2.0 Spatial Framework

The data collection effort for the representative national data set centers around the collection of site-based data for a representative sample of 201 nonhazardous industrial waste management facilities, along with the national and regional data necessary to complement this site-based data set. The 3MRA modeling system uses site-based modeling to provide spatial distributions of contaminants in a prespecified radius of interest around Industrial D facilities with land-based WMUs. To support this strategy, the data collection effort included mapping the modeled facilities nationally (using GIS), providing a spatial frame-of-reference around each facility within the AOI for the analysis, and collecting site-based and regional data within this framework.

2.1 Modeled Sites

The 201 sites in the representative national data set are a random sample from EPA's 1985 *Screening Survey of Industrial Subtitle D Establishments* (Westat, 1987), also referred to as the Industrial D Screening Survey or Industrial D. This survey was designed to characterize nonhazardous (RCRA Subtitle D) waste management practices for 17 industry groups and four land-based WMU types: landfills, waste piles, LAUs, and surface impoundments. Data from this survey have been used to represent Industrial D facility locations and WMU characteristics in a variety of RCRA regulatory initiatives. Although the Industrial D data are more than 10 years old, they represent the largest consistent set of data available on Industrial D WMU locations, dimensions, and waste volumes. Information on the survey design, response rates, and overall data quality and completeness may be found in Westat (1987), Clickner (1988), and Clickner and Craig (1988).

The Industrial D screening survey contacted 15,844 industrial facilities. Of those, 2,850 reported that they managed waste in a landfill, LAU, surface impoundment, or waste pile. To adequately represent the 17 industry groups, EPA randomly selected 201 sites from these 2,850 facilities (see Section 3.0 for more details on site selection). Appendix 2A at the end of this section lists the 201 facilities by their industry group and shows the number of WMU types at each facility. The basic assumption for this analysis is that these data are representative of the types, characteristics, and locations of nonhazardous industrial WMUs.

2.2 Site Locations

The Industrial D Screening Survey contained only address and zip code locations for the sampled facilities. Although zip code centroids were adequate for previous uses of the Industrial D data, the site-based data collection for the 3MRA modeling system required more accurate locations. Results of a pilot study showed that locational accuracy could have a great impact on the data collected around a site, especially for population and land use data. Because zip code centroid locations can be off by 2 km or more, facilities can be displaced from urban to rural settings or vice versa.

Accuracy of the site location information was improved through a variety of techniques, including the following:

- Matching facilities to EPA's Location Reference Tables (LRT) from the Envirofacts database to obtain the Agency's most reliable location,
- Identifying zip code centroids using GIS software (for sites that could not be matched to the LRT), and
- Visually placing sites using interactive ArcView software based on land use, WMU features (e.g., large surface impoundments), and topographic maps (when available).

Appendix 2A provides the best locations obtained for each of the 201 Industrial D facilities. Appendix 2B describes the facility location effort in detail, including the source for each location and the rationale for every manual site location adjustment. In essence, the effort helped to ensure that all Industrial D locations used in the representative national data set are a reasonable representation of current and future industrial nonhazardous waste management facilities.

2.3 Settings and Area of Interest (AOI)

Based on sensitivity analysis results for the Air Module, EPA has defined the AOI for the representative national data set as the area encompassed by a circle defined by a 2 km radius extending from the corner of a square WMU. Many Industrial D sites have multiple WMU types; when this occurs, multiple AOIs and "settings" are defined. A setting is the basic modeling unit for the 3MRA modeling system and is defined as each unique WMU type/site combination. Thus, a site with a landfill and a waste pile would constitute two settings.

There are 419 unique site/WMU settings across the 201 sites selected for the representative national data set. Each of these settings is modeled independently and all site-based data are passed to the 3MRA modeling system with a unique setting identification number, Setting_ID. The Setting_ID is simply the WMU type present in the Industrial D data[1] (landfill, waste pile, LAU, surface impoundment, and/or aerated tank) plus the seven-digit Industrial D Site ID. Thus, if Industrial D site 1234567 has a landfill and a waste pile present, it would have two settings: LF1234567 and WP1234567. Appendix 2A includes the WMU types present at each of the Industrial D facility sites; a full list of the 419 settings included in the representative national data set is provided in the Appendices to Section 3.

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[1]Because aerated tanks were not included in the Industrial D screening survey data, a tank is placed at every Industrial D site with a surface impoundment (see Section 3); thus, every surface impoundment site has at least two settings, surface impoundment and aerated tank.

2.4 Regional Assignments

Regional assignments, including meteorological station, USGS hydrologic region, and ground water class, are necessary so that the 3MRA modeling system can assign the correct regional data to each site/setting. Meteorological station and USGS hydrologic region (Seaber et al., 1987) were assigned using GIS overlays as described in Section 4.0 and Section 6.0, respectively. Assignment of ground water class (i.e., hydrogeologic setting) is described in U.S. EPA (1996). Appendix 2A provides these regional assignments for all 201 Industrial D facilities.

2.5 Site Layout, Spatial Data Layers, and Grid Database

Collection of site-based data for the representative national data set centered around the use of GIS technology (ArcInfo and ArcView software) to create several key spatial data layers for each site/WMU setting, as shown in Figure 2-1. These key areas are

- *Human receptor points*, defined by U.S. Census block centroids (residents) and randomly placed farms based on block group (beef and dairy farmers), agricultural census, and land use data (see Section 9.0). These serve as points to calculate exposure concentrations in various media and to estimate risks to human receptors.

- *Ecological habitats*, areas with assigned ecological receptors, defined by land use and other ecologically relevant data (see Section 13.0). These areas perform a similar function as the human receptor points for ecological receptors.

- *Watersheds*, delineated using digital elevation models (DEMs) of topography or manually, based on Reach File (RF) stream networks (see Section 5.0). Watershed subbasins provide the input data and output spatial framework necessary to model contaminant deposition, erosion, and overland transport, as well as resultant soil concentrations, in the LAU, Waste Pile, and Watershed Modules.

- *Waterbodies* (lakes, streams, and wetlands), defined by DEMs, RF data, land use data, and/or the National Wetlands Inventory (NWI; see Section 5.0). These provide the input data and output spatial framework necessary to model contaminant deposition, fate, and transport and the resulting water column and sediment concentrations in streams and lakes.

In the GIS, each of these spatial data layers is composed of two-dimensional (2-D) polygons, with the exception of streams, which are defined by one-dimensional (1-D) vectors (stream reaches). Because these polygon coverages could not be exported directly to the 3MRA modeling system, each spatial data layer was defined in terms of a base grid composed of 100 × 100 m cells, which roughly correspond to the minimum resolution of several site-specific data types (i.e., land use, topographic, and soil).

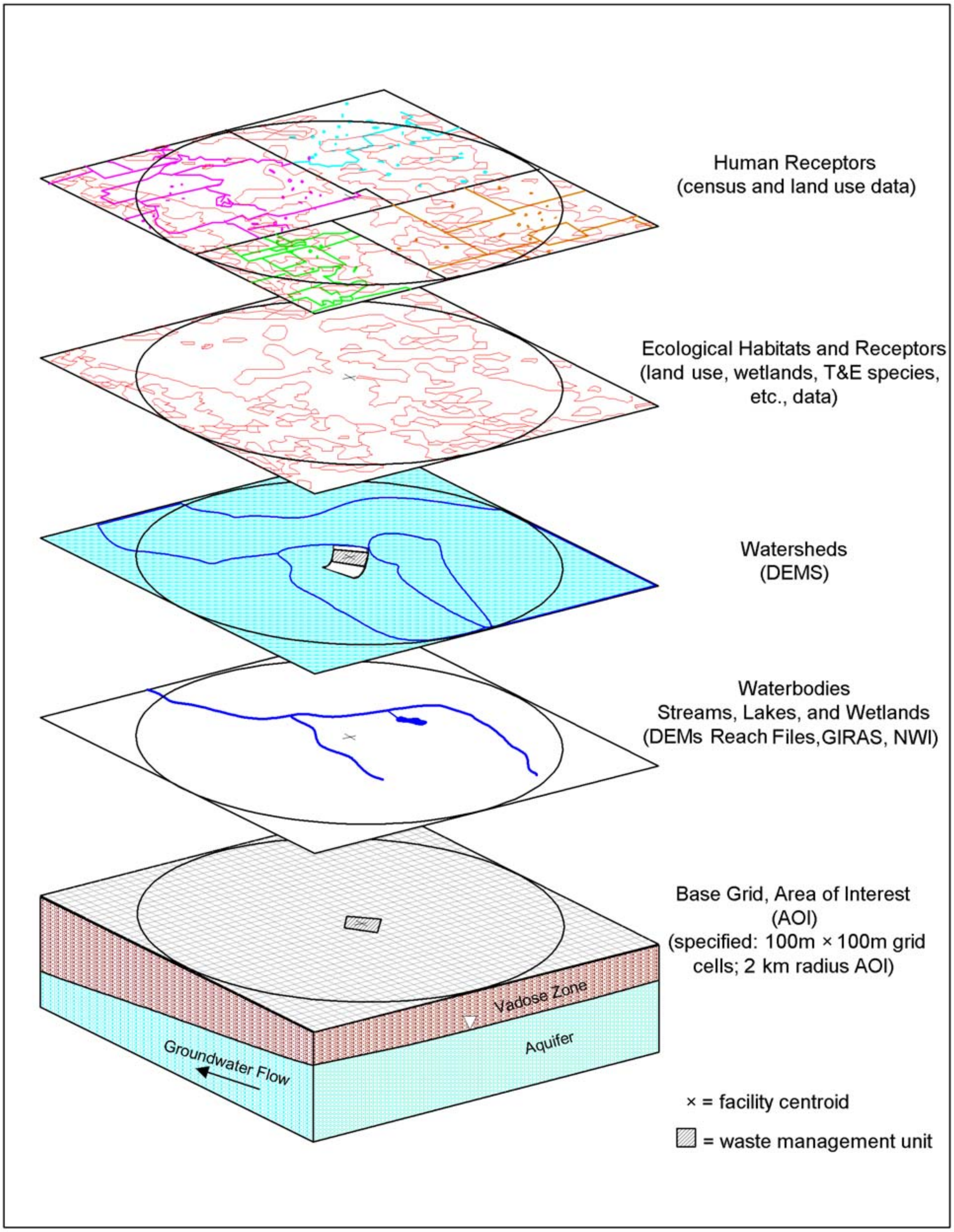

Figure 2-1. Site-based spatial overlays for the 3MRA modeling system spatial framework.

This base grid (or *x,y* coordinate system) serves as the basis for defining receptor points at which the Air and Aquifer Modules produce contaminant concentrations (and deposition rates for the Air Module) in terms of distance and direction from the WMU contaminant source. To provide the 3MRA modeling system's SLP with the data necessary to specify air points, spatial data are passed to the system using this site coordinate system for the following data layers:

- Watersheds
- Waterbodies
- Farms
- Human receptor points
- Wells (human receptor points with drinking water wells)
- Ecological habitats.

These data are passed as six separate data tables within the "grid" database, along with the Setting_ID and the necessary index (e.g., watershed number). Figure 2-2 shows the structure of these data tables.

