

Well Database Appendix

The Research Team determined the location of each well to ensure that the Well Database contains only wells in the five-mile exposure domain surrounding the former Fernald Uranium Processing Plant. The townships of interest were Fairfield, Morgan and Ross Townships in Butler County and Colerain, Crosby, Harrison and Whitewater Townships in Hamilton County.

Many well locations were easily identifiable as being within the five-mile domain because the Well Reports record the township SECTION NUMBER. ODNR defined the SECTION NUMBER as typically representing one square mile (640 acres); most townships have approximately thirty-six sections. However, it is important to note that a SECTION NUMBER is only useful in the company of the township.

In addition to SECTION NUMBER, the ODNR Well Reports sometimes included a LOCATION NUMBER or a LOCATION AREA; locations were associated with a specific map in a specific township for a specific year. Therefore, every location is associated with a MAP YEAR. Location designations resulted from onsite verification of the well location(s) by ODNR field staff using a USGS topographical map. Wells were given location numbers (1, 2, 3, and so on) except in high-density neighborhoods where there were too many wells to adequately represent on the map; consequently, these wells were assigned an alphabetic area (A, B, C, and so on). It is critical to associate LOCATION NUMBER or LOCATION AREA with MAP YEAR.

Sometimes, the on-line Water Well Log and Drilling Report merely had the street name. Often, this was sufficient when the road is clearly within the domain. But, for the many roads that traverse the townships and counties, it made the task more difficult.

Well Reports that contain incomplete or suspect information make it nearly impossible to discern whether or not these wells were within the five-mile domain. Therefore, the Research Team developed a coding system to document data entry uncertainties:

Problem	Indicator	Examples
Doubtful Entry	Parentheses	(1)34 means "134" should probably be "34". (34) means location probably not in section 34.
Incomplete Entry	Dash	3- means it should probably be "32" or "33", etc.
Incorrect Entry	Star	If an entry is starred, it means a correction was made; the original typing is under "Edited from".
Blank Entry	Brackets	[Entry] means that this line was blank on the Well Report and was determined by Research Team.

Table AP-1: Sample of Coding System

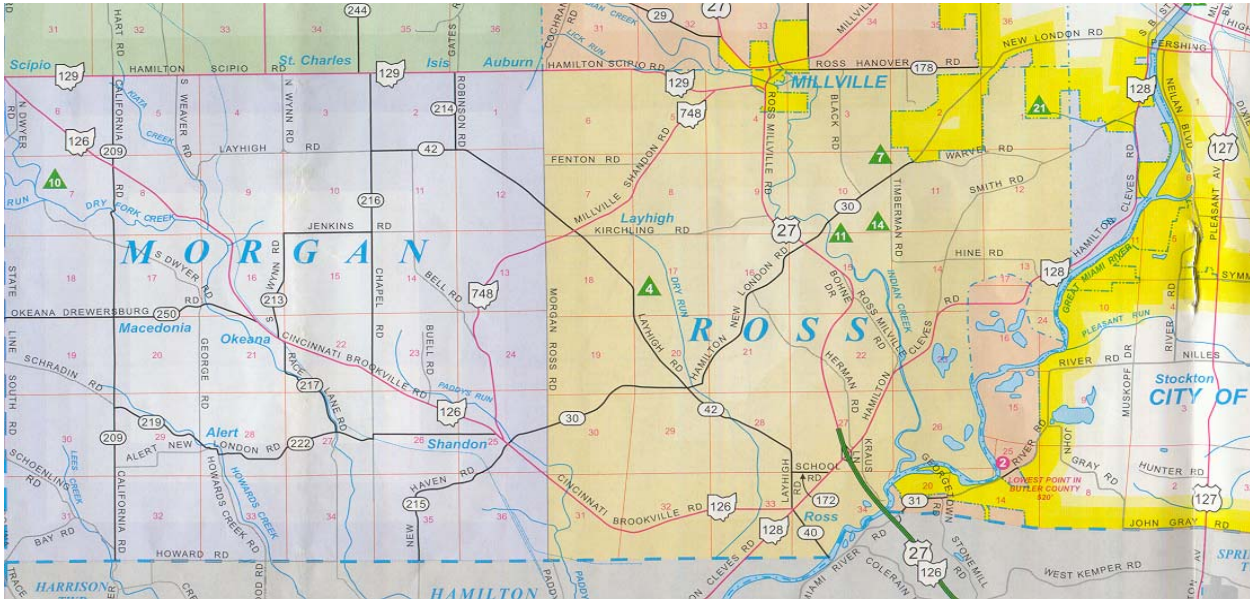
Sample of Database Inaccuracies								
County	Township	Well No	Section No	Location	Map Year	Str no.	Street	Edited from
Butler	Ross	624265	(1)34	B	1988	5157	128 Road	
Hamilton	Whitewater	172571	(31)				St RT 128	
Butler	Ross	570967	3-	15	1984	4052	Mikehill Drive	
Hamilton	Harrison	659990	9*			10720	Mockernut Drive	17
Hamilton	Colerain	53089					Colerain*	ST RT 50, Ross
Butler	Morgan	225117	25	D	1969	[5437]	Alert New London Road	

