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Well Database Overview

Fernald Community Health Effects Committee

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WELL DATABASE

Introduction

The Agency for Toxic Substances and Disease Registry (ATSDR) published the Public Health Assessment Feed Materials Production Center (USDOE) (a/k/a Fernald Environmental Management Project) in 2004. It identified historic and current pathways of exposure of community residents to radioactive materials or chemicals (ATSDR 2004). This public health assessment expanded on the information presented in the CDC-sponsored Final Report: Fernald Dosimetry Reconstruction Project, Task 6: Radiation Doses and Risks to Residents from Feed Materials Production Center Operations from 1951-1988, Volumes I and II (Appendices), 1998. The prevalence of diseases of the urinary system was studied in association with sources of drinking water and the distance of the water source from the Fernald Environmental Management Project (FEMP) site. This study was conducted by the University of Cincinnati College of Medicine using data from the Fernald Medical Monitoring Program (FMMP). The study concluded that there was "a strong association between the incidence of urinary system cancer and the joint effect of living close to the plant (within approximately 2.5 miles) and using a private well as the water source." (Quoted from the presentation "Urinary System Cancers in FMMP Participants," by Susan M. Pinney, Ph.D., and Rong Qi, MS, to the Fernald Health Effects Sub-Committee, September 20, 2000.) It was further noted that of the 8,540 FMMP respondents, 41.3% reported that they used a well and 28.4% reported using a cistern as their drinking water source while living in at least one residence within the exposure domain. It is important to know that although cisterns are designed to collect rainwater, it is also necessary to supplement with water deliveries during dry periods or intervals of excessive water use. Many water haulers filled their water tanks with well water from local sources.

Community residents continue to be concerned about on-going exposures to wastes from the past production and processing of radioactive and toxic materials at Fernald. At the same time, many area residents continue to depend on their cisterns/wells as sources for drinking water. The existent data pertaining to measurements of radiological, chemical and heavy metal contaminants in cistern/well water sources have not been adequately catalogued and summarized for inclusion in dose reconstruction studies, exposure assessments, and/or epidemiologic studies.