The site coordinate system uses *x,y* coordinates (in meters) relative to a 0,0 georeference point, which is defined as the facility centroid. The 3MRA modeling system also requires specification of the georeference point using latitude and longitude in the Universal Transverse Mercator (UTM) coordinate system. This requires conversion of the Albers meters GIS coordinates to UTM.

The grid tables are created using GIS by overlaying coverage of spatial data (e.g., watersheds) with the standard grid. If the centroid of a grid cell intersected a polygon, it receives the identifier for that polygon (see Figure 2-3). The resulting table from this overlay is passed on to the database processors as the table of grid cell IDs that represent that spatial feature. The database processors then use the standard grid table of *x,y* points to convert the real-world UTM coordinates to a set of *x,y* points centered about 0,0.

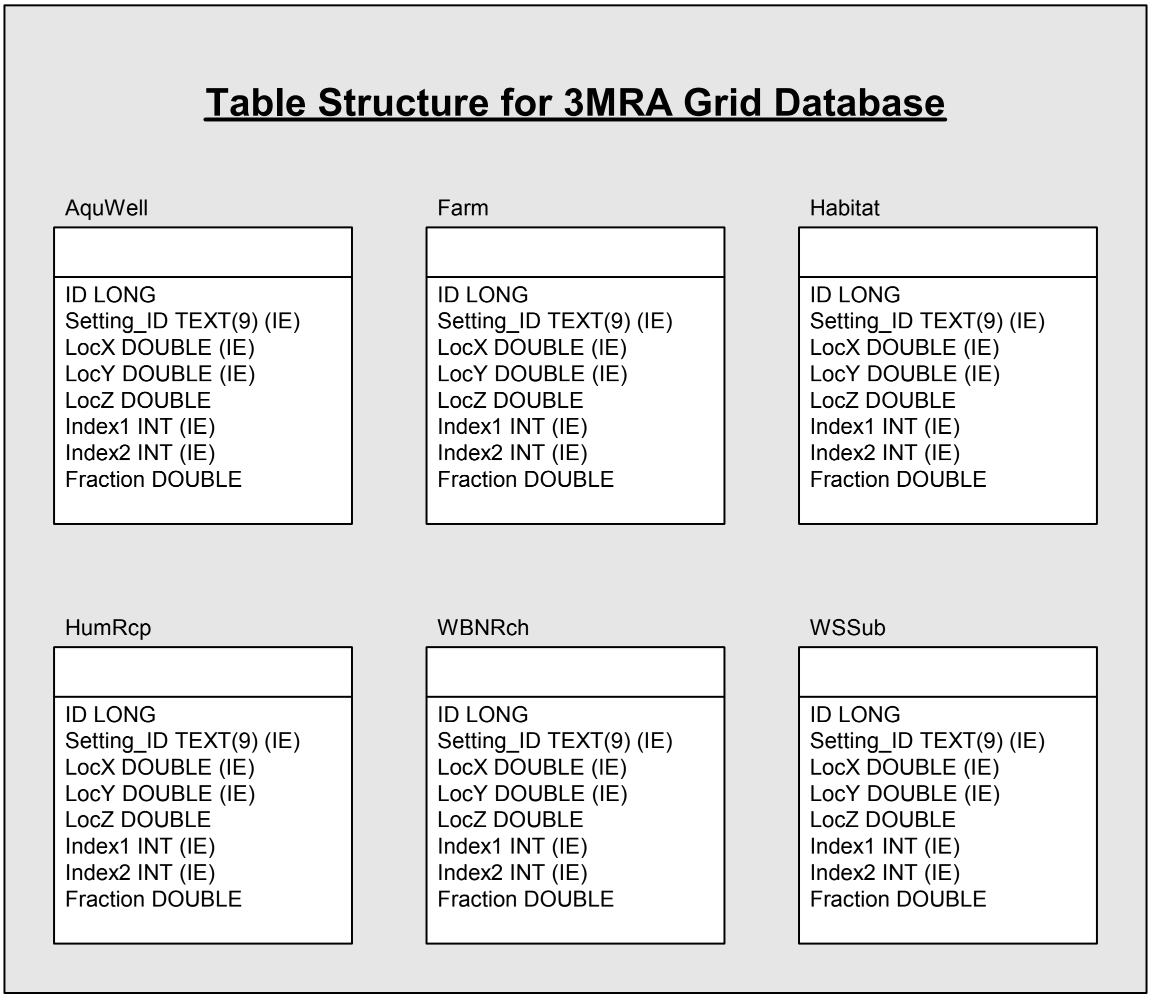

Figure 2-2. Table format and content for the 3MRA modeling system grid database.

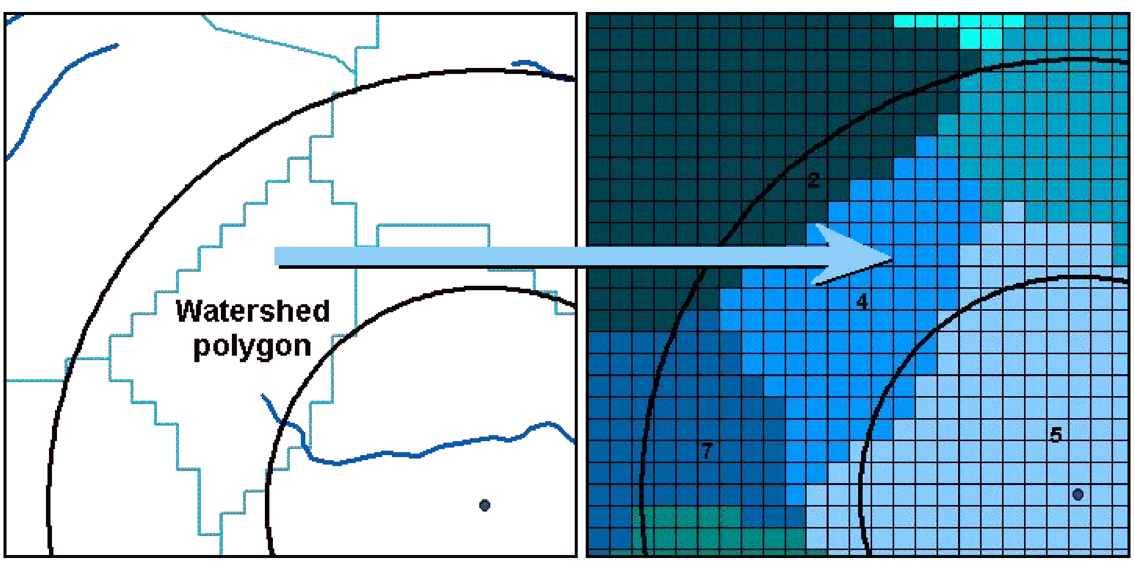

Figure 2-3. Transfer of watershed polygons to 100 × 100 m template grid.

A template grid was created to cover the largest AOI of the 419 site/WMU settings. This way, only one grid needed to be created for use with all the sites. The largest WMU from the 201 selected sites (1,618,800 m^2 at site 0431912) was used to define the template grid for the example data set.

Because the template grid was created the same way for each site (centered on the site location) the cell centroid *x,y* coordinates were always the same delta *x* and delta *y* from the site centroid (0,0). As a result, only one grid definition file needed to be created. The grid definition file consisted of the cell address, the *x* distance, and the *y* distance. A cell's UTM coordinates can be determined by simply adding the *x* and *y* distance from the grid definition file to the facility centroid UTM coordinates. Cell ordering starts at 1 in the upper left corner and works its way across horizontally and then down.

2.6 Quality Assurance/Quality Control

General QA/QC of the spatial aspects of the data collection and processing effort included checks to ensure accuracy of facility location, proper registration (alignment) of GIS coverages, proper placement of grid templates, and accurate transfer of grid information to the 3MRA modeling system grid database. These QC activities included

- Visual review of each facility/WMU location and manual relocation as necessary to ensure reasonable location prior to GIS processing of spatial data (see Appendix 2B),
- Automatic regeneration of the grid template for a site prior to GIS postprocessing of spatial data to ensure proper correspondence with the facility centroid,
- Generation and visual review of thumbnail images of all spatial data for every site to ensure accurate registration and collocation of all data layers, and
- Visual checks of a subset of sites in the grid database against original GIS coverages to ensure accurate data processing and transfer.

QA/QC of specific data layers (i.e., human receptors, habitats, watersheds, and waterbodies) is discussed in the section describing data collection for each data type.

2.7 Issues and Uncertainties

Overall, one of the most significant general uncertainties with the spatial data in the representative national data set is the accuracy of facility location and its impacts on the site-based data collected around each site. Appendix 2B discusses such locational uncertainties in some detail. However, these locational uncertainties are likely to be significant only in terms of a site-specific analysis at certain sites, and 3MRA modeling system is site-based, not site-specific. EPA believes that the location review and adjustment efforts described in Appendix 2B resulted in site locations representative of current and future locations of Industrial D WMUs, and, as such, these locations are adequate and appropriate for a nationwide site-based analysis. EPA emphasizes that the site-based data collected for the 3MRA representative national data set are not intended to be used for site-specific risk assessments.

Other issues and uncertainties associated with specific site-based data layers are found in the sections of this report discussing each data type.

2.8 References

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Seaber, P. R., F. P. Kapinos, and G. L. Knapp. 1987. *Hydrologic Unit Maps*. U.S. Geological Survey Water-Supply Paper 2294. Washington, DC: U.S. Government Printing Office.

U.S. EPA (Environmental Protection Agency). 1996. *EPA's Composite Model for Leachate Migration with Transformation Products; EPACMTP: Background Document for Metals. Volume 1: Methodology.* Washington, DC: U.S. Environmental Protection Agency, Office of Solid Waste.

Westat, Inc. 1987. *Screening Survey of Industrial Subtitle D Establishments. Draft Final Report.* Prepared for the U.S. Environmental Protection Agency. Rockville, MD: Westat, Inc. December.