The Research Team still had a formidable task to verify the location of each well with reference to the five-mile exposure domain. We looked at our records by county, township and street to be sure that we were searching only streets within the exposure domain. We used maps provided by the Engineering Offices of Butler and Hamilton Counties to verify the location of all streets listed on the ODNR website for the seven townships in the exposure domain.

Well locations were easily identifiable as being within the domain when the Well Reports included the TOWNSHIP and SECTION NUMBER. However, it is important to note that a SECTION NUMBER is only useful relative to the specific TOWNSHIP.

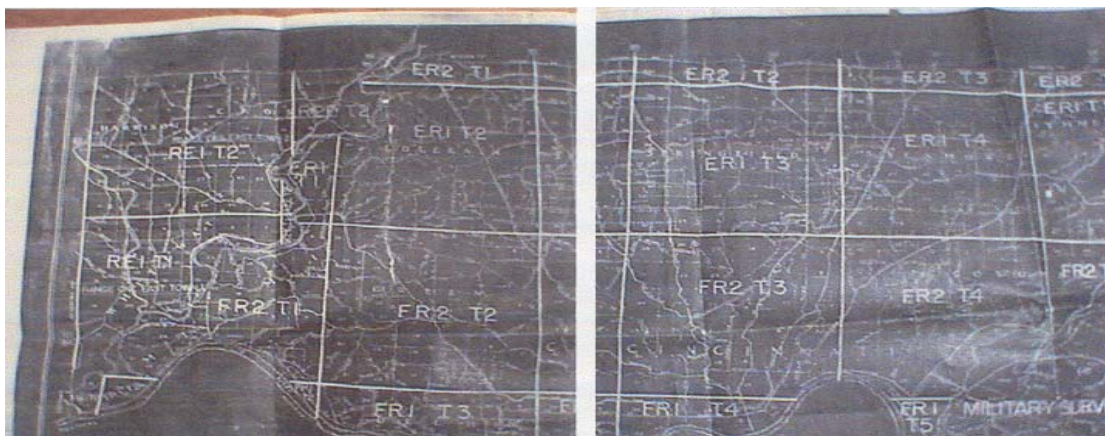
Figure AP-1 is from the Butler County Engineer Office (BCEO) publication, Butler County 2003 Official Transportation Map; SECTION NUMBERS were noted on each map. This made our task easier when identifying SECTION NUMBER locations in Butler County.

Figure AP-1: Butler County 2003 Official Transportation Map, pages 12-13.



Determining the section numbers in the townships of Hamilton County was a bit more challenging. The Hamilton County Engineer's Office (HCEO) provided us with a map on which the sections are illustrated within ranges (Figure AP-2).

Figure AP-2: Hamilton County Map of Survey Ranges and Township Sections.



The Research Team had to understand this type of map before tackling the array of SECTION NUMBERS within a township. This type of map represents the Rectangular Survey System. Using this system, a base line and principal meridian is established relative to a predefined point. The land is divided into townships and sections; the RANGE is used to further identify the land location *via* the east or west tier which traverses the townships. For detailed explanations of Rectangular Surveys, consult the “Rectangular Survey System, Bureau of Land Management (BLM), General Land Office Records,” <http://www.glorerecords.blm.gov/visitors/PLSS.asp>. We did not locate wells by RANGE numbers because there were none on the Well Reports; however, when locating a specific SECTION NUMBER, we considered the RANGE to ensure that our determinations were accurate.

Six well locations could not be verified and, therefore, could not be included in the Well Database. In the end, we were able to determine the location of 1,709 wells in the five-mile exposure domain.

Table AP-2 lists the roads within the five-mile exposure domain where wells were located.