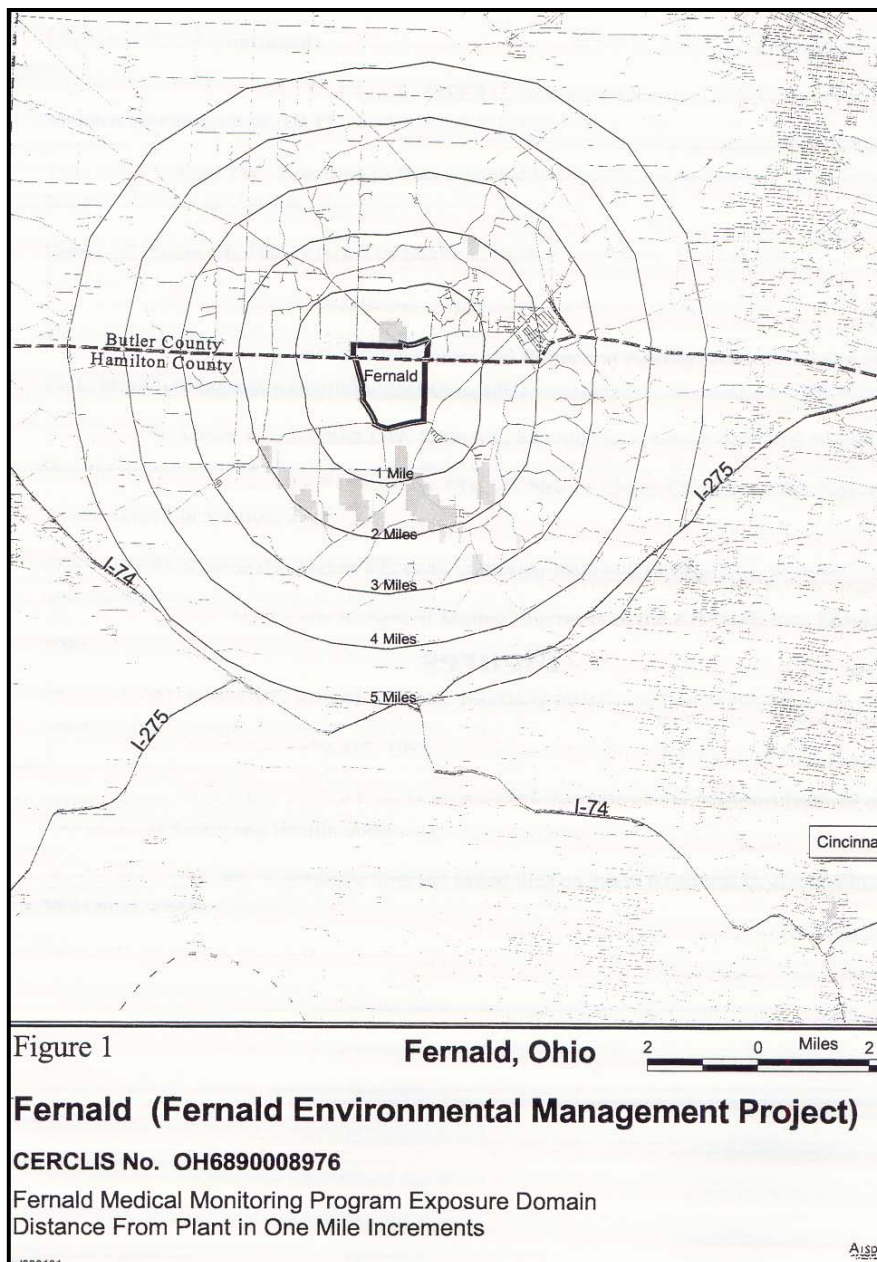
The Fernald Community Health Effects Committee, Inc. (F-CHEC) partnered with the University of Cincinnati Environmental Health Foundation (UEHF) to conduct research aimed at identifying and reviewing existing information on contaminants of water in wells and cisterns in the five-mile exposure domain surrounding the site. The F-CHEC and UEHF partnership is hereinafter called the Research Team.

The Research Team determined that the existent information on well use in the five-mile exposure domain did not include either the number or the locations of offsite water wells within the exposure domain. Therefore, it was apparent that this project should include a database of offsite water wells within the five-mile exposure domain.

Methods

The Research Team adopted the five-mile exposure domain as defined in the Class Action Lawsuit against the Department of Energy (DOE) and its contractor National Lead Company of Ohio (NLO). This domain was defined as the five-mile area from the perimeter of the 1050 acre Fernald Site. This same area was also used by ATSDR in the Final Report: Prevalence of Adverse Health Outcomes in Residents of the Area Surrounding the Former Feed Materials Processing Center at Fernald, Ohio Participating in the Fernald Medical Monitoring Program August 2001, Publication number PB2001-107821, ATSDR Division of Health Studies (Figure WD-1).

Figure WD-1: Map of the Fernald five-mile Exposure Domain




The Fernald site itself traverses Crosby Township in Hamilton County and Ross Township in Butler County. The exposure domain encompasses seven townships: Fairfield, Morgan, and Ross Townships in Butler County; and Colerain, Crosby, Harrison, and Whitewater Townships in Hamilton County.

The Ohio Department of Natural Resources (ODNR) has the responsibility to collect and maintain well logs for the State of Ohio. Well permits are required by the Ohio Revised Code (ORC) Section 121.05 for each well drilled. The ODNR publication When Does a Well Log Need to be Filed (www.dnr.state.oh.us/water/pubs/) defines WELL USE as including a public or private water supply; aquifer recharge or boring to characterize the aquifer; cooling water well; dewatering or drainage well; fire protection well; heat/exchange well; industrial use well; irrigation, livestock watering, or general farm use well; monitor or test well; power generation supply well; remediation, extraction, or collector well; or any alteration to an existing well. This information is housed at the Ohio Division of Natural Resources (ODNR) in Columbus, Ohio. The individual counties and townships do not keep copies of the ODNR Well Reports; however, ODNR maintains a website at <http://www.dnr.state.ohio.us/water/maptechs/wellogs/app>. On the following pages, Figures WD-2 and WD-3 show the ODNR Water Well Log and Drilling Report, front and back views. Table WD-1 explains the variables from the Report that the Research Team used in developing the Well Database.

