

6024

G-000-1012.102

RESULTS OF WELL SAMPLING

08/22/94

DOE-2159-94
DOE-FN CITIZEN
25
LETTER



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

AUG 22 1994

DOE-2159-94

Dear Ms. Schiermeier:

As you are aware, the U.S. Department of Energy (DOE) has three groundwater monitoring wells (MW2096, MW3096, and MW4096) situated on your property. These monitoring wells have been sampled by Fernald Environmental Restoration Management Corporation (FERMCO) personnel in support of the environmental restoration program at the Fernald Site. Data from groundwater samples retrieved from the monitoring wells are used to determine the quality of the water for projects specific to the Fernald Site.

The sole purpose of the monitoring wells installed on your property is sample collection. To ensure your safety and the integrity of the samples collected, these monitoring wells are accessed by authorized personnel only and are kept locked at all times.

The 1993 analytical results from MW2096, MW3096, and MW4096 for inorganics (metals), volatile organics, general water quality, and radiological parameters are provided in Enclosure A. For each analytical result listed, a standard is displayed. This standard is provided so that you may compare the analytical results from these monitoring wells to the established guidelines. The references for these standards are the U.S. Environmental Protection Agency (EPA) Drinking Water Regulations and Health Advisories for non-radiological parameters, and the DOE Guidelines for Radionuclides in Drinking Water for radiological parameters.

To help you understand these analytical results, a Fact Sheet is provided in Enclosure B. This document is useful for explaining pertinent terms, units, and the format used in the analytical summary reports.

When reviewing the analytical results for each sampling period, please keep in mind that FERMCO samples monitoring wells for specific projects. As the requirements for each project change, the parameters analyzed by the laboratory will also change. Therefore, the parameter list identified for each sampling period may not be identical.

Additionally, please note that not all of the 1993 analytical data for MW2096, MW3096, and MW4096 are available at this time. The data from the first and fourth sample collection rounds (February and December 1993) have not been independently validated. As soon as this data becomes available, it will be provided to you.

000001

A preliminary review of the data collected prior to 1993, which you have not received, indicates that the parameter concentrations are generally comparable to the data provided in this report. If you wish to receive validated data from these prior sample collection rounds, please submit a written request to me at the Fernald Site address. Analytical data generated from sampling performed after 1993 will be sent to you on a routine basis upon completion of the validation process.

If you have any questions regarding your analytical results, or need assistance in understanding the data, please contact me at (513) 648-3137. Additional information concerning the Fernald Site restoration plan is available at the Public Environmental Information Center located in the JAMTEK Building at 10845 Hamilton-Cleves Highway, Harrison, OH.

The DOE is committed to making the environmental restoration of the Fernald Site effective and successful. Your cooperation in this effort is greatly appreciated.

Sincerely,



Walter J. Quaider
Acting Associate Director
Safety, Operations, & Technical Support

FN:Quaider

Enclosures: As stated

ENCLOSURE A

SUMMARY OF SAMPLE RESULTS

This enclosure provides a listing of the parameters analyzed and the concentrations reported by the laboratory. Where applicable, a drinking water standard, guideline, or health advisory associated with the parameter is also provided. Please refer to the cover letter and Enclosure B for additional information.

000003

**MONITORING WELL 2096
SAMPLED MAY 6, 1993**

Parameters regulated under EPA Safe Drinking Water Act. (Please see Enclosure B regarding Primary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Primary Standard</u>
Inorganics			
Antimony	45 µg/L	U	6 µg/L
Antimony (filtered)	45 µg/L	U	
Arsenic	1.0 µg/L	U	50 µg/L
Arsenic (filtered)	1.0 µg/L	U	
Barium	74 µg/L	U	2000 µg/L
Barium (filtered)	71 µg/L	U	
Beryllium	1.0 µg/L	U	4 µg/L
Beryllium (filtered)	1.0 µg/L	U	
Cadmium	3.3 µg/L	U	5 µg/L
Cadmium (filtered)	3.2 µg/L	U	
Chromium	4.0 µg/L	U	100 µg/L
Chromium (filtered)	4.0 µg/L	U	
Cyanide	10 µg/L	U	200 µg/L
Cyanide (filtered)	10 µg/L	U	
Lead	1.0 µg/L	UJ	15 µg/L
Lead (filtered)	1.0 µg/L	UJ	
Mercury	0.2 µg/L	U	2 µg/L
Mercury (filtered)	0.2 µg/L	U	
Nickel	19 µg/L	U	100 µg/L
Nickel (filtered)	19 µg/L	U	
Nitrate + Nitrite	0.05 mg/L	U	10 mg/L
Selenium	1.0 µg/L	UJ	50 µg/L
Selenium (filtered)	1.0 µg/L	UJ	
Thallium	1.0 µg/L	UJ	2 µg/L
Thallium (filtered)	1.0 µg/L	UJ	

