APPENDICES

APPENDIX 1: GPS FIELD GUIDANCE (ADAPTED FROM REGION 8 INTERNAL GUIDANCE.)

Purpose

To provide a standard approach for configuring global positioning system (GPS) equipment and collecting spatial data using UPS equipment during EPA field activities that are aligned with national and regional policies and standards.

Applicability and Scope

This standard operating procedure (SOP) outlines minimum data collection requirements and is specifically intended for personnel who conduct field data collection for EPA Regions using GPS equipment. These procedures rely on requirements outlined in EPA's *National Geospatial Data Policy (EPA 2008)* and *U.S. EPA Region 8 GIS Deliverable Guidance (EPA 2014).*

Summary of Method/Procedure

This SOP covers general GPS configuration settings and data collection standards for physical features represented spatially as points, lines, or polygons. To be complete, this SOP must be used in combination with the manual for the particular GPS unit for device-specific operation and configuration.

Personnel Qualifications & Responsibilities

Personnel who will be collecting data with the specified equipment should be trained in the use of the equipment, data collection, and data transfer. It is recommended that personnel practice with the equipment before use in the field. Additionally, personnel who conduct fieldwork should familiarize themselves with the standard health and safety practices associated with field operations.

Definitions and Acronyms

EPA	United States Environmental Protection Agency
FGDC	Federal Geographic Data Committee
GIS	Geographic Information System
GPS	Global Positioning System
HASP	Health and Safety Plan
PDOP	Position Dilution of Precision
SBAS	Satellite Based Augmentation System
SNR	Signal to Noise Ratio
SOP	Standard Operating Procedure
QAPP	Quality Assurance Project Plan

Equipment & Supplies

- GPS receiver
- Computer and/or external hard drive
- Appropriate cables
- GPS software for post-processing

Health and Safety Considerations

There are no health and safety issues specific to GPS unit operation; however, whenever GPS field work is conducted, operators are referred to and must be familiar with the applicable site-specific health and safety requirements, including the site's Health and Safety Plan (HASP).

GPS Receiver Requirements

GPS receivers must have the following capabilities in order to be used for official EPA data collection:

- Real-time SBAS integration (2 – 5 meter post-processed accuracy); and
- The ability to digitally download the collected data.

GPS Receiver Configuration

The following settings should be used whenever collecting GPS data. Refer to the user manual of the GPS receiver you are using to determine how to adjust the receiver's settings.

Required Settings

Coordinate System: Geographic also known as Latitude/Longitude

Units: Decimal Degrees (DDD.dddddd) [a minimum of 6 digits to the right of the decimal is recommended]

Datum: World Geodetic System 1984 (WGS84)

Altitude Reference: Mean Sea Level (MSL)

Altitude Units: Feet

Recommended Settings (dependent on the GPS receiver capabilities)

Position Dilution of Precision (PDOP): 6

Antenna Height: 1 meter

Logging Interval: 1 second

Minimum Signal to Noise Ratio (SNR) Mask: 39 dBHz

Minimum Elevation Mask: 15 degrees

Velocity Filter: off

NMEA Output: off

GPS Data Collection Recommendations

General Data Collection

Collect data at a location and as a geometry type (point, line, or polygon) that best represents the feature being mapped. Refer to the site-specific Quality Assurance Project Plan (QAPP) for information about the desired geometry feature appropriate for your data collection effort.

Avoid locations that may result in a poor satellite signal. Obstruction of the sky by buildings and/or tree canopy can degrade precision by interfering with signal reception.

If there is an obstruction at the pre-planned GPS measurement location, move to a location that provides an adequate satellite signal but yet is still representative of the feature being mapped.

Use the feature offset capabilities of the GPS unit if available and notate that the location is offset from the desire data point. Document the details of the offset location, such as distance and direction offset point, reason for offset, and so on.

Collect coordinates in decimal degrees with 6 digits to the right of the decimal.

Latitude measurements in the continental United States and Hawaii should always be positive values. Latitude measurements in the Pacific Territories should always be negative.

Longitude measurements in the continental United States and Hawaii should always be negative values. Longitude measurements in the Pacific Territories should always be negative.