Figure WD-2: Front side of On-Line ODNR Water Well Log and Drilling Reports

http://www.dnr.state.oh.us/water/maptechs/wellogs/app/well_log_report.asp?cnty=HAMILTON&wln=2...



Water Well Log and Drilling Report

Ohio Department of Natural Resources
Division of Water
Phone: 614-265-6740 Fax: 614-265-6767

Well Log Number: _____

ORIGINAL OWNER AND LOCATION

Original Owner Name: _____

County: _____ Township: _____ Section Number: _____

Address: _____ City: _____ State: _____ Lot Number: _____

Location Number: _____ Location Map Year: _____ Zip Code: _____

Latitude: _____ Longitude: _____ Location Area: _____

CONSTRUCTION DETAILS

Borehole Diameter: _____ Depth to Bedrock: _____ Total Depth: _____

Casing Diameter: _____ Casing Thickness: _____ Casing Length: _____

Well Use: _____ Screen Length: _____ Date of Completion: _____

Aquifer Type: _____ Driller's Name: _____

WELL TEST DETAILS

Static Water Level: _____ Test Rate: _____ Associated Reports: _____

Drawdown: _____ Test Duration: _____ NONE

COMMENTS:

WELL LOG

Formations	From	To
TOP SOIL	_____	_____
SAND & CLAY	_____	_____
SAND	_____	_____
SAND & CLAY	_____	_____
SAND	_____	_____
SAND & GRAVEL	_____	_____

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OR use your browsers back button to see the last list of addresses or roads.

[Well log questions](#) - [Web site questions](#) - [Web policies](#)

Figure WD-3: Reverse side of online ODNR Water Well Log and Drilling Reports.
[Note: Many well reports did not have these instructions on the back of the Report.]

Sec. 408-10. a. For the purpose of this act the following word is herewith defined:

A "well" is any excavation whether drilled, bored or dug for water.

b. It shall be the duty of any person, firm or corporation who for hire, drills, bores, or digs within the state a well to keep a careful and accurate log of the drilling, boring or digging of such well. The log shall show:

1. The character and depth of the formation passed through or encountered.
2. Depth at which water is encountered.
3. Static water level of the completed well.
4. Copy of record of pumping tests, if any.
5. Construction details including lengths and sizes of casing, screening and gravel packing.

A copy of such log shall be furnished within thirty days after the completion of such well to the Division of Water upon forms prescribed and prepared by the said Division of Water. Such log shall be kept on file by the Division of Water.

INSTRUCTIONS

The Well Log and Drilling Report form is designed to record only the most essential data concerning a well. Carbon paper is supplied so that one copy may be retained by the driller for his files, one copy for the customer and the original sent to the Division of Water. *The original log must be furnished within thirty days after the completion of the well.*

We suggest that you be as accurate as possible in recording this data as it may in the future be of great assistance in the planning and developing of new water supplies.

An accurate location of the well is equally as important as an accurate well log. In the space allotted for a map, sketch the position of the well site in relation to numbered state highways, railroad crossings, street intersections, etc. If the property is located on a county or township road show its position in relation to the nearest state highways.

