	-
Plutonium-238	152	2.1×10^2	R	0	-	-	-	ND	ND
Plutonium-239/240	152	2.0×10^2	R	0	-	-	-	0.09	ND
Radium-226+8d	364	3.8×10^1	R	0	1.2×10^3	0	2	0.35	0.41
Radium-228+1d	368	4.7×10^1	R	1	-	-	-	2.1	2.2
Strontium-90+1d	183	4.1×10^1	R	0	-	-	10	0.96	ND
Technetium-99	185	1.5×10^2	R	1	-	-	14	ND	ND
Thorium-228+7d	228	8.3×10^2	R	0	1.9×10^3	0	-	ND	0.62
Thorium-230	229	3.5×10^3	R	0	2.2×10^3	0	-	ND	0.36
Thorium-232+10d	230	2.7×10^2	R	0	2.5×10^3	0	0	ND	ND
Uranium, total (mg/L)	340	5.3×10^{-1}	R	25	8.9×10^{-1}	18	10	0.001	0.001
Chemicals (mg/L)									
Alpha-chlordane	23	3.1×10^{-4}	R	0	-	0	-	-	-
Aluminum	95	-	-	-	8.7×10^{-2}	37	34	-	-
Ammonia	94	-	-	-	1×10^0	4	-	-	-
Antimony	88	1.9×10^{-1}	A	0	1.9×10^{-1}	0	-	ND	ND
Aroclor-1254	23	2.0×10^{-4}	D	0	-	-	-	-	-
Aroclor-1260	23	2.0×10^{-4}	D	0	-	-	-	-	-
Arsenic	145	4.9×10^{-2}	R	0	1.9×10^{-1}	0	-	ND	0.0036
Barium	145	1.0×10^2	R	0	1.45×10^{-1}	2	0	0.053	0.1
Benzene	48	2.8×10^{-1}	R	0	-	-	-	-	-
Benzo(a)anthracene	47	1.0×10^{-3}	D	U	-	-	-	-	-

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TABLE 4-2
(Continued)

Constituent	No. of Analyses	Final Remediation Levels[b] (FRL)	FRL Basis[b]	No. of Analyses Above FRL[c]	Benchmark Toxicity Value (BTV)	No. of Analyses Above BTV[c]	No. of Areas Failed Modeling	95th Percentile Background Level in Surface Water[d]	
								Paddys Run	Great Miami River
Chemical (mg/L) - Contd.									
Benzo(a)pyrene	47	1.0×10^{-3}	D	U	-	-	-	-	-
Beryllium	86	1.2×10^{-3}	A	5	1.5×10^{-1}	0	-	ND	ND
Bis(2-chloroisopropyl)ether	47	2.8×10^{-1}	R	0	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	47	8.4×10^{-3}	A	9	8.4×10^{-3}	9	-	-	-
Bromodichloromethane	49	2.4×10^{-1}	R	0	-	-	-	-	-
Bromomethane	49	1.3×10^{0}	R	0	-	-	-	-	-
Cadmium	143	9.8×10^{-3}	B	1	3.5×10^{-3}	19	0	ND	0.01
Carbon disulfide	49	-	-	-	1.49×10^{0}	0	-	-	-
Chloroform	49	7.9×10^{-2}	A	0	-	-	-	-	-
Chromium VI[e]	145	1.0×10^{-2}	D	25	1.1×10^{-2}	25	-	ND	ND
Copper	143	1.2×10^{-2}	A	8	3.4×10^{-2}	0	-	ND	0.012
Cyanide	81	1.2×10^{-2}	A	4	1.2×10^{-2}	4	35	ND	0.005
Dibenzo(a,h)anthracene	47	1.0×10^{-3}	D	U	-	-	2	-	-
3,3-Dichlorobenzidene	47	7.7×10^{-3}	R	U	-	-	-	-	-
Di-n-butylphthalate	47	6.0×10^{0}	R	0	-	-	-	-	-
1,1-Dichloroethene	49	1.5×10^{-2}	R	0	-	-	-	-	-
1,2-Dichloroethene (total)	49	-	-	-	3.1×10^{-1}	0	-	-	-
Dieldrin	23	2.0×10^{-5}	D	0	-	-	-	-	-
Di-n-octylphthalate	6	5.0×10^{-3}	D	2	-	-	-	-	-
Fluoride	94	2.0×10^{0}	A	0	-	-	-	0.22	0.9
Lead	94	1.0×10^{-2}	B	13	3.0×10^{-2}	9	0	ND	0.010
Manganese	138	1.5×10^{0}	R	0	9.8×10^{-2}	19	-	0.035	0.08
Mercury	145	2.0×10^{-4}	D	12	2.0×10^{-4}	12	35	ND	ND
Methylene chloride	49	4.3×10^{-1}	A	0	4.3×10^{-1}	0	-	-	-