In general, using a GPS to record geographic coordinates of a feature requires being able to see the feature. It is important to remember that the thing you are looking at may not really be what you think it is. For example, fence lines are not property lines. They may be coincident with a property line sometimes, or they may not be related to property lines at all. For property line mapping, it is best to start with a deed prepared by a surveyor and use the COGO tool in ArcMap. The result will be a polygon that is as precise as the survey in terms of property line lengths and angles between adjacent lines. The COGO tool can also generate precise curves from survey descriptions (many legal property boundaries include curved segments). Metes and bounds property descriptions begin at a starting point, then move around the boundary using distance and direction. However, there are two pieces of information that is often missing from a property description, that will affect your ability to put the precise polygon in the correct place: (1) the geographic coordinates of the start point and, (2) a bearing correction for direction measurements (which will affect the location of all the other property corners). Start points (or point of beginning) may or may not be a feature that a non-surveyor can locate with any accuracy. Some property corners (but usually not all) may be marked with a physical marker, such as an iron rod. Therefore, if mapping a property boundary, a professional surveyor should be hired to recover and mark at least 2 property corners from which geographic coordinates can be measured to properly align the COGO-generated property boundary within ArcMap. At least 2 property corners should be found, so that an appropriate bearing correction can be applied using the COGO tool. This is necessary because although some surveys are relative to true north; some are relative to magnetic north (at the time of the survey, and magnetic north drifts each year); and some are based on "plant north" which is just made up for convenience so that the roads line up with the edge of the map. The COGO tool in ArcMap allows a bearing correction be input to correct for these differences. Having coordinates for two of the property corners allows various bearing corrections to be applied until the polygon is correctly aligned.

Geometry Data Collection

Point features: If the desired GPS measurement is the location of a discrete feature, use point geometry type and collect the data by remaining stationary until 30 readings from the satellites have been received. Examples would include but are not limited to: sample locations, wells, tanks, intakes, buildings, seeps, containers, etc. If it is necessary to represent an area feature such as a facility as a point, then collect the data point as close to the center of the area feature as possible.

Line features: Whenever mapping linear features such as streams, fences, roads, and so on, use line geometry type. Follow the linear feature as closely as possible using continuous data stream capture. Pause/resume the signal logging if needing to deviate from a path due to obstructions. Alternatively, line features can be collected at line end and bend points, using the methodology for point features. This will minimize the collection of unnecessary data points in the middle of straight line segments.

Polygon features: Features such as landfill caps, tailings piles, ponds, waste in place, and the like should be captured as a polygon geometry type. Follow the outer perimeter of the polygon feature as closely as possible using continuous data stream capture. Mark on the ground your beginning point and make sure to return to that spot before closing the feature. Pause/resume the signal logging if needing to deviate from a path due to obstructions. Alternatively, polygon features can be collected at polygon vertices, using the methodology for point features. This will minimize the collection of unnecessary data points in the middle of straight line segments.

GPS File Names and File Management

At minimum, assign a unique identifier to each feature you collect.

Collect any other attribution in separate data fields to accurately describe the feature being mapped, such as name, feature category or classification, and comments.

Name your GPS file as descriptively as possible, such as <sitename_date>. Example: ChalkCreek_2014Mar10.ssf. Use a data dictionary whenever possible; refer to the project-specific QAPP for the site's data dictionary and/or file naming conventions.

Download and backup your raw GPS files at the end of each field day. At minimum, post the files to a field computer. Ideally, post the files onto a supported EPA system that is secure and regularly backed-up.

Immediately inspect the data to ensure that information was downloaded accurately. At the same time, review the data for any data entry errors. Correct or edit any locations, number and types of features, and feature attribution that were mistyped during data collection. Include a note in the comments that identifies what, when and by whom the corrections were made.

GPS Accessories

Refer to the appropriate user manuals for connecting and using GPS accessories such as laser ranger finders.

Troubleshooting

Refer to the owner's manual for troubleshooting a specific GPS device.

Calibration

None.

Maintenance

GPS maintenance involves firmware updates that are published by GPS manufacturers and are publicly available. Hardware updates include visual and physical checks and the replacement of equipment as needed. As a rule of thumb, conduct regular GPS maintenance checks annually to determine if updates are needed. Document all maintenance activities in the field equipment log for the specific GPS unit in use.

Data and Records Management

All data captured with a GPS device in the field should be managed in the appropriate regional or national database system for the data type being located. Sample locations should be managed in SCRIBE, STORET, or other appropriate standard EPA sample database. Refer to the site-/project-specific QAPP for which database to use. Point locations captured at regulated facilities should have the locational data submitted to the appropriate facility database. Complex geographic features (lines, polygons) should be managed in regional enterprise GIS databases. Please see your programmatic database manager or the regional GIS team for input or support regarding data management.