DEPARTMENT OF NATURAL RESOURCES

Division of Water

Columbus, Ohio

Table WD-1: F-CHEC Well Database Variables

Variable Group	Variable	Description
Well Log Number	WELL NUMBER	Well Log Number defined by ODNR.
	AUTONO	Microsoft Access database autonumber.
Location	STRNO, STREET, COUNTY, TOWNSHIP, CITY, ZIP	Individual fields for location of well from ODNR Well Log and Drilling Report.
	STREET SORT	Field to overcome the issue of street name variability; for example, Hamilton Cleves Highway is also State Route 128.
	TRST MILE	Mileage from the perimeter of the Fernald Plant as determined by the Fernald Trustees Settlement File.
	SECTION NUMBER	Each section typically represents one square mile (640 acres). Sections are present on the US Geological Survey (USGS) quads that ODNR uses for location maps. The section number is not unique to a township.
	LOCATION NUMBER	Assigned by field staff locating the well on a USGS topographical map to verify the correct well location. The location number is not unique to a section but is linked to a specific map year.
	LOCATION AREA	Assigned by field staff locating the well on a USGS topographical map when there are too many wells in an area to differentiate individual wells. The location area is not unique to a section, but is linked to a specific map year.
	LATITUDE	Occasional entry on the ODNR Well Log and Drilling Report.
	LONGITUDE	Occasional entry on the ODNR Well Log and Drilling Report.
	LOCATION MAP YEAR	An entry for Location Map Year on the ODNR Well Log and Drilling Report indicates there is a map with a field location of the well. Field maps are identified by county and township and year.
Construction Detail	WELL DEPTH	Excavation footage at which water was found.
	WELL USE	Agriculture/Irrigation; Domestic; Commercial; Industrial; Monitor; Public/Municipal; Recovery/ Test; Other.
	DATE DRILLED	Date of well installation.
Well Test Details	STATIC LEVEL	When a well is drilled into a confined aquifer, the water in the casing will generally rise above the level of the aquifer. The static water level is the distance the water rises to, with no other forces acting upon it, as measured from the ground surface to the top of the water.
	ASSOCIATED REPORTS	Any document submitted with the Well Log and Drilling Report at time of installation.
Miscellaneous	EVIDENCE 1	Documentation of well location.
	EVIDENCE 2	Documentation of well location.
	NOTES	Miscellaneous additional information.
	EDITED FROM	The exact characters from the ODNR Report when a Report variable was adjusted to correct errors.

Note: Owner names were deleted from the database to preserve confidentiality.

F-CHEC members of the Research Team created the well database using Microsoft Office Access 2003 software. The Research Team finalized the database layout/structure after much discussion and tweaking (Figure WD-4). An F-CHEC member of the Research Team entered the offsite well information from the ODNR on-line Water Well Log and Drilling Reports. Then, F-CHEC members verified the locations of the wells as being within the five-mile exposure domain. For details of this undertaking, see the Well Database Appendix.

Figure WD-4: Sample of Well Database layout

County	Township	Well No	Section	Location	Map Year	Lat	Long	Str No	Street	Date Drilled	Well use	Depth
Butler	Fairfield	209986		37	1969			5861	Gray Road	10/12/1962		100
Butler	Fairfield	42179	8	502	1945				Gray Road	1/1/1949		50
Butler	Fairfield	947555						4421	Layhigh Road	9/23/2002	monitor	50
Butler	Fairfield	268023		31	1969			6050	River Road	4/30/1962		57
Butler	Fairfield	778759	15					6070	River Road	4/25/1994		52

Results

F-CHEC members of the Research Team determined that the number of offsite wells installed within the five-mile exposure domain between 1940 and 2005 totaled 1,709. However, nineteen well reports did not include installation dates. So, only 1,690 offsite wells were included in the data breakdown presented in Table WD-2, which depicts the number of wells installed by time period and township.

Table WD-2: Wells by Drill Date and Township

*This table does not include the 19 wells without installation dates

Date Drilled	<u>Butler County, Ohio</u>			<u>Hamilton County, Ohio</u>				Total	Cumulative Total
	Fairfield Twp	Morgan Twp	Ross Twp	Colerain Twp	Crosby Twp	Harrison Twp	Whitewater Twp		
1940 - 1945	4	0	5	2	0	0	0	11	11
1946 - 9/1951	5	1	27	14	2	5	1	55	66
10/1951 - 1959	5	18	234	27	38	23	5	350	416
1960 - 1969	9	34	153	8	40	25	1	270	686
1970 - 1979	2	13	250	8	61	34	2	370	1056
1980 - 1989	8	8	122	30	65	49	4	286	1342
1990 - 1992	1	2	28	16	38	14	1	100	1442
1993 - 1997	2	0	32	14	31	23	1	103	1545
1998 - 2005	14	0	37	30	31	33	0	145	1690
Total	50	76	888	149	306	206	15	1690	