TABLE 4-2
(Continued)

Constituent	No. of Analyses	Final Remediation Levels[b] (FRL)	FRL Basis[b]	No. of Analyses Above FRL[c]	Benchmark Toxicity Value (BTV)	No. of Analyses Above BTV[c]	No. of Areas Failed Modeling	95th Percentile Background Level in Surface Water[d]	
								Paddys Run	Great Miami River
Chemical (mg/L) - Contd.									
4-Methylphenol	47	2.2×10^{0}	R	0	-	-	-	-	-
Molybdenum	143	1.5×10^{0}	R	0	7.0×10^{-1}	0	-	ND	0.02
Nickel	143	1.7×10^{-1}	A	0	4.7×10^{-1}	0	-	ND	0.023
Nitrate	64	2.4×10^{3}	R	0	-	-	-	1.7	6.6
4-Nitrophenol	44	7.4×10^{3}	R	0	-	-	-	-	-
Selenium	123	5.0×10^{-3}	A	1	5×10^{-3}	1	-	ND	ND
Silver	128	5.0×10^{-3}	D	15	1.3×10^{-3}	16	12	ND	ND
Tetrachloroethene	49	4.5×10^{-2}	R	1	7.3×10^{-2}	1	-	-	-
Thallium	85	-	-	-	1.6×10^{-2}	0	-	ND	ND
1,1,1-Tricholoroethane	49	1.0×10^{-3}	D	1	-	-	-	-	-
1,1,2-Tricholoroethane	49	2.3×10^{-1}	R	0	-	-	-	-	-
Trichloroethene	49	-	-	-	7.5×10^{-2}	0	2	-	-
Vanadium	103	3.1×10^{0}	R	0	4.1×10^{-2}	0	-	ND	ND
Zinc	84	1.1×10^{-1}	A	2	2.8×10^{-1}	1	1	ND	0.045

[a] = Shading indicates parameters selection for IEMP surface water target analytes and associated reason for selection
[b] = Derived from Operable Unit 5 Record of Decision Table 9-5
A = ARAR values
B = Background concentrations
D = Analytical detection limit
R = Human health risk
[c] = Additional information is provided in Appendix B
[d] = For small data sets (≤ 7 Samples), the maximum detected concentration is used as the 95th percentile
[e] = FRL and BTV are based on chromium VI; however, the analytical results are for total chromium
U = Number of analyses above FRL is unknown because method detection limits for all analyses were above the FRL
ND= Non-detect
\- = Not applicable/not available

- Column 7, Number of Analyses above BTV: This column represents the number of analyses in Column 2 which exceeded the BTV. An analyte was added to the parameter list for all surface water sample locations downstream of the BTV exceedence. Additional detail is provided in Appendix B.

- Column 8, Number of Areas Failed Modeling: This column represents, by constituent, the total number of on-property site drainage areas that failed modeling for cross-media impacts (35 specific drainage areas were evaluated, see Figure 4-3). Fate-and-transport modeling of on-property soil contaminants was conducted on an area-by-area basis for those areas of the FEMP east of Paddys Run (including source operable unit areas) to determine what area-specific constituents in soil have the potential to affect a surface water receptor or could cause a cross-media impact to groundwater during remediation. Specifically, if a particular constituent was found to have the potential to exceed the surface water BTV or FRL for that constituent, it failed the modeling and was therefore selected for monitoring at key downstream locations. Also, if a constituent was found to have a potential to cause a cross-media impact to groundwater via the surface water pathway (i.e., cause an FRL exceedence in groundwater), it failed.

  This information was used as part of the parameter selection process for each of the proposed IEMP surface water sampling locations. If a constituent failed the modeling in any drainage area "upstream" from a particular sampling location, then the respective "downstream" sampling location target analyte list includes the failed constituent.

- Column 9, 95th Percentile Background Level in Surface Water: This column represents the 95th percentile background level in surface water as presented in the Operable Unit 5 Remedial Investigation (DOE 1995f) for Paddys Run and the Great Miami River. This information is provided for comparison purposes.