Spatial data products such as maps, tables, graphs, and charts may be developed to support site documentation and therefore the product becomes part of the record. Generally, these products are embedded in specific site documents or are attached as appendices.

Quality Control and Quality Assurance

Coordinates for sampling are considered required attributes of a sample event. All data collected in the field should be addressed under site-/project-specific QAPPs. All instructions for collection of spatial data should be detailed in the QAPP, including intended use, intended accuracy, FGDC-required metadata, and data management.

All data received by GIS staff from field personnel are reviewed under Regional GIS guidelines (US. EPA Region 8 GIS Deliverable Guidance, 2014). Data received are reviewed for the correct projection, units and datum. Data are checked for positional error using differential correction and review of field notes. Attribute information is reviewed for misspellings, inaccuracies, and operator error. All data processing performed by a staff member must be reviewed by another qualified staff member to assure quality control.

APPENDIX 2: GEOCODING PROPERTY BOUNDARIES FROM STATE AND LOCAL PARCEL DATA

Sources of Data

There are several sources of cadastral data obtainable at different levels. Certain states have state-wide parcel data available as a single download. In areas where state wide parcel data is not available, electronic cadastral data can be obtained from the counties or municipalities themselves. The data may not be immediately available for download, but can instead be seen in a viewer. In such cases, the municipality can often provide the applicable .gdb/.shp after directly contacting the town.

In rural areas, electronic parcel data is often not available. In such cases, municipal assessors may have scanned paper plat maps on their websites that can be georeferenced. In the case that no electronic or scanned paper cadastral information is available, site figures from technical reports can be georeferenced and used to provide an image of the approximate property boundaries of the facility.

In Region 1, electronic cadastral data availability at the state level is as follows:

R1 State	Cadastral Data Available Electronically?	Comment
Connecticut	Yes	This is a mostly complete data set, although several towns were missing data. This was alleviated by contacting the local assessors/town engineers who provided the information to fill the data gaps.
Maine	Yes	Data mostly limited to more urban areas, many rural Maine sites not included.
Massachusetts	Yes	Boston included in its own separate data set, otherwise, a complete state-wide collection.
New Hampshire	Yes	A complete state wide data set.
Rhode Island	None available	RI has no plans to offer statewide parcel data. Most boundaries drawn in this state were georeferenced from site figures or provided at the municipal level.
Vermont	Yes	Limited data coverage; Vermont is actively working on gathering more parcel data.

Parcel data provided at the municipal and state level seems to generally be of good quality, meeting the accuracy requirements for Tier 2 or Tier 3 data. Data from heavily urbanized areas is often highly accurate (Tier 2 accuracy within 1-5 m), whereas data from more rural areas or where the electronic mapping program is not as robust often is of lower quality. In these instances, it is particularly important to QA/QC the data provided. It is often helpful to look how well the edges of the polygon line up with recognizable features on the basemap, such as road edges and fences. If the polygon shape does not generally make sense with what's on the basemap, it may be prudent to touch it up yourself, or take further action to ensure that the shape is correct.

Data Processing

Once cadastral data is brought into ArcMap using the "add data" tool, it should be re-projected into WGS_1984, the de-facto projection for the CAB mapping efforts. This can be done via the "Project" tool in ArcToolbox. To access this tool, open ArcToolbox and enter the "Data Management Tools" section. The "Project" function can then be found under the "Projections and Transformations" tab.

After the parcel data feature class has been re-projected into WGS_1984, the polygon geometry can be moved to the Facility Boundaries layer that the user has created. The address of the facility to be mapped should be zoomed to through ESRI's World Geocode Service (look for the "Find" ability in ArcMap). In an edit session in the Facility Boundaries layer, while keeping the cadastral data layer open, the polygon of interest should be copied and pasted from the parcel layer. Upon creation of a new Facility Boundaries object, the Handler_ID field from the approved schema must be filled with the EPA ID number corresponding to the facility whose boundaries have just been mapped. By filling out this attribute alone, the rest of the schema can be populated at a later date for each individual facility via data table joins with information from FRS, avoiding significant user effort.