Appendix 2A

201 Industrial D Waste Management Sites Used in the Representative National Data Set

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Table 2A-1. 201 Industrial D Waste Management Sites Used in the Representative National Data Set

SiteID	State	Urban/ Rural [a]	Latitude	Longitude	Meteorologic Station [b]	Water Resources Region [c]	Ground Water Class [d]	WMU Type
1 - Organic Chemicals								
0130207	IA	Rural	41.399742	-91.06297	Moline, IL	Upper Mississippi	Bedded Sedimentary Rock	WP
0136703	NM	Rural	35.19942	-103.71577	Amarillo, TX	Arkansas-White-Red	Alluvial Basins Valleys and Fans	AT, LAU, SI
0131207	NY	Urban	43.079444	-79.008889	Buffalo, NY	Great Lakes	Bedded Sedimentary Rock	AT, SI
0114001	PA	Urban	40.49308	-80.07914	Pittsburgh, PA	Ohio	Bedded Sedimentary Rock	WP
0131508	TN	Urban	36.52501	-82.53999	Bristol, TN	Tennessee	Bedded Sedimentary Rock	AT, LF, SI, WP
0131104	WI	Rural	42.66416	-89.05569	Rockford, IL	Upper Mississippi	Bedded Sedimentary Rock	AT, SI
2 - Primary Iron and Steel								
0233603	AL	Rural	33.541515	-86.543034	Huntsville, AL	South Atlantic-Gulf	Bedded Sedimentary Rock	LF
0232705	GA	Rural	34.1769	-84.81757	Atlanta, GA	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, SI
0231610	IL	Urban	41.73503	-87.54159	Chicago, IL	Great Lakes	Bedded Sedimentary Rock	AT, SI
0231002	IN	Rural	40.192049	-84.981029	Dayton, OH	Ohio	Till and Till Over Outwash	LF
0235301	IN	Urban	39.9335	-85.38004	Indianapolis, IN	Ohio	Till and Till Over Outwash	LF
0231911	MI	Urban	43.447145	-83.920814	Flint, MI	Great Lakes	Bedded Sedimentary Rock	WP
0231914	MI	Urban	42.256748	-83.135334	Detroit, MI	Great Lakes	Bedded Sedimentary Rock	AT, SI
0231106	NJ	Rural	40.11836	-74.81713	Philadelphia, PA	Mid-Atlantic	Sand and Gravel	LF
0221207	OH	Urban	40.292475	-84.162526	Dayton, OH	Ohio	Bedded Sedimentary Rock	WP
0223504	OH	Urban	40.850867	-81.763907	Akron/Canton, OH	Ohio	Sand and Gravel	LAU, LF, WP
0232415	OH	Urban	41.457226	-81.688288	Cleveland, OH	Great Lakes	Bedded Sedimentary Rock	AT, SI, WP
0232402	PA	Urban	39.970278	-75.815833	Wilmington, DE	Mid-Atlantic	Metamorphic and Igneous	AT, LF, SI
0232501	PA	Rural	41.26468	-80.4838	Youngstown, OH	Ohio	Bedded Sedimentary Rock	LF, WP
0234904	PA	Rural	41.02221	-75.19536	Allentown, PA	Mid-Atlantic	Bedded Sedimentary Rock	LF
0220102	SC	Urban	32.834906	-79.948129	Charleston, SC	South Atlantic-Gulf	Bedded Sedimentary Rock	WP
0232313	TX	Rural	32.43605	-95.36401	Shreveport, LA	Texas-Gulf	Bedded Sedimentary Rock	AT, LF, SI, WP
0231407	TX	Rural	32.46527	-97.02675	Fort Worth, TX	Texas-Gulf	Bedded Sedimentary Rock	LF
0233601	VA	Urban	38.064696	-78.874709	Roanoke, VA	Mid-Atlantic	Bedded Sedimentary Rock	AT, SI
0232305	VT	Rural	43.969506	-72.689212	Burlington, VT	New England	Unconsolidated and Semiconsolidated Shallow Aquifers	WP
0224002	WI	Urban	43.86402	-91.22462	Moline, IL	Upper Mississippi	Bedded Sedimentary Rock	WP

(continued)

Table 2A-1. (continued)

SiteID	State	Urban/ Rural [a]	Latitude	Longitude	Meteorologic Station [b]	Water Resources Region [c]	Ground Water Class [d]	WMU Type
3 - Fertilizer and Agricultural Chemicals								
0331006	AR	Rural	34.563889	-90.652778	Memphis, TN	Lower Mississippi	Alluvial Basins Valleys and Fans	AT, SI
0332707	FL	Rural	27.88554	-81.94815	Tampa, FL	South Atlantic-Gulf	Bedded Sedimentary Rock	LF, WP
0314202	NY	Urban	42.711063	-73.671455	Albany, NY	Mid-Atlantic	Sand and Gravel	LF
0332811	OH	Urban	40.59397	-83.10857	Columbus, OH	Ohio	Bedded Sedimentary Rock	WP
0331902	OK	Rural	36.439167	-99.468611	Dodge City, KS	Arkansas-White-Red	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI, WP
0321802	OR	Rural	45.615336	-122.7105	Portland, OR	Pacific Northwest	Alluvial Basins Valleys and Fans	AT, SI, WP
0332104	TX	Rural	35.642778	-101.42694	Amarillo, TX	Arkansas-White-Red	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, LAU, SI, WP
0312301	VA	Rural	38.42827	-78.94495	Roanoke, VA	Mid-Atlantic	Bedded Sedimentary Rock	AT, LAU, SI
4 - Electric Power Generation								
0432011	AL	Rural	34.703889	-87.118889	Huntsville, AL	Tennessee	Bedded Sedimentary Rock	LF
0434505	CA	Rural	32.847146	-115.56736	Phoenix, AZ	California	Sand and Gravel	AT, SI
0435510	IL	Rural	40.27633	-90.08052	Peoria, IL	Upper Mississippi	Bedded Sedimentary Rock	AT, LAU, SI
0433201	IN	Rural	41.21534	-87.0191	South Bend, IN	Upper Mississippi	Till and Till Over Outwash	AT, LF, SI
0431912	KS	Rural	38.35827	-94.63423	Kansas City, MO	Missouri	Bedded Sedimentary Rock	AT, LF, SI
0432716	MN	Rural	47.261	-93.674	Duluth, MN	Upper Mississippi	Bedded Sedimentary Rock	AT, SI
0433408	MT	Rural	45.892	-106.632	Miles City, MT	Missouri	Alluvial Basins Valleys and Fans	AT, SI
0434804	NC	Rural	35.38401	-78.07439	Raleigh-Durham, NC	South Atlantic-Gulf	Metamorphic and Igneous	AT, SI
0436007	NC	Rural	35.5871	-79.04772	Raleigh-Durham, NC	South Atlantic-Gulf	Metamorphic and Igneous	AT, SI
0436108	NC	Rural	35.18328	-81.01201	Charlotte, NC	South Atlantic-Gulf	Metamorphic and Igneous	AT, SI
0430108	NE	Rural	40.36094	-95.64231	Kansas City, MO	Missouri	Alluvial Basins Valleys and Fans	AT, SI, WP
0430412	OH	Rural	41.78825	-81.14677	Cleveland, OH	Great Lakes	Bedded Sedimentary Rock	AT, LF, SI
0432106	PA	Rural	40.79771	-75.11741	Allentown, PA	Mid-Atlantic	Bedded Sedimentary Rock	AT, SI
0433204	SC	Rural	33.330278	-79.357222	Charleston, SC	South Atlantic-Gulf	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI
0433404	WY	Rural	42.0824	-104.94946	Cheyenne, WY	Missouri	Alluvial Basins Valleys and Fans	AT, LF, SI
5 - Plastic and Resins Manufacturer								
0534504	GA	Urban	33.84175	-84.23034	Atlanta, GA	South Atlantic-Gulf	Metamorphic and Igneous	AT, SI
0531301	IL	Rural	39.84983	-89.27569	Springfield, IL	Upper Mississippi	Bedded Sedimentary Rock	AT, SI

(continued)

Table 2A-1. (continued)

SiteID	State	Urban/ Rural [a]	Latitude	Longitude	Meteorologic Station [b]	Water Resources Region [c]	Ground Water Class [d]	WMU Type
0530901	OH	Rural	41.372916	-82.542933	Cleveland, OH	Great Lakes	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, LAU, SI
0531502	OH	Urban	39.03921	-82.62841	Huntington, WV	Ohio	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI
0531702	TX	Rural	35.66336	-101.45024	Amarillo, TX	Arkansas-White-Red	Unconsolidated and Semiconsolidated Shallow Aquifers	LF
0531902	TX	Urban	29.72675	-95.13189	Houston, TX	Texas-Gulf	Sand and Gravel	AT, SI
6 - Inorganic Chemicals								
0622902	AZ	Rural	31.935764	-111.0029	Tucson, AZ	Lower Colorado	Alluvial Basins Valleys and Fans	AT, SI
0625002	GA	Rural	32.2	-81.166667	Savannah, GA	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, LF, SI
0634001	GA	Rural	34.13254	-84.77666	Atlanta, GA	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, SI
0613402	IL	Urban	38.586459	-90.176488	St. Louis, MO	Upper Mississippi	Bedded Sedimentary Rock	AT, SI
0621902	KS	Rural	38.03371	-97.97337	Wichita, KS	Arkansas-White-Red	Alluvial Basins Valleys and Fans	AT, SI
0631903	LA	Urban	30.23167	-93.27781	Lake Charles, LA	Lower Mississippi	Sand and Gravel	AT, LF, SI
0635301	NV	Urban	36.04434	-114.99514	Las Vegas, NV	Lower Colorado	Bedded Sedimentary Rock	AT, SI
0632608	OR	Rural	45.56941	-122.7448	Portland, OR	Pacific Northwest	Alluvial Basins Valleys and Fans	AT, LF, SI
0620401	TX	Urban	29.758611	-95.176389	Houston, TX	Texas-Gulf	Sand and Gravel	AT, SI
0621603	TX	Rural	29.701746	-95.082965	Houston, TX	Texas-Gulf	Sand and Gravel	AT, SI
0625501	TX	Rural	29.99645	-94.96404	Houston, TX	Texas-Gulf	Sand and Gravel	LAU
0631701	TX	Rural	29.71475	-95.07624	Houston, TX	Texas-Gulf	Sand and Gravel	LAU
0632003	TX	Rural	32.437778	-94.688889	Shreveport, LA	Texas-Gulf	Bedded Sedimentary Rock	AT, LF, SI
0632606	TX	Rural	35.48185	-101.0562	Amarillo, TX	Arkansas-White-Red	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, LF, SI
0620604	UT	Rural	40.7375	-111.98814	Salt Lake City, UT	Great Basin	Alluvial Basins Valleys and Fans	AT, SI
7 - Stone, Clay, Glass, and Concrete								
0713705	AZ	Rural	32.833	-111.734	Phoenix, AZ	Lower Colorado	Alluvial Basins Valleys and Fans	AT, LF, SI
0715216	CA	Urban	33.89933	-117.82175	Los Angeles, CA	California	Coastal Beaches	WP
0731411	CA	Rural	37.091066	-120.24545	Fresno, CA	California	Sand and Gravel	WP
0732405	CA	Urban	37.65484	-121.02633	Sacramento, CA	California	Sand and Gravel	WP
0733203	CA	Rural	37.71502	-121.49048	Sacramento, CA	California	Sand and Gravel	AT, SI
0722503	CO	Urban	39.807664	-105.00613	Boulder, CO	Missouri	Bedded Sedimentary Rock	AT, SI

(continued)

Table 2A-1. (continued)