4.4.2.2 Surface Water Cross-Media Impact

To assess the cross-media impact that contaminated surface water has on the underlying Great Miami Aquifer, the following design considerations are necessary:

- Samples should be collected at those points near where the glacial overburden has been breached by site drainages. As described in the Operable Unit 5 Remedial Investigation, the majority of the FEMP is underlain by clay-rich glacial overburden, which, where present, provides a measure of protection to the underlying sand-and-gravel aquifer. Where the protective glacial overburden (Figure 4-4) has been eroded by site drainages (primarily in the lower reaches of Paddys Run and in the storm sewer outfall ditch), a direct pathway exists for surface water and associated contaminants to reach the underlying sand-and-gravel Great Miami Aquifer. In the Operable Unit 5 Remedial Investigation, contaminant migration via this pathway was determined to be responsible for the formation of the South Plume. Specifically, the South Plume was formed over the years when contaminated surface water runoff infiltrated through the streambeds of the storm sewer outfall ditch and Paddys Run.

- Parameters analyzed should represent those area-specific COCs identified in the Operable Unit 5 Feasibility Study (DOE 1995a) and subsequent fate-and-transport modeling as having the potential for cross-media impact to groundwater via the surface water pathway.

Quality assurance specialists will participate on the project team, as necessary, to review project procedures and activities ensuring consistency with the requirements of the SCQ or other referenced standards and assist in evaluating and resolving all quality related concerns.

6.5.2 Sampling Program - Radiological Air Particulates

This sampling program is designed to collect radiological air particulate data which is representative of ambient air conditions at/or near potential receptor locations (see Figure 6-2). The data collected under this program will be used to assess the collective effect of concurrent remediation activities on the air pathway and provide continual feedback to the remediation projects on the effectiveness of emission controls and provide a monitoring basis to support the implementation and track the effectiveness of corrective actions as necessary. As such, field procedures and analytical methods are designed to support the necessary level of data quality.

The monitoring design incorporates a network of 18 high-volume continuous air monitoring stations. Filter media are collected on a bi-weekly basis and analyzed at the on-site laboratory for total uranium at ASL B. ASL B provides qualitative, semi-qualitative and quantitative data with some QA/QC checks. A portion of each bi-weekly sample is retained for a quarterly composite sample, which is analyzed at ASL D by an off-site laboratory for those radionuclides expected to be the major contributors to dose. ASL D provides quantitative data with fully defined QA/QC and complete data packages, including raw data. Greater detail on the sampling design is provided in Section 6.4.2.1 and Appendix C.

6.5.2.1 Sampling Procedures

The air filters from the high-volume environmental monitors are collected and analyzed in accordance with the following:

- DOE Order 5400.5, "Radiation Protection of the Public and Environment"
- "Environmental Regulatory Guide for Radiological Effluent Monitoring" (DOE 1991)
- FEMP SCQ Section 6.0 and Appendix K
- Standard Operating Procedure SRS-REM-001, High Volume Air Monitoring
- Data Quality Objective AR-006, "Routine Air Monitoring"
- Standard Operating Procedure EW-0002, Chain of Custody/Request for Analysis Record for Sample Control
- Standard Operating Procedure EQT-18, Calibration of Graesby GMW High Volume Air Sampler.

Table 6-5 provides the technical specifications for air-particulate monitors program.

TABLE 6-5

TECHNICAL SPECIFICATIONS FOR AIR-PARTICULATE MONITORS

Monitor Type	Flow Rate	Filter Type	Gauge/Meters	Indicator
High volume continuous	45 cfm	Polyester 0.5 um Dynaweb© brand	Hours Flow Rate Flow Rate Set Point	Low Flow Warning Light

Sample collection is accomplished by using high-volume environmental air monitors that continuously collect samples of airborne particulates. Table 6-5 provides the technical specifications for the high volume air monitoring equipment and filter media. Any changes in flow rate are accounted for by the automatic flow controller in the monitor and are documented on a flow chart recorder which continuously records flow data. Air monitoring equipment must meet the following criteria per DOE guidance and industry practice:

- Environmental air samplers shall be mounted in locked, all-weather stations with the sampler discharge positioned to prevent the recirculation of air.
- The air sampling system shall have a flow-rate meter, and the total air flow or total running time should be indicated.
- The air sampling rate should not vary by more than +/- 10 percent of the monitor setpoint of 45 cfm for the collection of a given sample.
- Linear flow rate across air particulate filters should be maintained between 20 and 50 m/min.
- Air sampling systems shall be flow-calibrated, tested, and inspected routinely according to written procedures (DOE 1991). Flow calibration shall be at least as often as recommended by the manufacturer.