**MONITORING WELL 2096
SAMPLED MAY 6, 1993**

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Primary Standard</u>
Volatile Organics			
Benzene	10 µg/L	U	5 µg/L
Bromodichloromethane	10 µg/L	U	100 µg/L
Bromoform	10 µg/L	U	100 µg/L
Carbon Tetrachloride	10 µg/L	U	5 µg/L
Chloroform	10 µg/L	U	100 µg/L
1,2-Dichloroethane	10 µg/L	U	5 µg/L
1,1-Dichloroethene	10 µg/L	U	7 µg/L
1,2-Dichloroethene	10 µg/L	U	70 µg/L
1,2-Dichloropropane	10 µg/L	U	5 µg/L
Ethylbenzene	10 µg/L	U	700 µg/L
Styrene	10 µg/L	U	100 µg/L
Tetrachloroethene	10 µg/L	U	5 µg/L
Toluene	10 µg/L	U	1000 µg/L
1,1,1-Trichloroethane	10 µg/L	U	200 µg/L
1,1,2-Trichloroethane	10 µg/L	U	5 µg/L
Trichloroethene	10 µg/L	U	5 µg/L
Vinyl Chloride	10 µg/L	U	2 µg/L
Xylenes	10 µg/L	U	10,000 µg/L
Radionuclides			
Radium-226	0.3 pCi/L	UJ	20 pCi/L
Radium-226 (filtered)	0.9 pCi/L	J	
Radium-228	0.8 pCi/L	U	20 pCi/L
Radium-228 (filtered)	0 pCi/L	UJ	
Total Uranium	0.7 µg/L	-	20 µg/L
Total Uranium (filtered)	0.7 µg/L	-	

**MONITORING WELL 2096
SAMPLED MAY 6, 1993**

Parameters for which guidelines are promulgated by EPA Safe Drinking Water Act. (Please see Enclosure B regarding Secondary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Secondary Standard</u>
Aluminum	14 µg/L	U	50-200 µg/L
Aluminum (filtered)	14 µg/L	U	
Chloride	4.7 mg/L	-	250 mg/L
Copper	5.8 µg/L	U	1000 µg/L
Copper (filtered)	4.0 µg/L	U	
Fluoride	0.20 mg/L	-	2.0 mg/L
Iron	5.5 mg/L	-	0.3 mg/L
Iron (filtered)	2.6 mg/L	-	
Manganese	620 µg/L	-	50 µg/L
Manganese (filtered)	600 µg/L	-	
pH	7.1 SU	-	6.5-8.5 SU
Silver	3.0 µg/L	UJ	100 µg/L
Silver (filtered)	3.0 µg/L	UJ	
Sulfate	200 mg/L	-	250 mg/L
Total dissolved solids	630 mg/L	-	500 mg/L
Zinc	23 µg/L	UJ	5000 µg/L
Zinc (filtered)	6.0 µg/L	U	

Parameters which are not specifically regulated, but for which some Health Advisory information is available. (Please see Enclosure B regarding Health Advisories.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Advisory Standard</u>
Inorganics			
Alkalinity	300 mg/L	-	NSG ¹
Ammonia	0.06 mg/L	-	NSG
Bicarbonate Alkalinity	380 mg/L	-	NSG
Calcium	150 mg/L	-	NSG
Calcium (filtered)	150 mg/L	-	
Carbonate Alkalinity	3 mg/L	U	NSG

¹Indicates that no standard is given for the parameter indicated.

**MONITORING WELL 2096
SAMPLED MAY 6, 1993**

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Advisory Standard</u>
Inorganics (Cont.)			
Cobalt	6.0 µg/L	U	NSG
Cobalt (filtered)	6.0 µg/L	U	
Magnesium	31 mg/L	J	NSG
Magnesium (filtered)	31 mg/L	J	
Phosphorus	0.09 mg/L	-	NSG
Potassium	2.1 mg/L	U	NSG
Potassium (filtered)	1.7 mg/L	U	
Sodium	6.1 mg/L	-	20 mg/L
Sodium (filtered)	6.3 mg/L	-	
Specific Conductivity	900 µmhos/cm	-	NSG
Total Solids	650 mg/L	-	NSG
Vanadium	4.0 µg/L	U	NSG
Vanadium (filtered)	4.0 µg/L	U	
Organics			
Acetone	10 µg/L	UJ	NSG
Bromomethane	10 µg/L	U	40 µg/L
2-Butanone	10 µg/L	U	NSG
Carbon Disulfide	10 µg/L	U	NSG
Chlorobenzene	10 µg/L	U	NSG
Chloroethane	10 µg/L	U	NSG
Chloromethane	10 µg/L	UJ	100 µg/L
Dibromochloromethane	10 µg/L	U	NSG
1,1-Dichloroethane	10 µg/L	U	NSG
cis-1,3-Dichloropropene	10 µg/L	U	10 µg/L
trans-1,3-Dichloropropene	10 µg/L	U	10 µg/L
2-Hexanone	10 µg/L	U	NSG
Methylene Chloride	10 µg/L	U	NSG
4-Methyl-2-Pentanone	10 µg/L	UJ	NSG
1,1,2,2-Tetrachloroethane	10 µg/L	U	NSG
Phenols	10 µg/L	U	NSG
Total Organic Carbon	1.0 mg/L	U	NSG
Total Organic Halides	10 µg/L	U	NSG