Table WD-2 demonstrates that the majority of the wells, 1,280 (74.6%), were drilled during the years of plant operation from 1952 to 1989; another 100 wells (<6%) were drilled from 1990 to 1992 prior to the award of the remediation contract. Only 68 wells (<4%) were drilled before operation of the Fernald Uranium Processing Plant commenced in 1952. Another 145 wells were drilled after the installation of the municipal water system in 1997. Table WD-3 illustrates these and other milestones of the Fernald Uranium Processing Plant.

Table WD-3: Time Periods of the Fernald Uranium Processing Plant

1946 to 1979	
Time Frame	Actions
1946	¹ Atomic Energy Act of 1946 includes a provision to create the Atomic Energy Commission (AEC), the predecessor to the US Department of Energy (DOE).
1951	¹ May: Groundbreaking for the Fernald Feed Materials Production Center (FMPC); National Lead of Ohio (NLO) contracted to manage site.
	¹ October: Operation of the Pilot Plant begins in October 1951, serving as the prototype of all phases of the uranium enrichment process.
1952	¹ Plant 6 becomes operational, fabricating ingots into finished uranium cores.
	² Official start of uranium ore processing.
1953	^{2,4} K-65 Silos are built to store radioactive materials received from the Belgian Congo. Silos 1 and 2 (K-65 Silos) provide temporary storage of processed pitchblende residue; Silo 3 was used for Thorium waste.
	¹ May: Plant 5 operational converting green salt to uranium derbies.
	¹ October: Plant 4 is operational, converting uranium trioxide to uranium dioxide.
	¹ November: Plant 8 is operational, converting scrap uranium metal and metal-bearing waste into black oxide.
	¹ December: Plants 1, 2 and 3 are operational. Plant 1 receives incoming raw materials; Plants 2 & 3 enrich the uranium feed material.
June 1954	¹ Plant 7 is operational, converting uranium hexafluoride to green salt.
Mid-1954	¹ Production is at its highest level; production capacities are expanded.
October 1954	¹ Plant 9 operational producing thorium until 1956 and creating oversized enriched uranium ingots into billets.
1955	⁴ Storm sewer lift station installed to collect runoff groundwater before discharge to the Great Miami River. Before 1955, all runoff went directly to Paddy's Run Creek.
1956	¹ Employment is at its highest point (2879).
	¹ Pilot Plant takes over Plant 7 operations.
1960	⁵ Early '60s: Average monthly release is estimated at 500kg uranium to the Great Miami River and 100 kg uranium to Paddy's Run Creek
1961	³ January 1961: UC Professor J.D. Eye releases document showing groundwater contamination from Fernald site.
1962	³ September 1962: USGS confirms contamination from Fernald waste pits.
1966	⁴ Fernald facility begins monitoring effluents to Paddy's Run Creek.
1970	² Thorium metal production begins.
1973	³ OEPA replaces ODH as agency responsible for monitoring water quality offsite of the Fernald Plant.
1976	⁴ Fernald facility begins monitoring effluents to the Great Miami River.
1979	² DOE discovers radon gas has been leaking for years from two K-65 silos.