The monitors are inspected and calibrated at least once yearly in accordance with recommendations from the manufacturer. All units placed in the field are tracked via a field tracking log which provides information pertaining to when calibrations were last completed and the date of the next scheduled calibration. All monitors will be inspected daily to ensure continuous operation.

6.5.2.2 QA Sampling Requirements

Quality control samples will be taken according to the frequency recommended in the SCQ. These samples will be collected and analyzed in order to evaluate the possibility that some controllable practice, such as decontamination, sampling or analytical practice, may be responsible for introducing bias in the project's analytical results. The following quality assurance samples will be collected under this sampling program:

Air Particulate Samples

- One blank sample will be submitted for analysis with each batch of bi-weekly filters and with each set of quarterly composite samples.
- One spike sample with a known amount of uranium will be submitted for analysis with each batch of bi-weekly filters. The spike sample results are used to monitor the laboratory performance within defined tolerance limits within the established contract and in accordance with the SCQ (typically between 0.75 and 1.25 of the known value).
- The laboratory is also required to perform analyses on method blanks, matrix spikes and laboratory control samples as required by the SCQ for the corresponding ASL and analytical method. For the quarterly composite samples, analyzed under ASL D, a method blank, duplicate, matrix spike and laboratory control sample will be analyzed for each batch of samples.

In addition to QA sampling requirements, air monitoring personnel (technicians) are required to complete the following training requirements prior to performing unsupervised collection of air samples.

- 40-hour training program for general site workers in accordance with 29 CFR 1910.120
- Sample collection and chain-of-custody training
- Procedural training on the collection of air samples, air sampler maintenance, and calibration of air sampling equipment
- 40 hours of supervised on-the-job training.

6.5.2.3 Decontamination

Decontamination of air filters collected on site is not necessary since the filters are collected from stationary cassettes identified for each monitor. Only monitoring units that have been stationed in the former production area are required to undergo cleaning and decontamination if deemed necessary by a radiological survey. Radiological surveys are performed when equipment and/or samples are required to be released from the former process area for transport and/or analysis.

6.5.2.4 Waste Dispositioning

Contact wastes generated by technicians during sample collection activities are collected, maintained, and dispositioned, as necessary, depending on the location of waste generation (i.e., former production area or off site).

Waste associated with the air monitoring program is generated and handled by the respective laboratory identified for conducting the analyses.

6.5.3 Sampling Program - Radon Monitoring

This sampling program is designed to collect measurements of environmental radon concentrations released from the radon generating materials contained on-site and in the K-65 silos. Sample locations on-site, at the boundary fence lines and off-site locations provide representative measurements in assessing compliance with established limits. In addition, data collected will be used to assess radon concentrations during remediation activities both on-site and at the fence line. As such, field procedures and analytical methods are designed to support the necessary level of data quality.

The monitoring design incorporates a network of approximately 64 alpha track-etch radon cup locations. The cups are exchanged on a semi-annual basis (twice yearly) and measured at ASL B. ASL B provides qualitative, semi-qualitative, and quantitative data with some QA/QC checks. Additionally, in accordance with established agreements, approximately 20 alpha scintillation radon detectors are located on site and off site. Data from selected continuous monitors provide hourly readings which are compiled into 24-hour averages and included in the quarterly FFA report to the EPA, as required. The data collected from the monitors are collected at ASL A. Greater detail on sampling design is provided in Section 6.4.2.2.

6.5.3.1 Sampling Procedures

The alpha track-etch radon cups and continuous radon monitors are collected and analyzed in accordance with the following:

- DOE Order 5400.5 "Radiation Protection of the Public and Environment"
- Environmental Regulatory Guide for Radiological Effluent Monitoring (DOE 1991)
- FEMP SCQ, Appendix K
- Standard Operating Procedures:

  EP-REM-011, Environmental Radon Monitoring
  EM-RM-014, Real-Time Environmental Radon Monitoring
  SMPL-06, Radon Sampling from Headspace of K-65 Silos
  EM-RM-002, Logkeeping Procedure

- Standard Operating Procedure EW-0002, Chain of Custody/Request for Analysis Record for Sample Control.