In instances where site figures or paper plat maps are being used to delineate boundaries, the image should be added to ArcMap using the "add data" ability. The image can then be fitted to the basemap with the Georeferencing toolbar by creating links between recognizable points common to both the figure and the basemap, such as building corners. The property boundary can then be traced as a new polygon within the Facility Boundaries layer using the "create features" window.

Quality control for the electronic parcel boundaries can and should be done in a number of ways. On more active sites in which EPA remains heavily involved, the individual project managers can be approached for site figures and to confirm the accuracy of the drawn boundaries. Provided parcel data should be compared to site figures if available- many regions have document management systems where site plans can be downloaded (such as RDMS, the preferred system in Region 1). Historical imagery available in Google Earth can be used to supplement investigations- for example, sites currently on vacant lots can be viewed 20+ years ago, allowing the individual to confirm previous industrial activities on that site that match the known history. Close coordination with the states in instances where the boundary mapper is unsure of the exact bounds of the facility is essential. State project managers have so far been very cooperative in providing figures.

An individual boundary object can be created in approximately 10 to 15 minutes if parcel data is available and supporting documentation exists to vouch for the accuracy of the geometry. Boundaries that must be georeferenced often take longer (approximately 20 to 30 minutes), as site images must be added to the map and then affixed correctly before being traced. Familiarity with the process significantly reduces time and effort involved. Region 1 has experienced an approximate halving of time involved in individual boundary creation between the beginning and end of its mapping efforts, attributable to comfort with the tools and development of a standard process.

Examples

<u>GTE Parsonfield, MED000840991</u>

Figure 1. Former GTE Parsonfield site with property boundary.

Region I had no site figures available in paper or online- and the only address in the information system was “Route 25” in Parsonfield, Maine. EPA reached out to the state in the hopes that they might have more updated information, but the Maine Department of Environmental Protection had no record of a closer address as well. Direct contact with the Town yielded an address that we were able to find on a plat map, after which the boundary could be drawn.

<u>Hadco/Sanmina SCI, NHD046312559</u>

Figure 2. Former Hadco/Sanmina site with property boundary.

Region 1 records provided an incorrect address for the former Hadco property in Derry, New Hampshire. An old building plan (without site boundaries clearly delineated) was available for the site, but it was also discovered that the building had since been demolished and that the site was now a vacant lot. To determine which parcel contained the former facility, Region 1 used historical imagery from Google Earth to find a building matching the shape of the plan. Once the location of the former facility was discovered, we knew which parcel to mark as the boundary. EPA later confirmed the accuracy of this boundary with records held at the State of New Hampshire Department of Environmental Services.

Figure 3. Hadco/Sanmina site during active operation.

Figure 4. Hadco/Sanmina site today.

<u>King Manufacturing, NHD001090729</u>

Figure 5. King Manufacturing site with property boundary

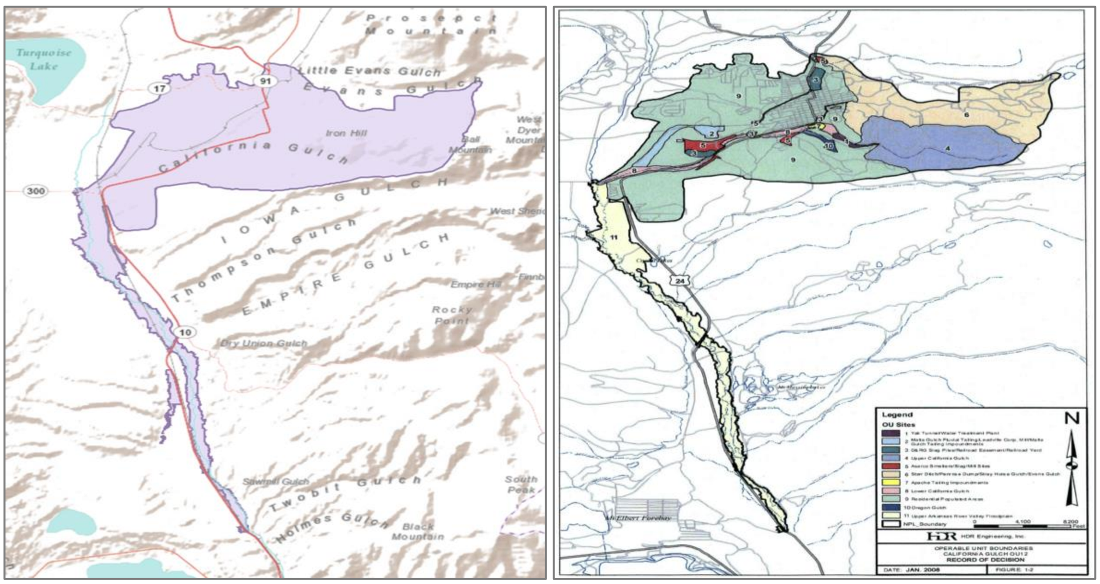
EPA records for the King Manufacturing site were outdated, as the road on which the facility was located had undergone a name change. Remedial work had been completed prior to the road renaming, and as such, no records existed with updated location information. After finding a facility that appeared to match records based on comparing features on the basemap to site descriptions, Region 1 utilized the Google Earth Street View tool. In street view, it was possible to see a sign reading “King Manufacturing” on the front of the former building, confirming the mapper’s suspicions about the identity of the parcel and its former operations. Data was QA/QC’ed with state records at a later date, indicating that Region 1’s boundary object had been created correctly.