Table AP-2: Roads within the Exposure Domain Where Wells Were Located.

BUTLER COUNTY	Ross Twp	Ross Twp	Colerain Twp	CrosbyTwp
<u>Fairfield Twp</u>	Clark St	Oriole Ave	Hughes Rd	New London Rd
Gray Rd	Clemmer Dr	Robin	Kemper Rd	Oxford Rd
Layhigh Rd	Clyde Ct	Plover	Lick Rd	Paddy Run Rd
River Rd	27/Colerain	River Circle	Miami River Rd	River Rd
<u>Morgan Twp</u>	Cross St	River Rd	New Haven Rd	Rockdale Ave
Alert New London Rd	Cypress Ln	Ross Manor	Rae Ann Dr	Shade Trace Rd
Bell Rd	Dry Run Dr	Ross-Millville Rd	Ripple Rd	Short Rd
Buell Rd	Fenton Rd	School Rd	River Rd	Starspray Dr
California Rd	Finch St	Scottwood Dr	Roppelt Rd	Tule Ln
Cann Rd	Gloria Dr	Silax Dr	Scull Rd	Water St
Chapel Rd	128/Hamilton Cleves	Smith Rd	Sheits Rd	Weathervane Ln
Church St	Hamilton New London	Sunshine Dr	Springdale Rd	West Rd
126/Cinti Brookville	Harold Ave	Thrush St	Stone Mill Rd	Willey Rd
Hamilton New London	Herman Rd	Timberman Rd	Struble Rd	<u>Harrison Twp</u>
Howard Rd	Hine Rd	Venice Blvd	Thompson Rd	Baughman Rd
Howards Creek Rd	Jay Phillip Ct	Wade St	Water St	Carolina Trace
Jenkins Rd	Jennifer Dr	Wade Mill Rd	Wesselman Rd	Dick Rd
Layhigh Rd	Kirchling Rd	Wren Ave	<u>CrosbyTwp</u>	Dry Fork Rd
748/Millville Shandon	Krause Ln		Atherton Rd	Edgewood Rd
New Haven Rd	Lane Street	HAMILTON COUNTY	Baughman Rd	Farmland Dr
Okeana/Drewersburg	Lark	<u>Colerain Twp</u>	Blue Rock Rd	Flintwood Dr
Race Lane Rd	Larry Ln	Althaus Rd	Chipstone Dr	Hickory Valley Dr
Robinson Rd	Laurie Ct	Bank Rd	Church St	Howard Rd
Schradin Rd	Layhigh Rd	Bevis Rd	Columbia Ave	Lees Creek Rd
Scott St	Leona Ct	Blue Rock Rd	Crosby Rd	Mockernut Dr
Wynn Rd	Maiden St	Brehm Rd	Diver	New Biddinger Rd
<u>Ross Twp</u>	Main St	Buell Rd	Dry Fork Rd	New Haven Rd
Banyon Ct	Mardel Ct	126/Cinti.Brookville	Edgewood Rd	Spring Flower Ct
Beechwood Dr	Mikehill Dr	27/Colerain Ave	5/Fifth St	Starspray Ave
Bella Vista Dr	748/Millville Shandon	Crest Rd	1/First St	Sugardale St
Birch Dr	Millville-Ross Rd	Day Rd	Glendale Rd	West Rd
Black Rd	Moeller Dr	Dry Ridge Rd	Hacienda Ln	<u>Whitewater Twp</u>
Brown Farm	Moores Rd	Eagle Creek Rd	128/Hamilton Cleves	Buena Vista
Canary	Morgan Ln	Flick Rd	Main St	128/Hamilton Cleves
Cardinal	Morgan Ross	Forfeit Run Rd	Mesa Ave	Harrison Ave
Central Ave	Narrow St	Gaines Rd	Mockernut Dr	Miami River Rd
Christian Rd	New London Rd	Havercos Ct	Mt Hope Rd	Strimple Road
126/Cinti.Brookville	Nugent Rd	128/Hamilton Cleves	New Haven Rd	

Another problem we encountered was that road names changed over the years. The Unofficial Ohio Highways Web Site, created by John Simpson, catalogues the road changes over the last 50 years (<http://pages.prodigy.net/john.simpson/highways/ohhwys.htm>). There were corroborating sources at the State Library of Ohio Website available through Ohio Link, or the Ohio Department of Transportation (ODOT), et.al.