Table 6-3 provides a sample and analytical summary for the radon monitoring program. Sample collection is accomplished by two different modes: one is the radon cup which utilizes an alpha track-etch detector and the second is continuous radon monitoring via a Continuous Passive Radon Detector (CPRD) and a Pylon AB-5 radon monitor. Radon alpha track-etch allows for radon to penetrate a membrane filter within a plastic cup. Once the radon decays, an alpha particle is emitted that interacts with the plastic chip within the cup (hence the measurement is based on the "etch" left in the plastic). The continuous environmental radon monitors operate in a passive mode, allowing radon to diffuse through the foam barrier of the CPRD into the detector. The units are set to collect measurements of a one-hour duration, with a 24-hour period averaged into a monthly summation of minimum, maximum, and average radon concentrations.

Continuous monitors are calibrated as a contiguous unit at least once per year with National Institute of Standards and Technology traceable sources. The radon cups are received new from the vendor and therefore do not require periodic calibration. Both types of units are tracked upon deployment in the field via an equipment tracking log and field logbooks. Additionally, an equipment maintenance/ calibration logbook is used to track and schedule units requiring any necessary maintenance and/or calibrations.

6.5.3.2 <u>QA Sampling Requirements</u>

Quality control samples will be taken according to the frequency recommended in the SCQ. These samples will be collected and analyzed to evaluate the possibility that some controllable practice, such as decontamination, sampling, or analytical practice, may be responsible for introducing bias in the project's analytical results. The following quality assurance samples will be collected under this sampling program, as applicable:

- Approximately 5-10 percent of the alpha track-etch detectors will be reserved for spike samples. The spike sample results are used to monitor laboratory performance within defined tolerance limits.

- QA practices for the electronic monitoring will be maintained as per established maintenance and calibration schedules. In addition, routine source checks (i.e., monthly) are performed on continuous radon detectors. Data will be recorded on process control charts and only instruments demonstrating acceptable performance will be used to collect data in the field. Source check data that falls within +/- two standard deviations of the mean identifies an instrument as acceptable for use. If the source check data from an instrument lies outside of the +/- two standard deviations from the mean, that instrument will not be used until it is examined and repaired, and recalibrated if necessary.

- The vendor is also required to perform analyses on their internal control blanks, spikes and laboratory control samples as required by the SCQ for the corresponding ASL and analytical method.

The following process will be used to evaluate replicate data usability by identifying outliers and suspect data points under four specific conditions. Data will be evaluated using exposure information (pCi/L-days) from data collected in the field, as well as, data from detectors exposed to known radon concentrations (spike samples). This information will be used to assess the variability, precision, and accuracy with known exposures approximate of environmental conditions.

Field Data — Control Data (95% Relative Error)

1) IF $\frac{|\text{Maximum Value - Average Value}|}{\text{Average Value}} \leq \frac{\text{Standard Deviation of Spikes}}{\text{Mean Value of Spikes}}$

AND

IF $\frac{|\text{Minimum Value - Average Value}|}{\text{Average Value}} \leq \frac{\text{Standard Deviation of Spikes}}{\text{Mean Value of Spikes}}$

THEN average all data from location

2) IF $\frac{|\text{Maximum Value - Average Value}|}{\text{Average Value}} \leq \frac{\text{Standard Deviation of Spikes}}{\text{Mean Value of Spikes}}$

AND

IF $\frac{|\text{Minimum Value - Average Value}|}{\text{Average Value}} \geq \frac{\text{Standard Deviation of Spikes}}{\text{Mean Value of Spikes}}$

THEN average data from two higher data points

3) IF

$$\frac{|\text{Maximum Value - Average Value}|}{\text{Average Value}} \geq \frac{\text{Standard Deviation of Spikes}}{\text{Mean Value of Spikes}}$$

AND

IF

$$\frac{|\text{Minimum Value - Average Value}|}{\text{Average Value}} \leq \frac{\text{Standard Deviation of Spikes}}{\text{Mean Value of Spikes}}$$

THEN average data from two lower data points

4) IF

$$\frac{|\text{Maximum Value - Average Value}|}{\text{Average Value}} \geq \frac{\text{Standard Deviation of Spikes}}{\text{Mean Value of Spikes}}$$

AND

IF

$$\frac{|\text{Minimum Value - Average Value}|}{\text{Average Value}} \geq \frac{\text{Standard Deviation of Spikes}}{\text{Mean Value of Spikes}}$$

THEN record highest value if within historical range and/or reasonable based on process knowledge.