**MONITORING WELL 2096
SAMPLED MAY 6, 1993**

Radiological parameters for which guidelines have been issued by DOE. (Please see Enclosure B regarding Drinking Water Guidelines for Radionuclides.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Standard</u>
Thorium-228	0 pCi/L	U	400 pCi/L
Thorium-228 (filtered)	0.3 pCi/L	J	
Thorium-230	0.1 pCi/L	U	300 pCi/L
Thorium-230 (filtered)	0 pCi/L	UJ	
Thorium-232	0.2 pCi/L	U	50 pCi/L
Thorium-232 (filtered)	0.2 pCi/L	U	
Uranium-234 (filtered)	0.7 pCi/L	J	500 pCi/L
Uranium-235/236 (filtered)	0 pCi/L	UJ	500 pCi/L
Uranium-238 (filtered)	0.4 pCi/L	J	600 pCi/L

**MONITORING WELL 3096
SAMPLED MAY 7, 1993**

Parameters regulated under EPA Safe Drinking Water Act. (Please see Enclosure B regarding Primary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Primary Standard</u>
Inorganics			
Antimony	45 µg/L	U	6 µg/L
Antimony (filtered)	45 µg/L	U	
Arsenic	1.1 µg/L	-	50 µg/L
Arsenic (filtered)	1.0 µg/L	U	
Barium	42 µg/L	-	2000 µg/L
Barium (filtered)	41 µg/L	-	
Beryllium	1.0 µg/L	U	4 µg/L
Beryllium (filtered)	1.0 µg/L	U	
Cadmium	3.0 µg/L	U	5 µg/L
Cadmium (filtered)	3.0 µg/L	U	
Chromium	4.0 µg/L	U	100 µg/L
Chromium (filtered)	4.0 µg/L	U	
Cyanide	10 µg/L	U	200 µg/L
Cyanide (filtered)	10 µg/L	U	
Lead	1.0 µg/L	U	15 µg/L
Lead (filtered)	1.6 µg/L	-	
Mercury	0.2 µg/L	U	2 µg/L
Mercury (filtered)	0.2 µg/L	U	
Nickel	19 µg/L	U	100 µg/L
Nickel (filtered)	19 µg/L	U	
Nitrate + Nitrite	0.05 mg/L	U	10 mg/L
Selenium	2.0 µg/L	U	50 µg/L
Selenium (filtered)	2.0 µg/L	UJ	
Thallium	1.0 µg/L	U	2 µg/L
Thallium (filtered)	1.0 µg/L	U	

**MONITORING WELL 3096
SAMPLED MAY 7, 1993**

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Primary Standard</u>
Volatile Organics			
Benzene	10 µg/L	U	5 µg/L
Bromodichloromethane	10 µg/L	U	100 µg/L
Bromoform	10 µg/L	U	100 µg/L
Carbon Tetrachloride	10 µg/L	U	5 µg/L
Chloroform	10 µg/L	U	100 µg/L
1,2-Dichloroethane	10 µg/L	U	5 µg/L
1,1-Dichloroethene	10 µg/L	U	7 µg/L
1,2-Dichloroethene	10 µg/L	U	70 µg/L
1,2-Dichloropropane	10 µg/L	U	5 µg/L
Ethylbenzene	10 µg/L	U	700 µg/L
Styrene	10 µg/L	U	100 µg/L
Tetrachloroethene	10 µg/L	U	5 µg/L
Toluene	10 µg/L	U	1000 µg/L
1,1,1-Trichloroethane	10 µg/L	U	200 µg/L
1,1,2-Trichloroethane	10 µg/L	U	5 µg/L
Trichloroethene	10 µg/L	U	5 µg/L
Vinyl Chloride	10 µg/L	U	2 µg/L
Xylenes	10 µg/L	U	10,000 µg/L
Radionuclides			
Radium-226	0.1 pCi/L	UJ	20 pCi/L
Radium-226 (filtered)	1.6 pCi/L	J	
Radium-228	1.3 pCi/L	U	20 pCi/L
Radium-228 (filtered)	0 pCi/L	UJ	
Total Uranium	0.6 µg/L	-	20 µg/L
Total Uranium (filtered)	0.6 µg/L	-	