Figure 6. The “King Manufacturing” sign in street view mode.

APPENDIX 3: EXAMPLE SITES AND BEST PRACTICE RECOMMENDATIONS

California Gulch – Leadville CO

The California Gulch site consists of about 18 square miles in Lake County, Colorado. The area includes the city of Leadville, parts of the Leadville Historic Mining District and a section of the Arkansas River from the confluence of California Gulch downstream to the confluence of Two-Bit Gulch. Former mining operations contributed to metals contamination in surface water, groundwater, soil and sediment. Cleanup is complete at several areas of the site. Operation and maintenance activities at these areas are ongoing. Cleanup of the remaining areas is ongoing.



Left: Cal Gulch Site Boundary; Right: Additional detail from the ROD

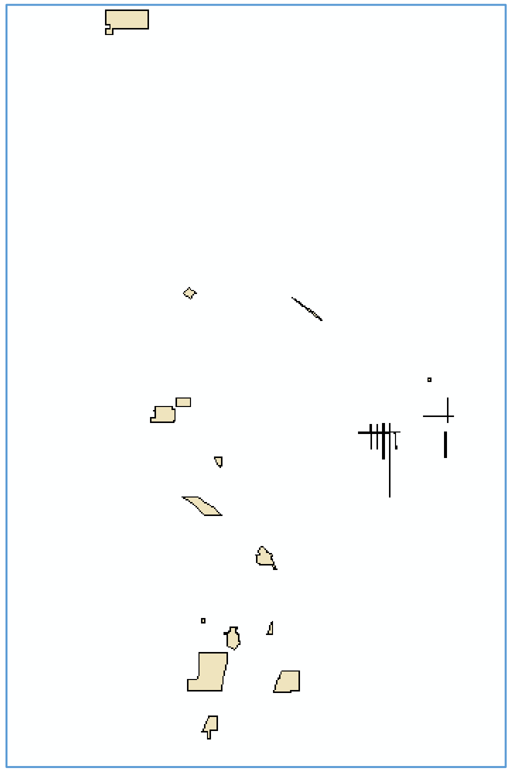
This site was used by Region 8 in their draft geospatial guidance as an example how Site Boundaries are often drawn without regard for property and cadastral boundaries, thereby allowing the boundary to cross more individually-owned properties than absolutely necessary.

On a site of this size, identifying all property boundaries along the edge of large, imperfectly defined contamination areas throughout the site area would be a challenge. Since the most populated area is Leadville, it may be appropriate to take most care to align the Site Boundary to property lines in this area—the northern border—where numerous small properties may be located.

This site also illustrates the need to provide interior detail to improve public understanding. The Site Boundary follows a mix of cadastral boundaries, soil contamination boundaries, sediment boundaries and groundwater boundaries. It contains populated as well as unpopulated areas. The additional detailed provided in the ROD (right diagram) might be the appropriate level to export to SEMS.

Denver Radium

The Denver Radium site is located in Denver, Colorado, along the South Platte River Valley. The site consists of over 65 properties contaminated by radioactive residues derived from the processing of radium in the early 1900s. Following cleanup, operation and maintenance activities are ongoing.