6.5.3.3 Decontamination

The decontamination of the radon monitoring equipment is necessary only for those detectors deployed in the former process area. Decontamination for these detectors is conducted under the radiological controls program for releasing equipment off-site. Radiological surveys are performed when equipment and/or samples are required to be released from the former process area for transport and/or analysis. These surveys are conducted in accordance with established procedures.

6.5.3.4 Waste Dispositioning

Contact wastes that are generated by the field technicians during field sampling activities are collected, maintained, and dispositioned, as necessary, depending upon the location of waste generation (i.e., former production area or off site). Any other waste generated is covered by the established contract(s) with the vendor(s).

6.5.4 Sampling Program - Direct Radiation (TLDs)

This sampling program is designed to measure the direct radiation at the FEMP from locations which are representative of radiological environmental conditions at select locations on-site, at the facility fence line and in the local community (see Figure 6-4). The data collected under this program will be used to assess the collective effect of current remediation activities on the air pathway. As such, field procedures and analytical methods are designed to support the necessary level of data quality.

The monitoring design incorporates a network of 37 TLD locations. Three TLDs are deployed quarterly at each location and submitted to the on-site dosimetry laboratory for analysis. External gamma radiation measurements are recorded from each TLD read. All TLDs are analyzed to ASL B. ASL B provides qualitative, semi-qualitative, and quantitative data with some QA/QC checks. Greater detail on the sampling design is provided in Section 6.4.2.3.

6.5.4.1 Sampling Procedures

The TLDs are collected from environment monitoring locations and analyzed in accordance with the following:

- DOE Order 5400.5 Radiation Protection of the Public and Environment
- Environmental Regulatory Guide for Radiological Effluent Monitoring (DOE 1991)
- FEMP SCQ Section 6.0 and Appendix K, Section 6.5
- Standard Operating Procedure EP-REM-002, Environmental Direct Radiation
- Data Quality Objective MS-004 REM Direct Radiation Measurements
- Standard Operating Procedure EW-0002, Chain of Custody/Request for Analysis Record for Sample Control.

Table 6-4 provides a sample and analytical summary for the direct radiation monitoring program.

Sample collection is accomplished using Panasonic UD-814 dosimeters. Environmental TLDs must meet the following criteria as per DOE guidance:

- Environmental TLDs shall be mounted at 1 meter above ground.
- The frequency of exchange should be based on predicted exposure rates from site operations.
- The exposure rate should be long enough (typically 1 calendar quarter) to produce a readily detectable dose (DOE 1991).
- Annealing, calibration, readout, storage and exposure periods used should be consistent with the ANSI standard recommendations (ANSI 1975).

All TLDs placed in the field are tracked via a field tracking log which provides information pertaining to when and where dosimeters were deployed as well as scheduled collection date.

Data evaluation to address any remaining expectations identified in Section 6.4.1 is encompassed in the data evaluation techniques described above.

6.6.4 Reporting

Data from the air monitoring program have been provided in three types of reports. Figure 6-8 identifies the reporting schedule for these documents and when IEMP reporting will assume responsibility for air monitoring reporting. Air monitoring activities have been reported in the following documents:

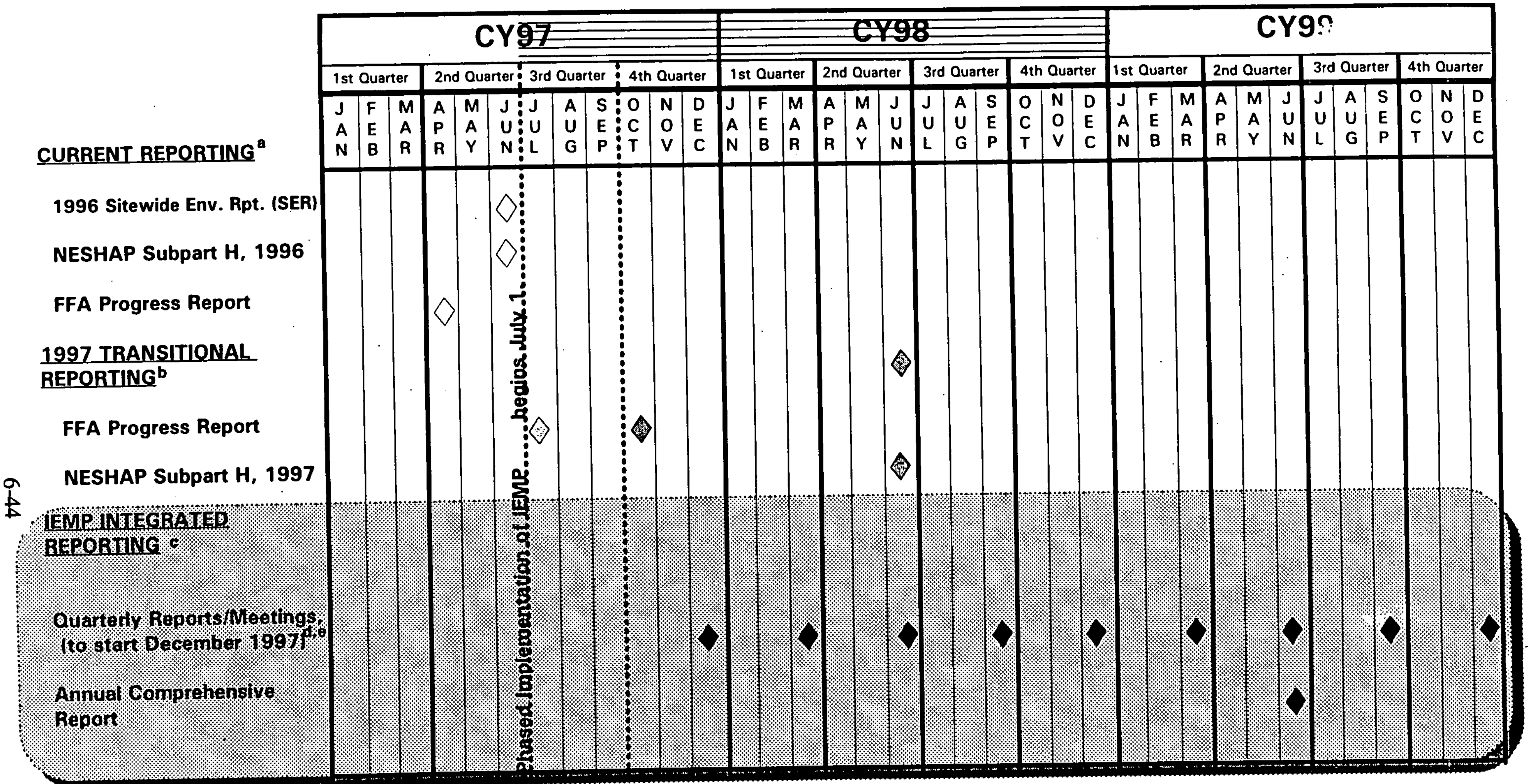
- Site Environmental Report, which provides monitoring data annually
- NESHAP Subpart H Report - required to be submitted annually by June 30 to demonstrate compliance with the NESHAP Subpart H annual off-site dose limit, and
- FFA reports for radon data at K-65 silos.

All three of the above reporting requirements will be streamlined into the IEMP reporting strategy. Air monitoring data reporting will be as follows:

- Air monitoring data for calendar year 1996 will be reported in the 1996 SER to be published in June 1997. Radiological air particulate monitoring, TLD and radon data for calendar year 1997 will be published in June 1998 in a transitional environmental monitoring report. Data collected in calendar year 1998, will be reported under the quarterly IEMP reports, as well as the new IEMP annual comprehensive report to be published in June 1999.
- The NESHAP Subpart H report for calendar year 1996 will be published in June 1997. Approval will be requested from EPA to submit the report, beginning with the 1997 report, as part of the transitional environmental monitoring report to be published in June 1998.
- Additionally, quarterly reporting for the FFA radon monitoring data will continue on its April, July, and October schedule. The FFA radon monitoring data will be incorporated into the IEMP quarterly reports/meetings beginning in December 1997, pending EPA approval.

Due to the amount of time necessary for sample analysis, data review, evaluation and reporting, the content of the quarterly submittal will not contain all the data collected in the previous quarter. Quarterly composite air particulate data and radon track-etch data reporting will lag other air data reporting by one month. Quarterly meetings will be held to coincide with the quarterly report submittal. Data and information pertaining to the air program will be presented in the quarterly meetings and reports and will consist of the following:

FIGURE 6-8
IEMP AIR REPORTING SCHEDULE



a = Reporting of all CY96 EMP data by June 1997.

b = Reporting CY97 EMP data and IEMP program data as implemented.

c = Includes the first complete year of reporting IEMP data, CY98 (Assuming IEMP fully implemented by January 1, 1998).

d = Includes the radon data collected per the FFA monitoring requirements.

e = Includes radon data formatted monthly from the preceding quarter.