SiteID	State	Urban/ Rural [a]	Latitude	Longitude	Meteorologic Station [b]	Water Resources Region [c]	Ground Water Class [d]	WMU Type
0720803	FL	Rural	27.07543	-82.38693	Tampa, FL	South Atlantic-Gulf	Coastal Beaches	AT, LAU, LF, SI
0722107	FL	Rural	26.87084	-82.00256	Tampa, FL	South Atlantic-Gulf	Coastal Beaches	WP
0722505	FL	Urban	25.99577	-80.18024	Miami, FL	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, SI
0730502	IL	Urban	39.00298	-87.748337	Evansville, IN	Ohio	Bedded Sedimentary Rock	AT, SI, WP
0731514	IL	Rural	42.38881	-87.81145	Chicago, IL	Great Lakes	Bedded Sedimentary Rock	AT, LF, SI
0732510	IL	Rural	41.61892	-88.20404	Chicago, IL	Upper Mississippi	Bedded Sedimentary Rock	WP
0716701	IN	Rural	38.06725	-87.26451	Evansville, IN	Ohio	Till and Till Over Outwash	AT, SI
0735309	KS	Rural	37.2165	-95.69048	Tulsa, OK	Arkansas-White-Red	Bedded Sedimentary Rock	AT, LF, SI
0733302	KY	Urban	37.64289	-84.78751	Lexington, KY	Ohio	Bedded Sedimentary Rock	AT, SI, WP
0731412	MA	Rural	42.5495	-71.51555	Boston, MA	New England	Metamorphic and Igneous	AT, SI, WP
0720506	ME	Rural	44.65533	-67.71774	Portland, ME	New England	Sand and Gravel	WP
0721305	MI	Urban	42.27879	-83.12807	Detroit, MI	Great Lakes	Bedded Sedimentary Rock	WP
0724301	MS	Rural	34.786143	-89.449686	Memphis, TN	Lower Mississippi	Sand and Gravel	WP
0724206	NC	Rural	35.77042	-80.60004	Greensboro, NC	South Atlantic-Gulf	Metamorphic and Igneous	AT, SI, WP
0731507	NC	Rural	34.74411	-79.39153	Raleigh-Durham, NC	South Atlantic-Gulf	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI, WP
0733501	NC	Rural	35.37242	-82.48649	Asheville, NC	Tennessee	Metamorphic and Igneous	AT, SI
0724909	ND	Rural	48.14514	-103.65068	Miles City, MT	Missouri	Unconsolidated and Semiconsolidated Shallow Aquifers	WP
0731501	NJ	Urban	40.43103	-74.23553	Newark, NJ	Mid-Atlantic	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI
0734604	NJ	Urban	39.78529	-74.91227	Philadelphia, PA	Mid-Atlantic	Unconsolidated and Semiconsolidated Shallow Aquifers	WP
0722705	NY	Urban	42.10712	-75.89799	Binghamton, NY	Mid-Atlantic	Sand and Gravel	LF
0731111	NY	Urban	42.15282	-77.0767	Binghamton, NY	Mid-Atlantic	Sand and Gravel	AT, SI
0733210	OH	Rural	40.6764	-80.8992	Akron/Canton, OH	Ohio	Bedded Sedimentary Rock	AT, LF, SI
0713618	OR	Urban	43.21486	-123.32816	Medford, OR	Pacific Northwest	Bedded Sedimentary Rock	AT, SI
0715007	PA	Urban	40.14299	-75.30585	Philadelphia, PA	Mid-Atlantic	Metamorphic and Igneous	WP
0724804	PA	Rural	40.326449	-75.322167	Allentown, PA	Mid-Atlantic	Bedded Sedimentary Rock	WP
0731405	PA	Rural	40.05671	-76.57743	Wilmington, DE	Mid-Atlantic	Bedded Sedimentary Rock	AT, SI
0731703	PA	Rural	40.17826	-75.5409	Philadelphia, PA	Mid-Atlantic	Bedded Sedimentary Rock	LF

(continued)

Table 2A-1. (continued)

SiteID	State	Urban/ Rural [a]	Latitude	Longitude	Meteorologic Station [b]	Water Resources Region [c]	Ground Water Class [d]	WMU Type
0732110	PA	Urban	41.347859	-75.747582	Wilkes-Barre, PA	Mid-Atlantic	Unconsolidated and Semiconsolidated Shallow Aquifers	LF
0733404	PA	Rural	41.42468	-78.53219	Williamsport, PA	Mid-Atlantic	Bedded Sedimentary Rock	LF, WP
0733606	PA	Rural	40.10934	-75.23637	Philadelphia, PA	Mid-Atlantic	Metamorphic and Igneous	AT, SI, WP
0723607	TX	Rural	30.77008	-98.67221	Austin, TX	Texas-Gulf	Bedded Sedimentary Rock	AT, SI
0730914	TX	Rural	30.32381	-97.29387	Austin, TX	Texas-Gulf	Bedded Sedimentary Rock	AT, LF, SI, WP
0730407	WV	Rural	39.01759	-80.29334	Pittsburgh, PA	Ohio	Bedded Sedimentary Rock	AT, LF, SI
8 - Pulp and Paper Industry								
0830601	AL	Rural	33.32008	-86.36476	Huntsville, AL	South Atlantic-Gulf	Metamorphic and Igneous	LF
0831406	AL	Rural	32.45003	-87.97949	Meridian, MS	South Atlantic-Gulf	Sand and Gravel	AT, LF, SI
0831904	GA	Rural	30.69851	-83.30035	Macon, GA	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, LAU, LF, SI
0832904	GA	Rural	33.992562	-83.77019	Athens, GA	South Atlantic-Gulf	Metamorphic and Igneous	AT, SI
0832903	LA	Rural	30.70787	-91.33987	Baton Rouge, LA	Lower Mississippi	Sand and Gravel	AT, SI, WP
0831102	ME	Urban	44.55504	-69.62128	Portland, ME	New England	Metamorphic and Igneous	WP
0826707	NC	Rural	36.150715	-80.278929	Greensboro, NC	South Atlantic-Gulf	Metamorphic and Igneous	AT, SI
0833001	NC	Rural	35.549	-82.879	Asheville, NC	Tennessee	Metamorphic and Igneous	LF
0830903	NY	Rural	44.15678	-74.98347	Burlington, VT	Great Lakes	Sand and Gravel	AT, LF, SI
0832909	OH	Urban	39.518638	-84.40415	Dayton, OH	Ohio	Sand and Gravel	AT, SI
0832510	PA	Rural	41.39016	-75.82027	Wilkes-Barre, PA	Mid-Atlantic	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI, WP
0834009	PA	Rural	40.06089	-75.26093	Philadelphia, PA	Mid-Atlantic	Metamorphic and Igneous	AT, SI
0832304	WI	Urban	44.495	-88.04	Green Bay, WI	Great Lakes	Sand and Gravel	LF, WP
0833007	WI	Rural	45.04	-87.725	Green Bay, WI	Great Lakes	Sand and Gravel	AT, LF, SI
9 - Primary Nonferrous Metals								
0923004	MI	Rural	42.816435	-85.663736	Grand Rapids, MI	Great Lakes	Till and Till Over Outwash	WP
0930205	NC	Rural	35.410833	-80.115556	Greensboro, NC	South Atlantic-Gulf	Metamorphic and Igneous	AT, SI, WP
0932507	PA	Urban	40.633611	-76.186944	Allentown, PA	Mid-Atlantic	Bedded Sedimentary Rock	AT, SI, WP
0932103	SC	Rural	33.787222	-81.113889	Columbia, SC	South Atlantic-Gulf	Sand and Gravel	AT, LF, SI, WP
0930702	TX	Rural	30.548	-97.066	Austin, TX	Texas-Gulf	Bedded Sedimentary Rock	AT, LF, SI
0932903	TX	Rural	28.663	-96.542	Houston, TX	Texas-Gulf	Sand and Gravel	AT, LF, SI
0933704	VA	Rural	36.66662	-82.06086	Bristol, TN	Tennessee	Bedded Sedimentary Rock	AT, SI

(continued)

Table 2A-1. (continued)

SiteID	State	Urban/ Rural [a]	Latitude	Longitude	Meteorologic Station [b]	Water Resources Region [c]	Ground Water Class [d]	WMU Type
0930301	WA	Rural	45.73123	-120.69753	Yakima, WA	Pacific Northwest	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, LF, SI, WP
0932509	WA	Rural	48.45497	-117.88196	Spokane, WA	Pacific Northwest	Till and Till Over Outwash	AT, LF, SI, WP
10 - Food and Kindred Products								
1032715	AL	Rural	33.96811	-85.96986	Huntsville, AL	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, SI
1033202	AR	Urban	35.425999	-94.329485	Tulsa, OK	Arkansas-White-Red	Bedded Sedimentary Rock	LAU
1034805	AR	Rural	35.7646	-91.644757	Springfield, MO	Arkansas-White-Red	Bedded Sedimentary Rock	AT, SI
1013209	CA	Rural	36.40229	-119.13225	Fresno, CA	California	Sand and Gravel	AT, SI
1031507	CA	Rural	36.94798	-120.072	Fresno, CA	California	Sand and Gravel	AT, SI
1033114	DE	Rural	38.719722	-75.289444	Atlantic City, NJ	Mid-Atlantic	Sand and Gravel	AT, SI
1014805	GA	Rural	30.919	-84.616	Tallahassee, FL	South Atlantic-Gulf	Bedded Sedimentary Rock	LF
1034005	GA	Rural	34.19171	-83.9055	Athens, GA	South Atlantic-Gulf	Metamorphic and Igneous	LAU, WP
1035405	ID	Rural	43.61545	-116.60928	Boise, ID	Pacific Northwest	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI
1031503	KS	Rural	38.781171	-97.635899	Wichita, KS	Missouri	Alluvial Basins Valleys and Fans	LAU
1033107	MI	Urban	44.735499	-85.625005	Muskegon, MI	Great Lakes	Till and Till Over Outwash	AT, SI
1033602	MI	Rural	42.42	-85.643	Grand Rapids, MI	Great Lakes	Till and Till Over Outwash	AT, LAU, SI
1035117	MO	Rural	39.24038	-94.4163	Kansas City, MO	Missouri	Alluvial Basins Valleys and Fans	AT, SI
1034406	MS	Rural	33.36092	-91.11143	Jackson, MS	Lower Mississippi	Alluvial Basins Valleys and Fans	AT, SI
1032802	NC	Rural	35.69275	-79.16879	Raleigh-Durham, NC	South Atlantic-Gulf	Metamorphic and Igneous	AT, LAU, LF, SI
1012203	NY	Rural	40.942	-72.616	New York, NY	Mid-Atlantic	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, LF, SI, WP
1023705	NY	Rural	42.893111	-76.985194	Rochester, NY	Great Lakes	Sand and Gravel	AT, SI
1034210	NY	Rural	42.3996	-77.25326	Binghamton, NY	Great Lakes	Sand and Gravel	AT, LAU, SI
1015510	TX	Rural	33.07983	-99.57937	Lubbock, TX	Texas-Gulf	Alluvial Basins Valleys and Fans	LF
1035508	UT	Rural	41.924522	-111.81336	Pocatello, ID	Great Basin	Alluvial Basins Valleys and Fans	AT, LAU, SI
1010805	WA	Urban	46.04296	-118.32333	Pendleton, OR	Pacific Northwest	Unconsolidated and Semiconsolidated Shallow Aquifers	LAU
11 - Water Treatment								
1131802	CA	Rural	38.859145	-120.66389	Sacramento, CA	California	Metamorphic and Igneous	LAU
1131103	LA	Urban	29.952305	-90.07619	New Orleans, LA	Lower Mississippi	Other (Not Classifiable)	AT, SI

(continued)

Table 2A-1. (continued)