The Research Team requested and gained access to the Fernald Settlement Trustees' census/inventory of properties located within the five-mile exposure domain. The Settlement Trustees' maps included detailed perimeter maps of the five-mile domain. For those wells near the five-mile boundary, the Settlement maps were compared to the maps in the Engineer's Office. Entries verified using these files are denoted as "Trustee Settlement Files" on the database.

Unfortunately, despite the detailed work to determine the well locations, there were still 130 wells that we were unable to verify. For this undertaking, the Research Team made three separate trips to ODNR offices in Columbus to view the original Water Well Log and Drilling Reports which often, but not always, included a drawing of the well location. We also made copies of the available maps by MAP YEAR. The MAP YEAR was essential to the LOCATION NUMBER and the LOCATION AREA noted on the on-line Water Well Log and Drilling Report. Butler County had separate maps for 1945, 1969, 1984 and 1988. Hamilton County had separate maps for 1945 and 1984. ODNR Staff were confident of the accuracy of the 1969, 1984 and 1988 maps. Therefore, the Research Team relied on these maps provide the final physical proof necessary to verify well location. On the other hand, ODNR staff was not as confident of the map for MAP YEAR 1945; they cautioned that it had not been verified and entries may be suspect. There were fifty wells on the 1945 map that were within the five-mile domain; however, thirty-four of these well locations were documented by other sources. The remaining sixteen wells are shown in Table AP-3 by township; no additional documentation was obtained for these sixteen wells.

Table AP-3: ODNR Map Year 1945 Used for Location Documentation

Source	Butler County, Ohio				Hamilton County, Ohio				
	Fairfield Twp	Morgan Twp	Ross Twp	Total	Colerain Twp	Crosby Twp	Harrison Twp	Whitewater Twp	Total
ODNR Map Year 1945	2	2	11	15	-	-	-	1	1

Fifteen different sources of information were consulted to verify the locations of the wells in the database as being within the five-mile domain. The sources and data used for verification are described below:

- Address: Street number & street name
- Crosby: All of Crosby Township is in the five-mile domain
- Entire Street is in domain: Refers to streets which do not traverse township or county boundaries.
- Historic Map: Depicts Dry Ridge Road in Colerain Township prior to the construction of I-275 across Colerain Avenue
- Local Knowledge: Interviews with family members, neighbors, etc.
- Map: Microsoft Streets & Trips 2002, Garmin GPS MapSource v6.1, Butler County Engineer's Office (BCEO) 2003 Official Transportation Map, and Hamilton County Engineer's Office (HCEO) 2005 Map.
- ODNR Maps: Maps dated 1945, 1969, 1984 or 1988
- ODNR Well Report
- Same as another entry: Well Report may be lacking identifying information but the address is same as a well address that has been verified, i.e., multiple wells at a single address
- Township Section Number: Each section typically represents one square mile (640 acres). They are present on the USGS quads that ODNR uses for location maps. The section number is not unique to a township.
- Trustee Settlement Files: Information obtained from the Fernald Settlement Trustees' census/inventory of properties located within the five-mile domain.
- Venice (a.k.a. Ross): Addresses on streets off RT 128 between Dry Run and Wade Mill

These sources of information are categorized by Township in Table AP-4.

Table AP-4: Information Sources Used to Verify Well Locations by Township

Primary Source (Evidence 1)	Butler County, Ohio			Hamilton County, Ohio				Totals
	Fairfield	Morgan	Ross	Colerain	Crosby	Harrison	Whitewater	
Address: Street number	1	-	3	1	-	1	-	6
Crosby: All of Township in domain	-	-	0	0	220	-	-	220
Entire street is in domain	-	1	8	10	0	95	-	114
Historical map	-	-		1	-	-	-	1
Local Knowledge	-	1	5	1	-	-	-	7
Map: i.e. GPS, Microsoft	3	-	9	7	-	-	-	19
ODNR Maps:1945	2	2	11	-	-	-	1	16
ODNR Maps:1969	5	24	75	-	-	-	-	104
ODNR Maps:1984	-	22	61	31	-	78	5	197
ODNR Maps:1988	13	10	517	-	-	-	-	540
ODNR Well Report	1	4	14	6	-	-	4	29
Same as another entry	1	0	3	2	-	-	-	6
Township Section Number	16	10	55	8	0	16	1	106
Trustee Settlement Files	9	4	100	85	86	17	4	305
Venice (a.k.a. Ross)	-	-	39	-	-	-	-	39
Totals	53	78	901	155	306	207	13	1709