**MONITORING WELL 3096
SAMPLED MAY 7, 1993**

Parameters for which guidelines are promulgated by EPA Safe Drinking Water Act. (Please see Enclosure B regarding Secondary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Secondary Standard</u>
Aluminum	14 µg/L	U	50-200 µg/L
Aluminum (filtered)	14 µg/L	U	
Chloride	7.1 mg/L	-	250 mg/L
Copper	4.0 µg/L	U	1000 µg/L
Copper (filtered)	4.0 µg/L	U	
Fluoride	0.20 mg/L	-	2.0 mg/L
Iron	0.59 mg/L	-	0.3 mg/L
Iron (filtered)	0.54 mg/L	-	
Manganese	62 µg/L	-	50 µg/L
Manganese (filtered)	61 µg/L	-	
pH	7.5 SU	-	6.5-8.5 SU
Silver	3.0 µg/L	UJ	100 µg/L
Silver (filtered)	3.0 µg/L	UJ	
Sulfate	43 mg/L	-	250 mg/L
Total dissolved solids	330 mg/L	-	500 mg/L
Zinc	21 µg/L	J	5000 µg/L
Zinc (filtered)	6.8 µg/L	J	

Parameters which are not specifically regulated, but for which some Health Advisory information is available. (Please see Enclosure B regarding Health Advisories.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Advisory Standard</u>
Inorganics			
Alkalinity	260 mg/L	-	NSG
Ammonia	0.05 mg/L	U	NSG
Bicarbonate Alkalinity	330 mg/L	-	NSG
Calcium	90 mg/L	-	NSG
Calcium (filtered)	90 mg/L	-	
Carbonate Alkalinity	3 mg/L	U	NSG
Cobalt	6.0 µg/L	U	NSG
Cobalt (filtered)	6.0 µg/L	U	
Magnesium	22 mg/L	-	NSG

**MONITORING WELL 3096
SAMPLED MAY 7, 1993**

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Advisory Standard</u>
Inorganics (Cont.)			
Magnesium (filtered)	22 mg/L	-	
Phosphorus	0.05 mg/L	-	NSG
Potassium	1.6 mg/L	U	NSG
Potassium (filtered)	1.4 mg/L	U	
Sodium	3.1 mg/L	-	20 mg/L
Sodium (filtered)	3.2 mg/L	-	
Specific Conductivity	570 µmhos/cm	-	NSG
Total Kjeldahl Nitrogen	0.1 mg/L	-	NSG
Total Solids	350 mg/L	-	NSG
Vanadium	4.0 µg/L	U	NSG
Vanadium (filtered)	4.0 µg/L	U	
Organics			
Acetone	10 µg/L	UJ	NSG
Bromomethane	10 µg/L	U	40 µg/L
2-Butanone	10 µg/L	U	NSG
Carbon Disulfide	10 µg/L	U	NSG
Chlorobenzene	10 µg/L	U	NSG
Chloroethane	10 µg/L	U	NSG
Chloromethane	10 µg/L	UJ	100 µg/L
Dibromochloromethane	10 µg/L	U	NSG
1,1-Dichloroethane	10 µg/L	U	NSG
cis-1,3-Dichloropropene	10 µg/L	U	10 µg/L
trans-1,3-Dichloropropene	10 µg/L	U	10 µg/L
2-Hexanone	10 µg/L	U	NSG
Methylene Chloride	10 µg/L	U	NSG
4-Methyl-2-Pentanone	10 µg/L	UJ	NSG
1,1,2,2-Tetrachloroethane	10 µg/L	U	NSG
Phenols	10 µg/L	U	NSG
Total Organic Carbon	1.0 mg/L	U	NSG
Total Organic Halides	10 µg/L	UJ	NSG

**MONITORING WELL 3096
SAMPLED MAY 7, 1993**

Radiological parameters for which guidelines have been issued by DOE (Please see Enclosure B regarding Drinking Water Guidelines for Radionuclides.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Standard</u>
Thorium-228	0 pCi/L	U	400 pCi/L
Thorium-228 (filtered)	0.4 pCi/L	J	
Thorium-230	0 pCi/L	U	300 pCi/L
Thorium-230 (filtered)	0.1 pCi/L	UJ	
Thorium-232	0 pCi/L	U	50 pCi/L
Thorium-232 (filtered)	0.1 pCi/L	J	
Uranium-234 (filtered)	0.7 pCi/L	J	500 pCi/L
Uranium-235/236 (filtered)	0 pCi/L	UJ	500 pCi/L
Uranium-238 (filtered)	0.8 pCi/L	J	600 pCi/L