SiteID	State	Urban/ Rural [a]	Latitude	Longitude	Meteorologic Station [b]	Water Resources Region [c]	Ground Water Class [d]	WMU Type
1134405	MO	Rural	39.67715	-91.40255	Columbia, MO	Upper Mississippi	Sand and Gravel	LAU
1133902	SC	Urban	34.50069	-82.02097	Greenville, SC	South Atlantic-Gulf	Metamorphic and Igneous	LAU
1122705	VA	Rural	37.221	-82.285	Bristol, TN	Ohio	Bedded Sedimentary Rock	AT, SI
1120904	VT	Rural	44.44519	-73.22743	Burlington, VT	Mid-Atlantic	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI
12 - Petroleum Refining								
1233101	CA	Urban	33.764167	-118.28333	Los Angeles, CA	California	Sand and Gravel	AT, SI
1236810	CA	Urban	33.931111	-118.06694	Los Angeles, CA	California	Sand and Gravel	WP
1236652	CT	Rural	41.556	-72.756	Hartford, CT	New England	Bedded Sedimentary Rock	AT, SI
1221704	FL	Urban	27.904372	-82.76268	Tampa, FL	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, SI, WP
1212301	MA	Rural	42.138844	-71.077019	Boston, MA	New England	Metamorphic and Igneous	AT, SI
1230517	MD	Rural	39.505833	-76.889444	Baltimore, MD	Mid-Atlantic	Metamorphic and Igneous	AT, SI
1230111	MT	Rural	45.65188	-108.75652	Billings, MT	Missouri	Alluvial Basins Valleys and Fans	AT, SI
1230919	NY	Urban	42.66174	-73.74344	Albany, NY	Mid-Atlantic	Sand and Gravel	WP
1236637	NY	Rural	41.09491	-73.95553	New York, NY	Mid-Atlantic	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI
1235205	OK	Rural	34.81205	-96.67695	Oklahoma City, OK	Arkansas-White-Red	Bedded Sedimentary Rock	AT, SI, WP
1223404	PA	Urban	40.071935	-75.295648	Philadelphia, PA	Mid-Atlantic	Metamorphic and Igneous	AT, SI
1236820	PA	Rural	41.785	-76.36	Binghamton, NY	Mid-Atlantic	Unconsolidated and Semiconsolidated Shallow Aquifers	AT, SI
1231705	SC	Rural	32.93092	-79.83102	Charleston, SC	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, LAU, SI
1230206	TN	Rural	35.27079	-89.97744	Memphis, TN	Lower Mississippi	Alluvial Basins Valleys and Fans	AT, SI
1231101	TN	Rural	35.087243	-90.080785	Memphis, TN	Lower Mississippi	Alluvial Basins Valleys and Fans	AT, LAU, SI
1236732	WV	Rural	37.793	-81.206	Roanoke, VA	Ohio	Bedded Sedimentary Rock	WP
13 - Rubber and Miscellaneous Products								
1331103	AL	Urban	34.0079	-85.97295	Huntsville, AL	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, SI
1333701	OH	Urban	41.24763	-80.80961	Youngstown, OH	Ohio	Unconsolidated and Semiconsolidated Shallow Aquifers	WP
1333001	SC	Rural	34.196944	-79.580833	Columbia, SC	South Atlantic-Gulf	Sand and Gravel	LAU
14 - Transportation Equipment								
1415407	AZ	Urban	33.49474	-112.04027	Phoenix, AZ	Lower Colorado	Alluvial Basins Valleys and Fans	WP

(continued)

Table 2A-1. (continued)

SiteID	State	Urban/ Rural [a]	Latitude	Longitude	Meteorologic Station [b]	Water Resources Region [c]	Ground Water Class [d]	WMU Type
1430602	CA	Urban	37.405945	-122.02725	San Francisco, CA	California	Coastal Beaches	AT, SI
1434022	CA	Urban	33.809808	-118.33645	Los Angeles, CA	California	Sand and Gravel	AT, SI
1430404	IN	Urban	39.737695	-86.215746	Indianapolis, IN	Ohio	Sand and Gravel	AT, SI
1430107	KS	Urban	37.62436	-97.280161	Wichita, KS	Arkansas-White-Red	Alluvial Basins Valleys and Fans	AT, LF, SI
1434802	SC	Urban	34.01779	-80.98919	Columbia, SC	South Atlantic-Gulf	Sand and Gravel	AT, SI
1435317	TX	Rural	30.10278	-94.09169	Port Arthur, TX	Texas-Gulf	Sand and Gravel	LF
1431515	UT	Rural	40.66357	-112.0865	Salt Lake City, UT	Great Basin	Alluvial Basins Valleys and Fans	AT, SI
1421506	WA	Urban	47.49002	-122.19757	Seattle, WA	Pacific Northwest	Till and Till Over Outwash	WP
15 - Selected Chemical and Allied Products								
1522504	DE	Rural	39.602886	-75.66059	Wilmington, DE	Mid-Atlantic	Metamorphic and Igneous	LAU
1530808	MI	Rural	42.116201	-83.190811	Detroit, MI	Great Lakes	Bedded Sedimentary Rock	AT, SI
1530605	TX	Rural	29.97179	-94.21806	Port Arthur, TX	Texas-Gulf	Sand and Gravel	AT, LF, SI
1532401	VT	Rural	43.9799	-73.09228	Burlington, VT	Mid-Atlantic	Unconsolidated and Semiconsolidated Shallow Aquifers	WP
16 - Textile Manufacturing								
1633404	AZ	Rural	33.431667	-112.36	Phoenix, AZ	Lower Colorado	Alluvial Basins Valleys and Fans	AT, SI
1633405	CT	Rural	41.55905	-73.40906	Hartford, CT	New England	Metamorphic and Igneous	AT, SI
1621808	GA	Rural	33.30623	-84.567245	Atlanta, GA	South Atlantic-Gulf	Metamorphic and Igneous	AT, LAU, SI
1630106	GA	Rural	34.954444	-83.379167	Asheville, NC	Tennessee	Metamorphic and Igneous	AT, LF, SI, WP
1631701	NC	Rural	35.573	-77.039	Raleigh-Durham, NC	South Atlantic-Gulf	Bedded Sedimentary Rock	AT, LAU, SI
1632106	NM	Urban	32.27424	-106.74707	El Paso, TX	Rio Grande	Alluvial Basins Valleys and Fans	AT, LAU, SI
1632703	SC	Rural	34.50029	-81.61482	Greenville, SC	South Atlantic-Gulf	Metamorphic and Igneous	LF
1635404	SC	Rural	34.783889	-82.687222	Asheville, NC	South Atlantic-Gulf	Metamorphic and Igneous	AT, SI
1630401	TN	Urban	35.984199	-83.913239	Knoxville, TN	Tennessee	Bedded Sedimentary Rock	WP
17 - Leather and Leather Products								
1721603	OR	Rural	45.359719	-122.83344	Portland, OR	Pacific Northwest	Bedded Sedimentary Rock	AT, SI

[a] Based on land use (see Section 4).
[b] Meteorologic station assignment (see Section 4).
[c] USGS first level of classification for hydrologic units (Seaber et al., 1987; see Section 6).
[d] EPACMTP ground water setting (U.S. EPA, 1996).

Appendix 2B

Facility Location

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Appendix 2B. Facility Location

Because the accuracy of the facility location directly affects the accuracy of site-based data collected for a site, an effort was conducted to collect the best locations possible. In previous modeling applications, Industrial D facilities were located using the centroid of the zip codes contained in the 1985 *Screening Survey of Industrial Subtitle D Establishments* (Westat, 1987), which does not contain facility latitude/longitude. However, the 3MRA modeling system relies heavily on a site-based modeling approach, and accurate facility locations are critical.

To address the need for more accurate site locations, the locations of the 201 Industrial D facilities included in the representative national data set were improved through a variety of techniques, including the following:

- Matching facilities to EPA's Location Reference Tables (LRT) from the EnviroFacts database to obtain the Agency's best location,
- Zip-code centroids using GIS software, and
- Visual placement using interactive ArcView software based on land use, WMU features (e.g., large surface impoundments as waterbodies), and topographic maps (when available).

The remainder of this appendix describes the source for each improved location and the rationale for every site location adjustment. In essence, this effort helped to ensure that all Industrial D locations used in the representative national data set are a reasonable representation of current and future industrial nonhazardous waste management facilities.

2B.1 Data Sources

The locational improvement effort began with EPA's LRT database, which is accessible via EPA's Envirofacts Web site. The following information was extracted from that Web site. Additional information on LRT data can be found at http://www.epa.gov/enviro/html/lrt/lrt_over.html.

The LRT database serves as a repository for information collected as a result of EPA's 1991 Locational Data Policy (LDP). The primary objective of the LDP is to identify, collect, verify, store, and maintain an accurate, consistently documented set of locational data for entities of environmental concern. A secondary objective is to support the infrastructure needed to manage these data in a manner that yields integration across national, regional, tribal, and state systems. The intent is to support EPA's movement toward data integration based on location, thereby promoting the use of EPA's data resources for a wide array of cross-media analysis.

The LRT component of Envirofacts contains data extracted from the Section Seven Tracking System (SSTS), the National Compliance Database (NCDB), the Federal Facility Information System (FFIS), the PCB-Handler Activity Data System (PADS), and five program systems in Envirofacts:

- Aerometric Information Retrieval System (AIRS)/AIRS Facility Subsystem (AIRS/AFS),
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Information System (CERCLIS),
- Permit Compliance System (PCS),
- Resource Conservation Recovery Act Information System (RCRIS), and
- Toxics Release Inventory System (TRIS).

These data were geocoded and loaded into the LRT. Envirofacts records in the LRT are updated monthly as part of the Envirofacts refresh.

LRT includes Method Accuracy Description (MAD) codes that provide positional accuracy for each location and are assigned by method. These include derived, provided, and default values. Table 2B-1 shows the MAD codes and their level of accuracy.

Table 2B-1. Method Codes and Accuracy Values Assigned in LRT

Method code	Description	Accuracy (m)
I1	Manual interpolation—map	2.2 to 27.4 (varies)
I2	Manual interpolation—photo	2.2 to 27.4 (varies)
A1	Address matching—house number	150
A4	Address matching—nearest intersection	1,000
AO	Address matching—other	1,000
Z4	ZIP+4 code-Centroid	1,000
A6	Address matching—digitized (computer-mapping)	2,000
Z2	ZIP+2 code-Centroid (averaging multiple street segments; about size of census block group)	6,000
Z1	ZIP code-Centroid	11,000

2B.2 Review of Locational Accuracy

Additional information on the accuracy of the LRT locations was obtained during the 3MRA modeling system data collection pilot. Facility front gate locations were obtained using global positioning system (GPS) technology and compared to zip code centroid and the best LRT locations available for five Industrial D facilities. Significant conclusions drawn from these comparisons are the following:

- At Site A (urban setting), an I1 "facility centroid" location was available from LRT. In this case, the LRT location provided a more accurate location for the onsite WMUs (surface impoundments) than did the front gate GPS location.

- At Site B (rural setting), only a zip code centroid location was available from LRT. In this case, the inaccuracy of the zip code centroid would have resulted in a significant difference in population estimates within the area of interest. The zip-code-based area overlapped a nearby town, resulting in a population estimate for the NW quadrant more than an order of magnitude higher than the estimate that would result from the GPS front gate location.