Table WD-3: Time Periods of the Fernald Uranium Processing Plant (continued)

1980 to 1989	
Time Frame	Actions
1980	¹ Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) becomes law; this Act federally regulates hazardous, toxic, and radioactive substances and creates Superfund to finance investigation and cleanup of releases to the environment.
1981	^{1,2,3} Offsite wells found to be contaminated.
1984	^{1,2} March: OEPA finds violations of Resource, Conservation and Recovery Act (RCRA) laws.
	^{1,2} Fernald area residents file a class action lawsuit.
	^{1,2} November: Accidental release of 300 pounds of uranium oxide from Plant 9.
	^{1,2} December: Ohio Attorney General files notice of intent to file suit against DOE for hazardous waste and water pollution violations.
1985	^{1,2} US Environmental Protection Agency (USEPA) issues a Notice of Noncompliance to DOE.
	^{2,3} January: OEPA sample 14 wells in the Fernald area following reports of uranium contamination and confirms that 3 offsite wells are contaminated.
	² September: OEPA begins meetings with DOE to discuss site wide study to characterize the environmental problems at Fernald and assess the exposure risks of the people living around the site.
1986	¹ Release from venting of two waste storage silos.
	¹ Crack found in the Pilot Plant vessel.
	¹ March: Ohio Attorney General files suit against DOE and NLO concerning violations of hazardous waste and water pollution laws.
	^{1,2} July: DOE/USEPA sign Federal Facilities Compliance Agreement (FFCA).
	¹ Amendment to CERCLA requires cleanup.
	¹ DOE awards the site management contract to Westinghouse Materials Company of Ohio, replacing NLO.
1987	May: Fort Scott Camp closes.
	² August: Fieldwork begins on the Remedial Investigation/Feasibility Study (RI/FS)
1988	Ross Girl Scout Camp closes.
1989	¹ USEPA places Fernald on the National Priorities Lists for cleanup
	³ Fernald residents request public water system. DOE provides bottled water.
	¹ Fernald area residents' lawsuit is settled.
	¹ Fernald operations are shut down.

Table WD-3: Time Periods of the Fernald Uranium Processing Plant (continued)

1990 to 2002	
Time Frame	Actions
1990	¹ DOE/USEPA sign Consent Agreement for RI/FS, a comprehensive environmental investigation.
1991	¹ Congress formally approves final closure and authorizes remediation.
1992	¹ DOE awards Environmental Mediation contract to FERMCO (renamed Fluor Fernald).
1993	¹ Five extraction wells are installed to limit off-site migration of the contaminated plume.
	³ September: Hamilton County Department of Public Works (HCDPW) receives funding from DOE for a public water system.
1994	³ December: Groundbreaking ceremony at the Cincinnati Water Works Bolton Treatment Plant for a water system extension to bring water to Fernald residences.
1995	¹ Advanced Waste Water Treatment Facility (AWWT) operational.
1996	¹ June: DOE, Fluor Fernald and Ohio EPA sign the Directors' Final Findings and Orders to implement Plant Closure.
	² June: First meeting of the Fernald Health Effects Subcommittee (FHES), a citizens' group to make recommendations on health issues.
	² August: CDC releases results of the Fernald Dosimetry Reconstruction Project.
1997	¹ Construction begins for On-Site Disposal Facility (OSDF)
	² Thorium overpack operations are completed.
	³ Public water system is complete.
1998	² July: Stream stabilization is completed in Paddy's Run Creek near the south waste units.
	² August: South Plume Optimization ground water extraction system becomes operational.
1999	¹ Safe Shutdown project is completed.
2000	¹ Aquifer Restoration/Wastewater Project removes uranium from the Great Miami aquifer.
	¹ DOE awards final demolition contract to Fluor Fernald
2001	² August: Last meeting of the Fernald Health Effects Subcommittee (FHES).
	² August: Fernald changes the final remediation level for uranium discharge to the Great Miami River from 20mg/L to 30 mg/L per the recent change in the USEPA Safe Drinking Water Act.
2002	² May: Final truckload of uranium product leaves Fernald.

¹DOE Fernald: fernalddoe.gov

²OEPA Office of Federal Oversight: <http://offo2.epa.oh.us/Fernald/fernalddinfo/chronology.htm>

³F-CHEC Timeline of the Crosby/Fernald Public Water System

⁴ATSDR Public Health Assessment for Feed Materials Production Center (USDOE) 8/17/2004 (astdr.cdc.gov/hac/pha/)

⁵Fernald Dosimetry Reconstruction Project Task 2 & 3, Radiological Assessment Corp (RAC) Report #CDC-5, Jan 1995

The F-CHEC Well Database does not include any of the wells that are on the Fernald property. Further, this database does not include any offsite wells that are not registered with the ODNR.