**MONITORING WELL 4096
SAMPLED MAY 6, 1993**

Parameters regulated under EPA Safe Drinking Water Act. (Please see Enclosure B regarding Primary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Primary Standard</u>
Inorganics			
Antimony	45 µg/L	U	6 µg/L
Antimony (filtered)	45 µg/L	U	
Arsenic	1.2 µg/L	-	50 µg/L
Arsenic (filtered)	1.0 µg/L	U	
Barium	23 µg/L	U	2000 µg/L
Barium (filtered)	23 µg/L	U	
Beryllium	1.0 µg/L	U	4 µg/L
Beryllium (filtered)	1.0 µg/L	U	
Cadmium	3.0 µg/L	U	5 µg/L
Cadmium (filtered)	3.0 µg/L	U	
Chromium	21 µg/L	UJ	100 µg/L
Chromium (filtered)	4.0 µg/L	U	
Cyanide	10 µg/L	U	200 µg/L
Cyanide (filtered)	10 µg/L	U	
Lead	1.0 µg/L	U	15 µg/L
Lead (filtered)	1.0 µg/L	U	
Mercury	0.2 µg/L	U	2 µg/L
Mercury (filtered)	0.2 µg/L	U	
Nickel	19 µg/L	U	100 µg/L
Nickel (filtered)	19 µg/L	U	
Nitrate + Nitrite	0.05 mg/L	U	10 mg/L
Selenium	1.0 µg/L	UJ	50 µg/L
Selenium (filtered)	1.0 µg/L	UJ	
Thallium	1.0 µg/L	U	2 µg/L
Thallium (filtered)	1.0 µg/L	U	

**MONITORING WELL 4096
SAMPLED MAY 6, 1993**

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Primary Standard</u>
Volatile Organics			
Benzene	10 µg/L	U	5 µg/L
Bromodichloromethane	10 µg/L	U	100 µg/L
Bromoform	10 µg/L	U	100 µg/L
Carbon Tetrachloride	10 µg/L	U	5 µg/L
Chloroform	10 µg/L	U	100 µg/L
1,2-Dichloroethane	10 µg/L	U	5 µg/L
1,1-Dichloroethene	10 µg/L	U	7 µg/L
1,2-Dichloroethene	10 µg/L	U	70 µg/L
1,2-Dichloropropane	10 µg/L	U	5 µg/L
Ethylbenzene	10 µg/L	U	700 µg/L
Styrene	10 µg/L	U	100 µg/L
Tetrachloroethene	10 µg/L	U	5 µg/L
Toluene	8 µg/L	J	1000 µg/L
1,1,1-Trichloroethane	10 µg/L	U	200 µg/L
1,1,2-Trichloroethane	10 µg/L	U	5 µg/L
Trichloroethene	10 µg/L	U	5 µg/L
Vinyl Chloride	10 µg/L	U	2 µg/L
Xylenes	10 µg/L	U	10,000 µg/L
Radionuclides			
Radium-226	0 pCi/L	UJ	20 pCi/L
Radium-226 (filtered)	1.2 pCi/L	J	
Radium-228	1.1 pCi/L	U	20 pCi/L
Radium-228 (filtered)	0 pCi/L	UJ	
Total Uranium	0.7 µg/L	-	20 µg/L
Total Uranium (filtered)	0.7 µg/L	-	

**MONITORING WELL 4096
SAMPLED MAY 6, 1993**

Substances for which guidelines are promulgated by EPA Safe Drinking Water Act. (Please see Enclosure B regarding Secondary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Secondary Standard</u>
Aluminum	14 µg/L	U	50-200 µg/L
Aluminum (filtered)	14 µg/L	U	
Chloride	3.4 mg/L	-	250 mg/L
Copper	4.0 µg/L	U	1000 µg/L
Copper (filtered)	4.3 µg/L	U	
Fluoride	0.20 mg/L	-	2.0 mg/L
Iron	0.31 mg/L	-	0.3 mg/L
Iron (filtered)	0.24 mg/L	-	
Manganese	900 µg/L	-	50 µg/L
Manganese (filtered)	920 µg/L	-	
pH	7.6 SU	-	6.5-8.5 SU
Silver	3.0 µg/L	UJ	100 µg/L
Silver (filtered)	3.0 µg/L	UJ	
Sulfate	19 mg/L	-	250 mg/L
Total dissolved solids	320 mg/L	-	500 mg/L
Zinc	21 µg/L	UJ	5000 µg/L
Zinc (filtered)	13 µg/L	UJ	