- Site C (rural industrial setting) had three facilities nearby. LRT facility centroid locations for each of these were somewhat offset from the GPS front gate locations; in one case, the LRT facility centroid was in a swamp across a large river from the facility. In this case, the GPS locations provided better estimates of WMU locations than the best available LRT locations.

In summary, even the better I1 locations can be somewhat inaccurate, and zip code centroid locations can significantly over- or underestimate population around a site. Based on this experience, a site relocation effort was developed to find, for each facility modeled, reasonable locations that represent likely locations for industrial Subtitle D waste management units (WMUs).

2B.3 Automated LRT Matching through Envirofacts (2,850 Sites)

Figure 2B-1 illustrates the automated methodology used to obtain LRT locations for the entire database of 2,850 Industrial D facilities. This involved using largely automated methods to match facilities in the Industrial D Screening Survey to EPA facility IDs and to obtain the best LRT locations for each facility. The methodology included

- Matching Industrial D Dun and Bradstreet (DUNS) numbers to EPAIDs in Envirofacts databases with DUNS numbers (TRIS, FINDS, and AIRS/AFS),

- Developing DUNS-based "pseudo-EPAIDs" for Industrial D facilities and matching to PCS and other Envirofacts data tables, and

- Automated and manual matching of Industrial D facility zip code and address to Envirofacts LRT data.

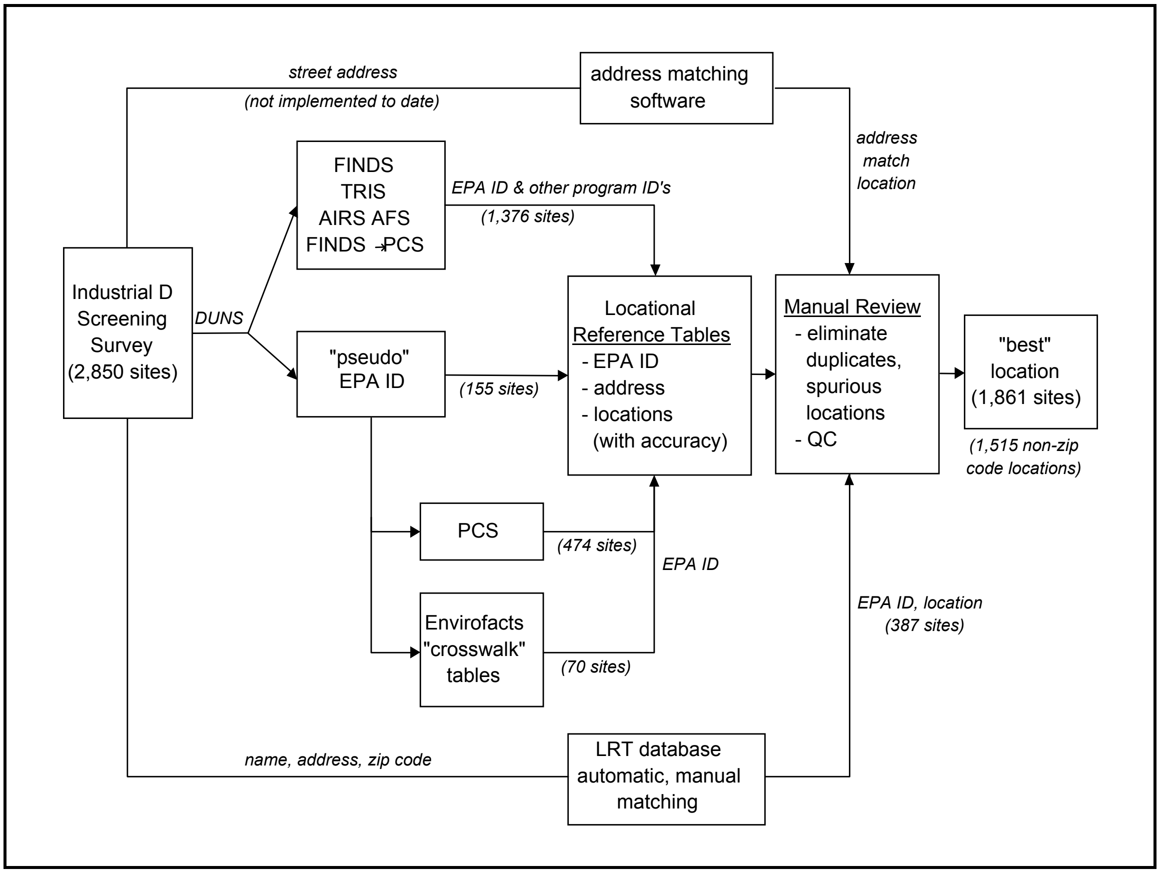

Figure 2B-1. Automated process for improving Industrial D site locations using Envirofacts locational data.

Table 2B-2 shows the results of this effort. Almost 1,900 of 2,850 Industrial D facilities were matched to EPA IDs, which enabled assignment of "better-than-zip-code" locations to over 1,500 facilities in the Industrial D database.

Table 2B-2. Number of Industrial D Sites Matched to LRT Locations

Method	Accuracy (m)	No. Sites
I1, I2	2.2–2.6 20.3–27.4 >150	53 483 3
A1	150	819
A4, AO, Z4	1,000	80
A6	2,000	75
Z2	6,000	33
Z1	11,000	339
Total		1,885

2B.4 Address Matching and Manual Techniques: 201 Sites

Once the 201 Industrial D sites were selected for the representative national data set, additional effort was made to get improved locations for those 201 sites. These efforts included

- Manual matching through the Envirofacts query form was done for sites in the 201 that were not already matched to Envirofacts locations. This resulted in an additional 45 sites matched to EPA IDs.

- Using a table of all available EPA IDs, for 181 of the 201 sites, to query the Envirofacts database to ensure that the best location was obtained for the sites from the LRT. This resulted in 12 new locations being added to the database as well as a few more accurate locations for sites already with LRT locations.

- Filling in remaining sites (without LRT locations) with zip code centroid latitude and longitudes using the ESRI ArcView Data Disk (data from a Geographic Data Technology, Inc., 1995 database).

Table 2B-3 shows the method and accuracies of the 201 site locations, including 66 locations based on 5-digit zip codes.

2B.5 Manual Location Review and Adjustment

During the initial watershed delineations of the sites, it became apparent that some locations would cause problems in the data collection process if they were not moved. Some locations put WMUs in rivers or other waterbodies. Other sites ended up in areas of inappropriate land use (e.g., large surface impoundments in residential land use areas).

To ensure that all sites were in reasonable locations with respect to land use, GIS coverages imported for data collection (including GIRAS land use, RF3 and NWI waterbodies, and zip code coverages), DeLorme topographic road atlases, and digital USGS topographic quadrangles (where available) were used to review all site locations and adjust inappropriate locations to better locations. In some cases, usually with large surface impoundments, the actual WMUs could be found using the various waterbody coverages provided by GIS or on the topographic maps. Attachment 2B-1 (at the end of this appendix) shows the sites moved from the initial locations described above to the final locations used for data gathering, including an explanation of why each site was moved.

2B.6 Quality Assurance/Quality Control

QA/QC activities for this effort included automated matching of zip codes and addresses between the Industrial D and LRT data to identify spurious facility locations and duplicate locations, which were then screened manually to eliminate duplicates and mismatched data. Manual checks of the matched sites (using facility name, address, and zip code comparisons) were conducted to verify the automated matching process. Whenever zip codes or addresses did not agree, manual verification was conducted. A manual review of all site locations using the GIS coverages was also done to identify sites that needed to be moved to more appropriate locations.

Table 2B-3. 201 Site Location Method and Accuracy

Method	Accuracy (m)	No. Sites
I1	2.2–2.6 20.3–27.4	8 43
A1	150	71
A4, AO, Z4	1,000	7
A6	2,000	6
Z2	6,000	2
Z1	11,000	31
Zip Code Centroid		33
Total		201

2B.7 Issues and Uncertainties

Uncertainties associated with the Industrial D facility locations include the following:

- For some sites, problems were encountered even with the most accurate locations from the Envirofacts LRT data. As shown in Attachment 2B-1, even a few facilities with accuracies of 150 meters or less had to be moved due to problems with the original location. One site with an LRT locational accuracy of 2 to 3 m (an I1 location) needed to be moved 10,047 m to remove the facility from a large bay that entirely covered the 2 km radius.

- While every attempt was made to move poorly located sites to the best locations possible, there was still no way to know exactly where the actual facility was located. Some facilities with only zip code centroid locations were moved to suitable land use (based on professional judgment) within a rather large zip code district.

However, these uncertainties should be considered in the context of the intended nationwide use of the 3MRA modeling system; although site-based data are the basis for the representative national data set, and the site-based data are determined by where each site is located, the representative national data set is not intended to support site-specific analysis. Within this context, the 201 facilities and their locations as presented herein were derived to adequately represent likely locations of Industrial D facilities across the nation.

Attachment 2B-1. Initial and Final Industrial D Facility Locations and Distances Moved[a]

Site ID	Initial Latitude	Initial Longitude	Collection Method[b]	Final Latitude	Final Longitude	Distance (m)	Comments/Notes
0114001	40.492134	-80.080149	A1	40.49308	-80.07914	135.72	WMU in river; moved due north to island center
0130207	41.399742	-91.06297	A1	41.399742	-91.06297	0.00	
0131104	42.655934	-89.062147	Z4	42.66416	-89.05569	1059.31	moved site to appropriate land use (LU)
0131207	43.079444	-79.008889	I1	43.079444	-79.00889	0.00	
0131508	36.519722	-82.540556	I1	36.52501	-82.53999	594.48	moved WMU to within LU (I1 location likely NPDES discharge point)
0136703	35.200897	-103.719283	A6	35.19942	-103.7158	357.65	moved large LAU to be between streams
0220102	32.834906	-79.948129	A1	32.834906	-79.94813	0.00	
0221207	40.292475	-84.162526	A1	40.292475	-84.16253	0.00	
0223504	40.850867	-81.763907	A1	40.850867	-81.76391	0.00	
0224002	43.864918	-91.22621	A1	43.86402	-91.22462	162.00	slight adjustment for waterbody
0231002	40.192049	-84.981029	A1	40.192049	-84.98103	0.00	
0231106	40.116667	-74.816667	I1	40.11836	-74.81713	193.67	moved site to center of tailings pile on topo. map
0231407	32.466028	-97.027776	A1	32.46527	-97.02675	127.86	moved LF SSE to within industrial LU (also based on topo. map)
0231610	41.733878	-87.540879	A1	41.73503	-87.54159	141.64	moved WMU behind buildings on topo. map
0231911	43.447145	-83.920814	A1	43.447145	-83.92081	0.00	
0231914	42.256748	-83.135334	A1	42.256748	-83.13533	0.00	
0232305	43.969506	-72.689212	Z1	43.969506	-72.68921	0.00	
0232313	32.436111	-95.366111	I1	32.43605	-95.36401	196.64	moved site to move large landfill out of town (residential land use)
0232402	39.970278	-75.815833	I1	39.970278	-75.81583	0.00	
0232415	41.457226	-81.688288	A1	41.457226	-81.68829	0.00	
0232501	41.26461	-80.482964	A4	41.26468	-80.4838	69.94	moved site out of residential neighborhood;
0232705	34.240689	-84.809157	A4	34.1769	-84.81757	7171.98	moved site to small industrial LU W of town
0233601	38.064696	-78.874709	A1	38.064696	-78.87471	0.00	
0233603	33.541515	-86.543034	A1	33.541515	-86.54303	0.00	
0234904	41.068123	-75.147684	Z1	41.02221	-75.19536	6498.84	moved site to likely LF location on topo. map
0235301	39.921	-85.366	Z1*	39.9335	-85.38004	1837.45	moved site to industrial LU NE of town
0312301	38.434	-78.994	Z1*	38.42827	-78.94495	4289.95	moved site to off Hwy 736 N of town (from Ind. D address)
0314202	42.711063	-73.671455	A1	42.711063	-73.67146	0.00	
0321802	45.615336	-122.710504	A1	45.615336	-122.7105	0.00	
0331006	34.563889	-90.652778	I1	34.563889	-90.65278	0.00	