The data for the 1,709 offsite wells are arranged by TOWNSHIP and DATE DRILLED using time periods to correspond to the operation of the Fernald site (Table WD-4),

Table WD-4: Wells by County/Township and Date Drilled

County	Township	No Date	1940-1951	1952- 1989 [Plant Operation]	1990- 2005 [Post-Operation]	TOTALS
Butler	Fairfield	1	9	24	17	51
	Morgan	2	0	74	2	78
	Ross	12	32	759	97	900
Hamilton	Colerain	3	15	74	60	152
	Crosby	0	2	204	100	306
	Harrison	1	5	131	70	207
	Whitewater	0	1	12	2	15
TOTALS		19	64	1278	348	1709

The F-CHEC Well Database includes 120 wells designated as recovery, test or monitor wells. The EPA defines a recovery well as a well used to inject fluids for later recovery and use; and, a monitoring well as a well used under condition of nonuse for potable water or irrigation of crops.

There are six recovery wells in the Well Database. Five were installed in September 1993 on Paddy's Run Road in Crosby Township; this corresponds to the extraction wells noted in the Table WD-3 Timetable, which were installed to limit off-site migration of the contaminated plume. A sixth recovery well was installed on Paddy's Run Road in July 1997.

There are five test wells in the F-CHEC Well Database. In 1984, three test wells were installed on the outer edge of the five-mile domain: two wells on Timberman Road, Ross Township, near the five-mile quadrant north of the Fernald site and one well on Livingston Road, Colerain Township, near the five-mile quadrant south of the Fernald site.

In 1987, a public water utility installed a test well on East Miami River Road in Colerain Township; East Miami River Road runs parallel to the Great Miami River. The fifth test well belongs to the FEMP site and is on State Route 128, installed in 1993.

The 109 monitor wells are grouped by owner type and County/Township in Table WD-5. Monitor wells represent six percent of the wells included in the database.

Table WD-5: Monitor Wells by Well Owner and County/Township

Well Owner	Butler County			Hamilton County				Total
	Fairfield	Morgan	Ross	Colerain	Crosby	Harrison	Whitewater	
Chemical Company	-	-	-	-	14	-	-	14
Conservancy Org.	2	-	1	-	-	-	-	3
Fuel/Gasoline	-	-	7	-	1	-	-	8
Landfill Company	-	-	2	38	1	-	-	41
Other Business	1	-	7	1	1	-	-	10
Private (Willey Road)	-	-	-	-	1	-	-	1
Public Water	11	-	9	8	-	-	-	28
USGS	-	-	2	-	2	-	-	4
Total	14	-	28	47	20	-	-	109

Most of the monitor use wells (63%) were for local landfills or the public water supply. Rumpke Consolidated Companies, Inc. installed thirty-eight wells on their landfills located in Colerain Township. Nineteen were installed between 1989 and 1991 corresponding to the time period between the cessation of operations in 1989 and Congressional approval for final closure and remediation of the Fernald site. Rumpke installed another nineteen wells from 1996 to 2000; during this time, the Fernald site was in full cleanup operation. Two wells in the Schlichter Landfill, located in Ross Township, were installed in 1999; and one New Baltimore Landfill well in Crosby Township was installed in 2004. The Cincinnati Water Works Bolton Plant on River Road in Colerain and Fairfield Townships installed fourteen wells in 1999 and nine wells in 2005. Southwest Regional Water in Ross Township installed five wells in 1999 and 2000. In 1995, installation began on the new public water system.

The many different WELL USES that are reported on the Water Well Log and Drilling Reports for the five-mile exposure domain surrounding the Fernald Site are included in the database; however, only 324 (19%) of the 1,709 Water Well Reports have a WELL USE recorded. No WELL USES were reported prior to the Fernald Plant operation startup in 1951, and none were reported in Morgan Township at any time. In general, most well use reporting was in later years, especially after 1990. There were no other well uses named on the well reports than those listed.