Parameters which are not specifically regulated, but for which some Health Advisory information is available. (Please see Enclosure B regarding Health Advisories.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Advisory Standard</u>
Inorganics			
Alkalinity	280 mg/L	-	NSG
Ammonia	0.05 mg/L	U	NSG
Bicarbonate Alkalinity	350 mg/L	-	NSG
Calcium	85 mg/L	-	NSG
Calcium (filtered)	87 mg/L	-	
Carbonate Alkalinity	3 mg/L	U	NSG
Cobalt	6.0 µg/L	U	NSG
Cobalt (filtered)	6.0 µg/L	U	
Magnesium	20 mg/L	J	NSG

**MONITORING WELL 4096
SAMPLED MAY 6, 1993**

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Advisory Standard</u>
Inorganics (Cont.)			
Magnesium (filtered)	20 mg/L	J	
Phosphorus	0.09 mg/L	-	NSG
Potassium	1.4 mg/L	U	NSG
Potassium (filtered)	1.3 mg/L	U	
Sodium	3.8 mg/L	-	20 mg/L
Sodium (filtered)	3.8 mg/L	-	
Specific Conductivity	550 µmhos/cm	-	NSG
Total Kjeldahl Nitrogen	0.20 mg/L	-	NSG
Total Solids	330 mg/L	-	NSG
Vanadium	4.0 µg/L	U	NSG
Vanadium (filtered)	4.0 µg/L	U	
Organics			
Acetone	10 µg/L	UJ	NSG
Bromomethane	10 µg/L	U	40 µg/L
2-Butanone	88 µg/L	-	NSG
Carbon Disulfide	10 µg/L	U	NSG
Chlorobenzene	10 µg/L	U	NSG
Chloroethane	10 µg/L	U	NSG
Chloromethane	10 µg/L	UJ	100 µg/L
Dibromochloromethane	10 µg/L	U	NSG
1,1-Dichloroethane	10 µg/L	U	NSG
cis-1,3-Dichloropropene	10 µg/L	U	10 µg/L
trans-1,3-Dichloropropene	10 µg/L	U	10 µg/L
2-Hexanone	10 µg/L	U	NSG
Methylene Chloride	10 µg/L	U	NSG
4-Methyl-2-Pentanone	10 µg/L	UJ	NSG
1,1,2,2-Tetrachloroethane	10 µg/L	U	NSG
Phenols	10 µg/L	U	NSG
Total Organic Carbon	1.0 mg/L	U	NSG
Total Organic Halides	10 µg/L	U	NSG

**MONITORING WELL 4096
SAMPLED MAY 6, 1993**

Radiological parameters for which guidelines have been issued by DOE. (Please see Enclosure B regarding Drinking Water Guidelines for Radionuclides.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Standard</u>
Thorium-228	0 pCi/L	U	400 pCi/L
Thorium-228 (filtered)	0.2 pCi/L	J	
Thorium-230	0.3 pCi/L	-	300 pCi/L
Thorium-230 (filtered)	0 pCi/L	UJ	
Thorium-232	0.2 pCi/L	U	50 pCi/L
Thorium-232 (filtered)	0.2 pCi/L	U	
Uranium-234	0.4 pCi/L	J	500 pCi/L
Uranium-234 (filtered)	0.9 pCi/L	J	
Uranium-235/236	0 pCi/L	UJ	500 pCi/L
Uranium-235/236 (filtered)	0 pCi/L	UJ	
Uranium-238	0 pCi/L	UJ	600 pCi/L
Uranium-238 (filtered)	0.6 pCi/L	J	

**MONITORING WELL 2096
SAMPLED AUGUST 4, 1993**

Parameters regulated under EPA Safe Drinking Water Act. (Please see Enclosure B regarding Primary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Primary Standard</u>
Radionuclides			
Radium-226	0.4 pCi/L	-	20 pCi/L
Radium-228	0.7 pCi/L	UJ	20 pCi/L
Total Uranium	0.6 µg/L	-	20 µg/L

Parameters for which guidelines are promulgated by EPA Safe Drinking Water Act. (Please see Enclosure B regarding Secondary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Secondary Standard</u>
pH	7.5 SU	-	6.5-8.5 SU
Total dissolved solids	550 mg/L	-	500 mg/L