CY97-98, the timeframe covered in this version of the IEMP

23

- Graphical presentation of data trends for radiological air particulate monitoring, radon, and TLD results at each sample location for the most recent quarter and target radionuclide results from analyses of quarterly composite filter samples from the previous quarter,

- Summary-level information on the effectiveness of the project-specific emission controls, as necessary for interpretation of IEMP results, and

- Status of regulatory compliance with NESHAP Subpart H.

The air portion of the IEMP annual report will consist of the following:

- Constituent concentrations for each sample location,

- Statistical analysis summary for each constituent,

- Status of regulatory compliance with NESHAP Subpart H, and

- Summary-level information on the effectiveness of the project-specific emission controls, if necessary for interpretation of IEMP results.

analysis, by the total volume of air drawn through the filter. As described above, decay chain daughter products will be assumed to be in equilibrium with the measured parent concentration. Concentrations will be corrected for background to obtain the net measured concentration. The resulting net annual average concentrations will be divided by the corresponding 40 CFR 61 subpart H, Appendix E Table 2 values. The resulting fractions will be summed per monitoring location to demonstrate compliance. Compliance with the Subpart H standard will be documented in an annual compliance summary that will be submitted as part of the IEMP sponsored annual environmental report.

Managing Analytical Results

The analysis of environmental air samples may result in contaminant concentrations being reported at levels which are at or below the minimum detectable concentration (MDC). Contaminant concentrations which are at or below MDC are statistically indistinguishable from concentrations found in a blank sample. Air sample results from fenceline or receptor locations which are reported at or below the MDC will therefore be considered non-detects (zero) for the purposes of demonstrating compliance with the NESHAP dose limit.

Detectable contaminant concentrations will be corrected to net detectable concentrations using the average background concentration measured during the same sampling period. Average background concentrations will be determined using the average detected concentrations at the two background air monitors. Background air monitoring results which are MDCs will not be averaged, only measured concentrations will be used.

Criterion (v): A quality assurance program shall be conducted that meets the performance requirements described in Appendix B, Method 114.

All environmental sample collection and analysis conducted in support of the remediation effort at the FEMP are subject to the quality assurance requirements of the Sitewide CERCLA Quality Assurance Program Plan (SCQ). This EPA approved plan and its incorporation into the IEMP sampling plan meets the quality assurance program requirements of Appendix B, Method 114.

Criterion (vi): Use of environmental measurements to demonstrate compliance with the standard is subject to prior approval by EPA. Applications for approval shall include a detailed description of the sampling and analytical methodology and show how the above criteria will be met.

The sub·:ittal of the IEMP to the EPA for review and approval serves as the application. The IEMP and its appendices provide a description of the sampling and analytical methodology and explains how the criteria will be met.

C.2.3.2 All Pathway Dose Calculations

This section describes the technical approach for demonstrating compliance with the 100 mrem/year all-pathway dose limit in DOE Order 5400.5. Estimates of annual dose are based on the measured, background-corrected concentration of a contaminant in each environmental media (e.g., groundwater, and foodstuff). Ingestion rates for standard man are used for the consumption of water. A modified reference diet (NRC Reg. Guide 1.109) is used for the consumption of food. Dose conversion factors (DCF) [which are radionuclide specific factors used to convert a unit of ingested radioactivity (pCi) to dose (mrem)] are taken from DOE publications (Internal/External Dose Conversion Factors for Calculation of Dose to the Public DOE/EH-0070 and DOE/EH-0071).

The general form of the dose assessment equation is

$$D = C_{i,m} * I_m * DCF_i$$

where,

D = Dose (mrem/yr)

$\mathbf{C_{i,m}}$ = Background-corrected concentration of radionuclide **I** in media **m** (pCi/kg or pCi/l)

$\mathbf{I_m}$ = Intake (ingestion) rate for media (kg/yr, or L/yr)

$\mathbf{DCF_i}$= Dose conversion factor for radionuclide **I** (mrem/yr*pCi)

The detailed calculation of doses from the various environmental media was governed by FEMP procedure EP-REM-008, Estimating Radiological Pathway Dose except for the air inhalation dose, which is calculated as described in the previous section. Doses from all the media monitored under the IEMP also will be calculated according to relevant sections in this procedure. In general, drinking