As shown in Table WD-6, WELL USE is summarized into four main categories for Table WD-5:

- Agricultural/Irrigation
 - Domestic
 - Monitor/Recovery/Test
 - Commercial/Public/Municipal/Other
- (Note: OTHER includes heating/cooling, abandoned, and dry.)

Table WD-6: Well Uses Reported on ODNR Well Reports

Group	Well Use	# Wells	% Total
Agriculture/ Irrigation	Agriculture/Irrigation	20	6%
Domestic	Domestic	162	50%
Monitor/Recovery/Test	Monitor	109	37%
	Recovery	6	
	Test/Test boring	4	
Commercial/ Public/ Municipal/ Other	Commercial	1	7%
	Industry	6	
	Municipal	1	
	Public/Semipublic	9	
	Other	3	
	Heating/Cooling	1	
	Abandoned	1	
	Dry	1	
TOTAL		324	100%

Unfortunately, the 1,385 well reports (81%) without a WELL USE could not be easily categorized. Hence, F-CHEC members of the Research Team decided to treat the WELL OWNER as a proxy for WELL USE; so, these 1,385 wells were assigned an approximate WELL USE based on a review of the WELL OWNER. The Research Team identified four categories of WELL USE based on OWNER NAME: Non-residential Business/Organizations; Residential Builder; Domestic (Non-Builder); and Indeterminate. Assignments were made based on review of WELL OWNER names using local knowledge. The resulting assignments of WELL USE are displayed in Table WD-7.

Table WD-7: Assignment of Proxy Well Use Based on Owner

	Butler County			Hamilton County				
Well Owner	Fairfield	Morgan	Ross	Colerain	Crosby	Harrison	Whitewater	Total
Non-Residential Business/Organization								
DOE	-	-	-	-	3	-	-	3
NLO	-	-	-	-	3	-	-	3
Chemical Company	-	2	1	-	5	-	-	8
Farm	-	-	4	-	9	-	-	13
Industrial Company	3	-	8	4	1	-	-	16
Landfill	-	-	5	3	1	-	-	9
Small Business	-	-	19	1	7	2	1	30
Water Supply Companies	-	-	16	5	-	-	-	21
Nonprofit Organizations	2	2	3	-	5	-	-	12
Other Business	3	-	3	2	9	6	1	24
Group Home/motel/ Trailer Park	1	-	1	-	1	-	-	3
Park or School	-	-	4	-	2	5	-	11
Restaurant/Food Mart	-	-	5	1	1	1	-	8
State/Local Government	-	2	2	1	1	-	-	6
Sub-Total	9	6	71	17	48	14	2	167
Residential Builder	-	2	258	3	34	59	-	356
Domestic (Non-Builder)	20	69	401	65	123	66	11	755
Indeterminate	3	-	83	2	8	11	-	107
Totals	32	77	813	87	213	150	13	1385
	Fairfield	Morgan	Ross	Colerain	Crosby	Harrison	Whitewater	

Both DOE and NLO appear on this chart for Well Reports without a record of WELL USE. There were three DOE wells installed 10/23/97 on Willey Road, which may correspond to the 1997 construction of the On-Site Disposal Facility (OSDF); and, there were three NLO wells installed in 1963: one on Paddy's Run Road; two on State Route 128.

Table WD—7 presents a general overview of the types of well installations in the Fernald five-mile exposure domain; however, this table is not all-inclusive since verification of all owner types is beyond the scope of this project.

For more information on Fernald milestones, consult one of the many websites with facility-related. Fernald's website (www.fernal.gov/50th/) provides the history of the site, the operations and products of the site, the controversy that ensued, the transition to cleanup, and the Fernald Closure Project that continues today. The OEPA Office of Federal Facilities Oversight includes a detailed chronology of Fernald Activities on its website (<http://offo2.epa.state.oh.us/Fernald/FernaldInfo/chronology.htm>).