Parameters which are not specifically regulated, but for which some Health Advisory information is available. (Please see Enclosure B regarding Health Advisories.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Advisory Standard</u>
Inorganics			
Alkalinity	290 mg/L	-	NSG
Bicarbonate Alkalinity	350 mg/L	-	NSG
Carbonate Alkalinity	3 mg/L	U	NSG
Specific Conductivity	700 µmhos/cm	-	NSG
Total Solids	590 mg/L	-	NSG

**MONITORING WELL 3096
SAMPLED AUGUST 11, 1993**

Parameters regulated under EPA Safe Drinking Water Act. (Please see Enclosure B regarding Primary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Primary Standard</u>
Radionuclides			
Radium-226	0 pCi/L	UJ	20 pCi/L
Radium-226	0 pCi/L	UJ	20 pCi/L
Radium-228	0 pCi/L	UJ	20 pCi/L
Radium-228	0 pCi/L	UJ	20 pCi/L
Total Uranium	0.7 µg/L	-	20 µg/L

Parameters for which guidelines are promulgated by EPA Safe Drinking Water Act. (Please see Enclosure B regarding Secondary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Secondary Standard</u>
pH	7.9 SU	-	6.5-8.5 SU
pH	7.4 SU	-	
Total dissolved solids	330 mg/L	-	500 mg/L
Total dissolved solids	320 mg/L	-	

Parameters which are not specifically regulated, but for which some Health Advisory information is available. (Please see Enclosure B regarding Health Advisories.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Advisory Standard</u>
Inorganics			
Alkalinity	210 mg/L	-	NSG
Alkalinity	210 mg/L	-	NSG
Bicarbonate Alkalinity	320 mg/L	-	NSG
Bicarbonate Alkalinity	270 mg/L	-	NSG
Carbonate Alkalinity	3 mg/L	U	NSG
Carbonate Alkalinity	3 mg/L	U	NSG
Specific Conductivity	440 µmhos/cm	-	NSG
Specific Conductivity	470 µmhos/cm	-	NSG
Total Solids	360 mg/L	-	NSG
Total Solids	360 mg/L	-	NSG

**MONITORING WELL 4096
SAMPLED AUGUST 4, 1993**

Parameters regulated under EPA Safe Drinking Water Act. (Please see Enclosure B regarding Primary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Primary Standard</u>
Radionuclides			
Radium-226	0.1 pCi/L	UJ	20 pCi/L
Radium-228	0.3 pCi/L	U	20 pCi/L
Total Uranium	0.7 µg/L	-	20 µg/L

Parameters for which guidelines are promulgated by EPA Safe Drinking Water Act. (Please see Enclosure B regarding Secondary Standards.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Secondary Standard</u>
pH	7.6 SU	-	6.5-8.5 SU
Total dissolved solids	340 mg/L	-	500 mg/L

Parameters which are not specifically regulated, but for which some Health Advisory information is available. (Please see Enclosure B regarding Health Advisories.)

<u>Parameter</u>	<u>Concentration</u>	<u>Validation Qualifier</u>	<u>Advisory Standard</u>
Inorganics			
Alkalinity	240 mg/L	-	NSG
Bicarbonate Alkalinity	320 mg/L	-	NSG
Specific Conductivity	540 µmhos/cm	-	NSG
Total Solids	380 mg/L	-	NSG

ENCLOSURE B

FACT SHEET

This enclosure provides explanations to assist in understanding some of the terms used and references quoted in this information packet. Please refer to the cover letter and Enclosure A for additional information.

Analytical Results

The analytical results in Enclosure A report the name of the parameter analyzed, the concentration measured, the units of concentration, the validation qualifier, and a drinking water standard or guideline. Note that some of the parameters are followed by the term "filtered". Many Fernald Site projects require a determination of the dissolved (filtered) parameter concentration, as well as the total (non-filtered) parameter concentration. Filtering a groundwater sample results in the removal of suspended soil particles that are greater than 0.45 micrometers (μm) in diameter. This diameter is approximately equivalent to 1/200 of the thickness of a notebook paper page.

Units

The analytical results are reported in standard concentration or radioactivity units. These are:

- mg/L (milligrams per liter) A unit of measure of the concentration of a substance. This unit is approximately equivalent to parts per million (ppm). As an illustration, one mg/L (ppm) is roughly one drop of gasoline in the gas tank of a full size automobile.
- $\mu\text{g/L}$ (micrograms per liter) A unit of measure of the concentration of a substance. This unit is approximately equivalent to parts per billion (ppb). As an illustration, one $\mu\text{g/L}$ (ppb) is roughly one drop of gasoline in a railroad box car.
- pCi/L (picocurie per liter) A unit of measure of the radioactivity of a substance. Radioactivity is the process in which the nucleus of an unstable atom spontaneously decays or disintegrates. Radiation is the energy that is released when the disintegration or decay occurs. The number of atomic nuclei that decay per unit time is measured in Curies (Ci). A picocurie (pCi) is one trillionth of a Curie. For natural uranium, 1.48 micrograms (μg) emits 1 pCi/L and 20 $\mu\text{g/L}$ of natural uranium emits 30 pCi/L. By comparison, 6.53 millionths of a microgram of radon-222 emits 1 pCi/L.
- SU (standard pH unit) A unit of measure used for the analysis of pH. pH is a measurement taken to determine the acidity or alkalinity of an aqueous solution. A pH of 7 SU is considered to be neutral. Any aqueous solution that has a pH less than 7 is considered to be acidic, and any aqueous solution that has a pH greater than 7 is considered to be alkaline.
- $\mu\text{mhos/cm}$ (micromhos per centimeter) A unit of measure used for the analysis of Specific Conductance. Note that with electricity a resistor is measured in ohms. Conversely, conductance is measured in the reciprocal of ohms called mhos.

Validation Qualifiers

Data validation is a data review process performed independently of the laboratory and field personnel generating environmental data. The goal is to qualify the usability of the data. Specifically defined letters, groups of letters, and symbols called validation qualifiers (defined below) are used to express data usability.

- U This qualifier indicates that the parameter was not detected. More specifically, the parameter was analyzed, but was not detected by the analytical instrument. Most analytical instruments are not adequately sensitive to detect a concentration of 0. Therefore, the lowest concentration that the instrument can reliably detect (the detection limit) is indicated and the concentration is actually between 0 and the detection limit.
- J This qualifier indicates that the reported concentration is approximate. More specifically, the parameter was positively detected; however, the associated numerical value is only an approximate concentration of the analyte in the sample. There are several quality control measures taken during sampling and analysis to assure that the analytical results are valid. If a quality control indicator is determined to be outside of a specified performance range, the qualifier "J" is used.
- UJ This qualifier indicates that the detection limit is approximate. More specifically, the parameter was not detected above the reported sample detection limit. However, the reported detection limit is approximate and may or may not represent the actual limit of detection necessary to accurately and precisely measure the parameter in the sample. Similar to the "J" qualifier above, if a quality control indicator is outside a specified performance range on a sample result that was reported at or below the detection limit, the qualifier "UJ" is used.
- The parameter was positively detected and the associated numerical value is an accurate concentration of the parameter in the sample.

Drinking Water Standards and Guidelines

On the Summary of Sample Results (Enclosure A) the laboratory results from the monitoring wells on your property are compared to the EPA Primary Drinking Water Standards and Drinking Water Health Advisories, and the DOE Drinking Water Guidelines. (Keep in mind that this information is provided for comparison purposes only, and may not reflect the actual parameter concentrations that would be found in a well system designed for providing drinking water. For example, a drinking water system usually includes a mechanism for filtering sediments and/or other indeterminable constituents from the water before it reaches the tap.) The values for the standards and guidelines are determined solely on the basis of the health risk (carcinogenic and/or toxic) associated with consuming water containing these substances. Please note, that for some substances, the health standards are extremely low values and may be below the minimum detection levels.

Safe Drinking Water Act of 1986

Under this Act, the EPA is required to regulate substances in drinking water. The Primary Drinking Water Regulations (found in 40 Code of Federal Regulations 141) establish maximum contaminant levels (MCLs) for substances that pose a health risk. (Note that the MCLs of 20 µg/L for Total Uranium and 20 pCi/L for Radium-226 and Radium-228 referenced in this report are proposed standards.) Secondary Drinking Water Standards (found in 40 Code of Federal Regulations 143) are referred to as secondary maximum contaminant levels (SMCLs). Federally non-enforceable, SMCLs propose limits for contaminants in drinking water which may affect the public's acceptance of drinking water (e.g. taste and odor).

Drinking Water Health Advisories

The EPA Office of Water has established non-regulatory guidance known as Drinking Water Health Advisories. Health Advisory values are based on health risk studies. The Drinking Water Equivalent Level (DWEL) Health Advisories are determined by the lifetime exposure concentration protective of adverse, non-cancer health effects for a 70 kilogram (154 pound) adult. It assumes all of the exposure to a contaminant is from a drinking water source.

Drinking Water Guidelines for Radionuclides

In order to protect the public from undue risk from radiation resulting from the operations of the DOE and/or their contractors, the DOE has issued Order 5400.5 "Radiation Protection of the Public and the Environment". The order establishes standards for radionuclides in drinking water. DOE Order Number 5400.5 includes radiation protection dose standards recommended by the International Commission on Radiological Protection (ICRP). The ICRP dose limitations have been adopted worldwide by many countries with nuclear programs.