(continued)

Attachment 2B-1. (continued)

Site ID	Initial Latitude	Initial Longitude	Collection Method[b]	Final Latitude	Final Longitude	Distance (m)	Comments/Notes
0331902	36.439167	-99.468611	I1	36.439167	-99.46861	0.00	
0332104	35.642778	-101.426944	I1	35.642778	-101.4269	0.00	
0332707	27.888056	-81.947778	I1	27.88554	-81.94815	280.16	moved site out of lake
0332811	40.592668	-83.105517	A1	40.59397	-83.10857	294.82	moved site out of residential area
0430108	40.398046	-95.717525	Z1	40.36094	-95.64231	7573.94	moved site to best road atlas location (Ind. D address)
0430412	41.766961	-81.16979	Z2	41.78825	-81.14677	3046.87	moved to better address-match location
0431912	38.334461	-94.756131	Z1	38.35827	-94.63423	10885.75	moved site to industrial LU in RF3 lake (this is the surface impoundment [SI])
0432011	34.703889	-87.118889	I1	34.703889	-87.11889	0.00	
0432106	40.7975	-75.107778	I1	40.79771	-75.11741	806.40	moved site to lake (SI) from RF3
0432716	47.263003	-93.680131	Z1	47.261	-93.674	516.49	moved site to utility LU; RF3 feature is SI
0433201	41.179782	-87.058589	Z1	41.21534	-87.0191	5161.87	moved site to centroid of SI lakes in RF3
0433204	33.330278	-79.357222	I1	33.330278	-79.35722	0.00	
0433404	42.014132	-105.017647	Z1	42.0824	-104.9495	9472.82	site moved to utility LU & RF3 lake (SI) of right size
0433408	45.87786	-106.61743	Z1	45.892	-106.632	1935.62	moved to suitable (industrial) LU
0434505	32.847146	-115.567363	A1	32.847146	-115.5674	0.00	
0434804	35.3775	-78.101944	I1	35.38401	-78.07439	2586.56	moved site to actual SI (NWI lake)
0435510	40.277643	-90.010646	Z1	40.27633	-90.08052	5892.10	moved site to road atlas location (Ind. D address)
0436007	35.540833	-78.989722	I1	35.5871	-79.04772	7347.30	moved site to actual SI (RF3 lake)
0436108	35.189167	-81.012222	I1	35.18328	-81.01201	659.05	moved to actual SI location (NWI lake)
0530901	41.372916	-82.542933	A1	41.372916	-82.54293	0.00	
0531301	39.85	-89.251	Z1*	39.84983	-89.27569	2093.84	moved site (Z1*) to only ind. LU w/in zip
0531502	39.040041	-82.62848	A1	39.03921	-82.62841	93.33	Site moved out of residential area
0531702	35.720214	-101.244738	Z1	35.66336	-101.4502	19502.38	moved to likely LF on topo. map; RF3 "lakes" surrounding new point (these are SIs)
0531902	29.711	-95.159	Z1*	29.72675	-95.13189	3150.39	moved to ind LU, SI locations from topo. map
0534504	33.843732	-84.233559	A1	33.84175	-84.23034	369.48	moved site to just within nearest industrial LU
0613402	38.586459	-90.176488	A1	38.586459	-90.17649	0.00	
0620401	29.758611	-95.176389	I1	29.758611	-95.17639	0.00	
0620604	40.736238	-111.96209	A1	40.7375	-111.9881	2186.42	huge SI, perfect area match with GIRAS/ RF3 lake; moved to lake centroid

(continued)

Attachment 2B-1. (continued)

Site ID	Initial Latitude	Initial Longitude	Collection Method[b]	Final Latitude	Final Longitude	Distance (m)	Comments/Notes
0621603	29.701746	-95.082965	A1	29.701746	-95.08297	0.00	
0621902	38.027	-98.087	Z1*	38.03371	-97.97337	9908.45	moved to nearest Ind LU
0622902	31.935764	-111.0029	A1	31.935764	-111.0029	0.00	
0625002	32.2	-81.166667	I1	32.2	-81.16667	0.00	
0625501	30.016308	-94.913917	Z1	29.99645	-94.96404	5309.60	moved 5 mi SW on hwy 90 (Ind. D address)
0631701	29.708333	-95.075	I1	29.71475	-95.07624	721.65	moved site off stream to likely LAU location (cropland LU)
0631903	30.235833	-93.264444	I1	30.23167	-93.27781	1365.25	moved site to likely RF3 feature (SI; delete feature from waterbodies)
0632003	32.437778	-94.688889	I1	32.437778	-94.68889	0.00	
0632606	35.422342	-100.838567	Z1	35.48185	-101.0562	20685.82	moved site to actual SI location (RF3&GIRAS)
0632608	45.570556	-122.743056	I1	45.56941	-122.7448	186.44	moved site away from river w/in Ind. LU
0634001	34.187	-84.82	Z1*	34.13254	-84.77666	7265.34	moved to likely RF3 lake (SI - don't include as waterbody)
0635301	36.036	-114.972	Z1*	36.04434	-114.9951	2267.53	moved to ind. LU within zip
0713618	43.223	-123.366	Z1*	43.21486	-123.3282	3191.00	moved site to nearest ind. LU within zip
0713705	32.720908	-111.917603	Z1	32.833	-111.734	21184.13	moved to approximate location of Peters Rd. (Ind D address)
0715007	40.124	-75.33	Z1*	40.14299	-75.30585	2947.51	moved site to likely land use (cemetery on topo. map)
0715216	33.888	-117.8	Z1*	33.89933	-117.8218	2364.58	moved site to nearest ind. LU
0716701	38.067291	-87.264515	A1	38.06725	-87.26451	4.61	moved WMU to be within ind. LU
0720506	44.67	-67.753	Z1*	44.65533	-67.71774	3233.55	moved site to approx. Ind D address NE of town (no suitable LU)
0720803	27.097	-82.436	Z1*	27.07543	-82.38693	5441.92	moved site to suitable LU
0721305	42.277826	-83.129062	A1	42.27879	-83.12807	135.00	moved site to industrial LU
0722107	26.824	-81.955	Z1*	26.87084	-82.00256	7015.78	moved site to industrial LU
0722503	39.807664	-105.006125	A1	39.807664	-105.0061	0.00	
0722505	26.022	-80.189	Z1*	25.99577	-80.18024	3012.60	moved site to industrial LU
0722705	42.146	-75.886	Z1*	42.10712	-75.89799	4458.57	moved to industrial LU
0723607	30.723	-98.653	Z1*	30.77008	-98.67221	5545.12	moved site to "gravel pit" N of town (topo. map)
0724206	35.790146	-80.610776	Z1	35.77042	-80.60004	2408.95	moved site to actual WMU location (NWI feature is SI; don't make a waterbody)
0724301	34.786143	-89.449686	A1	34.786143	-89.44969	0.00	
0724804	40.326449	-75.322167	AO	40.326449	-75.32217	0.00	
0724909	48.146	-103.603	Z1*	48.14514	-103.6507	3581.00	moved site to likely land use W of town

(continued)

Attachment 2B-1. (continued)

Site ID	Initial Latitude	Initial Longitude	Collection Method[b]	Final Latitude	Final Longitude	Distance (m)	Comments/Notes
0730407	38.969558	-80.228076	Z2	39.01759	-80.29334	7768.27	moved site to industrial LU outside of town
0730502	39.00298	-87.748337	A1	39.00298	-87.74834	0.00	
0730914	30.301356	-97.385637	Z1	30.32381	-97.29387	9157.41	moved to industrial LU ~5 mi. SW of town (Ind D address)
0731111	42.128812	-77.037595	Z1	42.15282	-77.0767	4185.44	moved site to industrial LU in town
0731405	40.055278	-76.574722	I1	40.05671	-76.57743	279.59	moved to industrial LU
0731411	37.091066	-120.245446	A1	37.091066	-120.2454	0.00	
0731412	42.5513	-71.531023	A1	42.5495	-71.51555	1278.84	moved site to “barren” LU near A1 location
0731501	40.443889	-74.244722	I1	40.43103	-74.23553	1634.79	moved site to industrial LU within zip
0731507	34.746389	-79.388333	I1	34.74411	-79.39153	386.37	site moved to actual SI location (RF3 lake)
0731514	42.399	-87.855	Z1*	42.38881	-87.81145	3740.34	site moved to road atlas location on Lake MI
0731703	40.177199	-75.541599	A4	40.17826	-75.5409	132.71	moved WMU out of river
0732110	41.347859	-75.747582	A1	41.347859	-75.74758	0.00	
0732405	37.625	-121.006	Z1*	37.65484	-121.0263	3787.02	site moved to likely LU
0732510	41.61767	-88.20255	A6	41.61892	-88.20404	186.44	site moved to nearby ind. LU
0733203	37.721859	-121.494389	A1	37.71502	-121.4905	839.03	moved to ind. LU near A1 location
0733210	40.6764	-80.8992	Z1	40.6764	-80.8992	0.00	
0733302	37.647	-84.775	Z1*	37.64289	-84.78751	1186.46	moved site to suitable LU in zip
0733404	41.426111	-78.526667	I1	41.42468	-78.53219	485.30	I1 is NPDES discharge pt; moved to likely LF site on topo. map
0733501	35.37606	-82.51622	Z1	35.37242	-82.48649	2708.85	moved to ind. LU within town from Ind. D address
0733606	40.108	-75.28	Z1*	40.10934	-75.23637	3689.65	moved site to between waste pile & old SI on topo. map
0734604	39.779	-74.931	Z1*	39.78529	-74.91227	1739.07	moved site to nearest ind. LU within zip
0735309	37.216505	-95.692613	A6	37.2165	-95.69048	187.51	slight move to best LU
0826707	36.150715	-80.278929	A1	36.150715	-80.27893	0.00	
0830601	33.267	-86.338	Z1*	33.32008	-86.36476	6422.69	moved site to ind. LU in town from Ind. D address
0830903	44.213889	-74.989167	I1	44.15678	-74.98347	6382.38	moved LF out of waterbody
0831102	44.555278	-69.624444	I1	44.55504	-69.62128	252.20	moved WMU from river (I1) to adjacent industrial LU
0831406	32.449444	-87.973333	I1	32.45003	-87.97949	579.49	site moved to SI (RF3 lake) location (don’t include these in WB network)
0831904	30.75545	-83.307766	Z1	30.69851	-83.30035	6367.95	site moved to SI feature on topo map and industrial LU

(continued)

Attachment 2B-1. (continued)

Site ID	Initial Latitude	Initial Longitude	Collection Method[b]	Final Latitude	Final Longitude	Distance (m)	Comments/Notes
0832304	44.493659	-88.036783	A1	44.495	-88.04	295.74	moved site to be within industrial LU
0832510	41.3925	-75.826111	I1	41.39016	-75.82027	550.95	moved site out of river into SI-looking feature on topo. map
0832903	30.709444	-91.32	I1	30.70787	-91.33987	1906.75	moved to RF3 lake (SI) locations (don't connect these)
0832904	33.992562	-83.77019	A1	33.992562	-83.77019	0.00	
0832909	39.518638	-84.40415	A1	39.518638	-84.40415	0.00	
0833001	35.535278	-82.841111	I1	35.549	-82.879	3735.88	I1 location is plant, not landfill; located landfill at one of the actual landfills using permit information
0833007	45.054396	-87.74886	A1	45.04	-87.725	2467.96	moved landfill to suitable LU and topo. map location
0834009	40.058116	-75.264293	Z1	40.06089	-75.26093	421.26	moved to SI location on topo. map; do not included squarish SIs to the NE
0923004	42.816435	-85.663736	A1	42.816435	-85.66374	0.00	
0930205	35.410833	-80.115556	I1	35.410833	-80.11556	0.00	
0930301	45.732222	-120.698056	I1	45.73123	-120.6975	117.56	moved WMU slightly to fit w/in ind. LU
0930702	30.553889	-97.051111	I1	30.548	-97.066	1568.46	moved site to industrial area near plant; note strip mine LU.
0932103	33.787222	-81.113889	I1	33.787222	-81.11389	0.00	
0932507	40.633611	-76.186944	I1	40.633611	-76.18694	0.00	
0932509	48.474695	-117.946123	A1	48.45497	-117.882	5262.34	moved site to nearest ind. LU in zip
0932903	28.645833	-96.561111	I1	28.663	-96.542	2666.46	moved WMU to area accommodating SI & LF (island likely location for SI, but square WMU won't fit; Sis & LFs in vicinity of new location)
0933704	36.75667	-82.035833	Z1	36.66662	-82.06086	10328.64	moved to ind. LU along Hwy. 11 (Ind D address)
1010805	46.061	-118.332	Z1*	46.04296	-118.3233	2111.80	moved LAU to agricultural LU to S, near commercial LU
1012203	40.941444	-72.495694	I1	40.942	-72.616	10047.53	I1 location in bay/estuary (entire AOI); used directory listing to locate
1013209	36.431	-119.092	Z1*	36.40229	-119.1323	4809.48	moved to approx. location on road atlas (Ind D address)
1014805	30.905339	-84.601838	A1	30.919	-84.616	2032.06	moved to likely LU (mining) using atlas & LU coverage
1015510	33.158	-99.731	Z1*	33.07983	-99.57937	16548.04	moved site to suitable land use "on lake Stamford" (Ind D address)
1023705	42.893111	-76.985194	I1	42.893111	-76.98519	0.00	
1031503	38.781171	-97.635899	A1	38.781171	-97.6359	0.00	

(continued)

Attachment 2B-1. (continued)

Site ID	Initial Latitude	Initial Longitude	Collection Method[b]	Final Latitude	Final Longitude	Distance (m)	Comments/Notes
1031507	36.947928	-120.072999	A1	36.94798	-120.072	88.33	moved site to RF3 lake (SI; delete this feature, large SI)
1032715	33.970556	-85.972222	I1	33.96811	-85.96986	348.80	moved site to NWI lakes (SIs; do not incorporate these into waterbody network)
1032802	35.769	-79.175	Z1*	35.69275	-79.16879	8554.84	moved site to actual SI location (LU& map, Ind D address); do not connect feature as waterbody
1033107	44.735499	-85.625005	A1	44.735499	-85.62501	0.00	
1033114	38.719722	-75.289444	I1	38.719722	-75.28944	0.00	
1033202	35.425999	-94.329485	A1	35.425999	-94.32949	0.00	
1033602	42.421948	-85.649703	A1	42.42	-85.643	589.81	moved large LAU to between streams
1034005	34.191708	-83.900498	A1	34.19171	-83.9055	457.53	moved LAU to agricultural area next to industrial area
1034210	42.443997	-77.196368	Z1	42.3996	-77.25326	6803.01	moved to atlas location of Ind D facility
1034406	33.333096	-91.109649	A6	33.36092	-91.11143	3111.08	moved WMU to small SI (RF3 lake near Miss. R; do not connect)
1034805	35.7646	-91.644757	A1	35.7646	-91.64476	0.00	
1035117	39.240922	-94.416439	A1	39.24038	-94.4163	61.89	moved WMU to just within industrial area to SE
1035405	43.617953	-116.611829	A6	43.61545	-116.6093	346.39	moved site (A6) to nearest ind. LU along RR
1035508	41.924522	-111.813356	A1	41.924522	-111.8134	0.00	
1120904	44.484	-73.22	Z1*	44.44519	-73.22743	4363.87	moved to correct street address using atlas
1122705	37.221	-82.285	Z1*	37.221	-82.285	0.00	
1131103	29.952305	-90.07619	A1	29.952305	-90.07619	0.00	
1131802	38.859145	-120.663889	A1	38.859145	-120.6639	0.00	
1133902	34.501	-82.027	Z1*	34.50069	-82.02097	550.46	moved to industrial LU
1134405	39.679462	-91.402836	A1	39.67715	-91.40255	260.23	moved LAU S to likely location based on address, LU
1212301	42.138844	-71.077019	A1	42.138844	-71.07702	0.00	
1221704	27.904372	-82.76268	A1	27.904372	-82.76268	0.00	
1223404	40.071935	-75.295648	AO	40.071935	-75.29565	0.00	
1230111	45.654698	-108.756506	Z1	45.65188	-108.7565	313.07	moved site out of river S of town
1230206	35.273275	-89.982701	A1	35.27079	-89.97744	550.02	moved WMU to industrial LU
1230517	39.505833	-76.889444	I1	39.505833	-76.88944	0.00	
1230919	42.65287	-73.74868	Z1	42.66174	-73.74344	1079.43	moved site to suitable LU within zip
1231101	35.087243	-90.080785	A1	35.087243	-90.08079	0.00	
1231705	32.959089	-79.882761	Z1	32.93092	-79.83102	5744.84	moved to suitable LU within zip

(continued)

Attachment 2B-1. (continued)

Site ID	Initial Latitude	Initial Longitude	Collection Method[b]	Final Latitude	Final Longitude	Distance (m)	Comments/Notes
1233101	33.764167	-118.283333	I1	33.764167	-118.2833	0.00	
1235205	34.796771	-96.78958	Z1	34.81205	-96.67695	10363.02	moved site N of airport on highway (Ind D address)
1236637	41.096887	-73.973995	Z1	41.09491	-73.95553	1554.58	moved site into correct zip code & suitable LU
1236652	41.556617	-72.755285	Z4	41.556	-72.756	90.95	moved site to within "barren" LU
1236732	37.793	-81.206	Z1*	37.793	-81.206	0.00	
1236810	33.931111	-118.066944	I1	33.931111	-118.0669	0.00	
1236820	41.785179	-76.359912	Z1	41.785	-76.36	21.31	moved site to ind/"barren" LU with SIs (RF3 lakes; do not connect as waterbodies)
1331103	34.006675	-85.97306	A1	34.0079	-85.97295	137.27	moved to within industrial LU
1333001	34.196944	-79.580833	I1	34.196944	-79.58083	0.00	
1333701	41.242234	-80.904287	Z1	41.24763	-80.80961	7896.26	moved to ind. LU in town (Ind D address)
1415407	33.51	-112.03	Z1*	33.49474	-112.0403	1950.03	site moved to industrial land use within zip
1421506	47.488603	-122.197347	A1	47.49002	-122.1976	157.46	moved site inside adjacent industrial LU
1430107	37.62436	-97.280161	A1	37.62436	-97.28016	0.00	
1430404	39.737695	-86.215746	A1	39.737695	-86.21575	0.00	
1430602	37.405945	-122.027249	A1	37.405945	-122.0272	0.00	
1431515	40.66357	-112.086499	A6	40.66357	-112.0865	0.00	
1434022	33.809808	-118.336446	A1	33.809808	-118.3364	0.00	
1434802	34.026	-81.005	Z1*	34.01779	-80.98919	1715.34	moved to industrial LU within zip
1435317	30.089252	-94.09914	A1	30.10278	-94.09169	1664.00	moved site to likely "waste pile" feature on topo. map
1522504	39.602886	-75.66059	A1	39.602886	-75.66059	0.00	
1530605	30.029167	-94.271111	I1	29.97179	-94.21806	8166.03	moved site to industrial LU using Ind D address
1530808	42.116201	-83.190811	A1	42.116201	-83.19081	0.00	
1532401	44.001412	-73.188314	Z1	43.9799	-73.09228	8042.02	moved to road atlas location (Ind D address)
1621808	33.30623	-84.567245	A1	33.30623	-84.56725	0.00	
1630106	34.954444	-83.379167	I1	34.954444	-83.37917	0.00	
1630401	35.984199	-83.913239	A1	35.984199	-83.91324	0.00	
1631701	35.547778	-77.076944	I1	35.573	-77.039	4426.85	moved site to best possible location out of river; DEMs won't work (flat site)
1632106	32.272848	-106.617001	Z1	32.27424	-106.7471	12191.53	moved to mixed LU in Ind D town

(continued)

Attachment 2B-1. (continued)

Site ID	Initial Latitude	Initial Longitude	Collection Method[b]	Final Latitude	Final Longitude	Distance (m)	Comments/Notes
1632703	34.498358	-81.616269	A1	34.50029	-81.61482	253.19	moved site to "commercial & services" LU
1633404	33.431667	-112.36	I1	33.431667	-112.36	0.00	
1633405	41.56	-73.408889	I1	41.55905	-73.40906	107.25	moved site slightly to within suitable LU
1635404	34.783889	-82.687222	I1	34.783889	-82.68722	0.00	
1721603	45.359719	-122.833438	A1	45.359719	-122.8334	0.00	

[a] Initial locations derived from Envirofacts LRT tables, address matching (using Industrial D address data), or zip code centroids (using Industrial D zip codes). Final locations determined using manual review and relocation, as necessary.

[b] Z1* indicates zip code location based on Industrial D zip code; all other initial locations from Envirofacts location reference tables: A1, A6 = address-match; I1 = manual map interpolation; Z1 = zip code centroid (5-digit); Z4 = zip code centroid (9-digit).