***Denver Radium Site:** Discontiguous polygons*

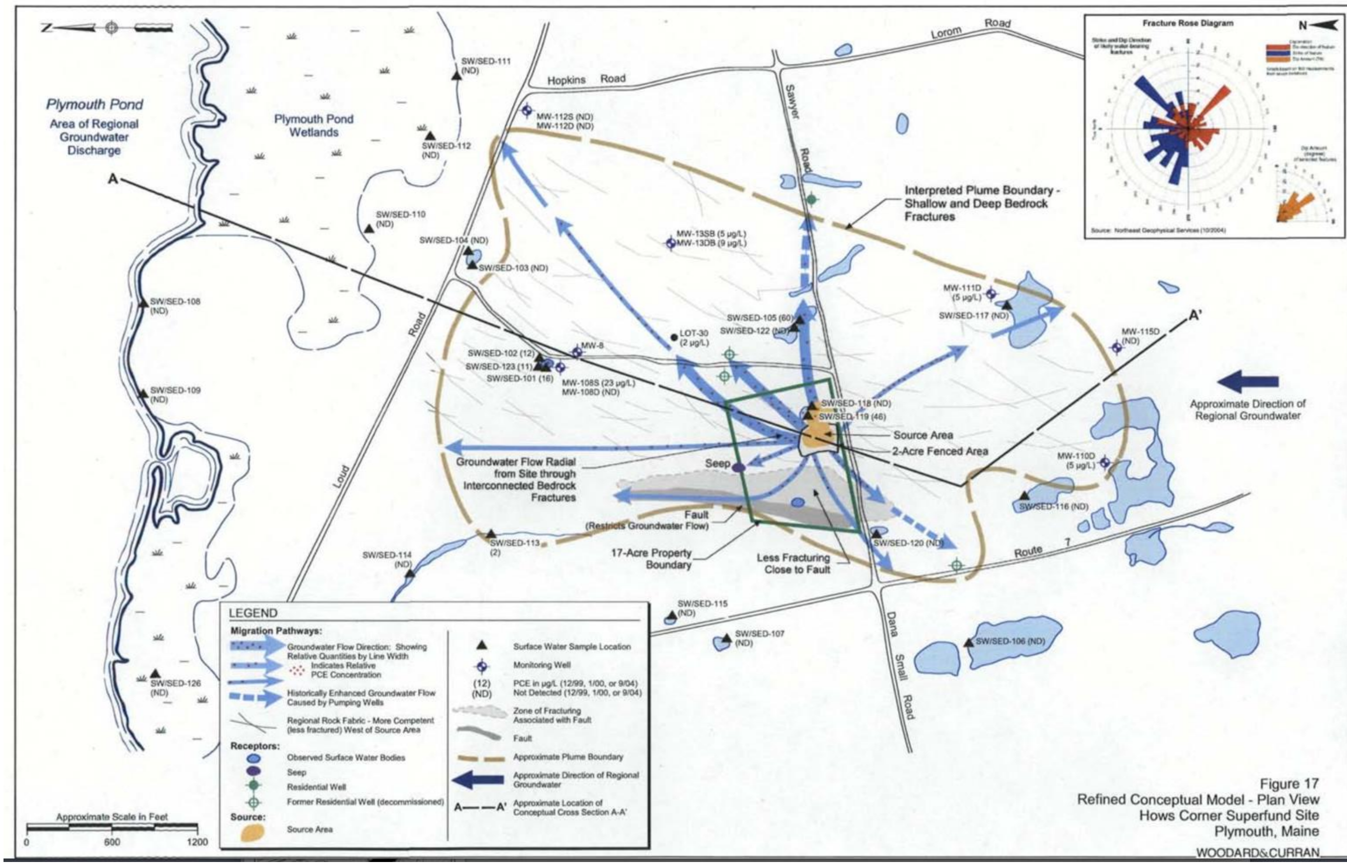
This site is a clear example of a single Superfund Site composed of multiple discontiguous polygons. Since these are all part of the same site, they must be mapped as a multipart polygon in ArcGIS and defined as a single Site Boundary, Site Feature Number 00. If each site is also its own OU, each polygon would appear separately as an OU feature.

Hows Corner

The West Site/Hows Corners site is located in Plymouth, Maine. The site includes a 17-acre parcel of land owned by George West, as well as surrounding properties with groundwater contamination. Mr. West used a 2-acre area of the site to operate a waste oil facility from 1965 to 1980 in affiliation with the Portland/Bangor Waste Oil Company. Groundwater at the site is contaminated with perchloroethylene (PCE) and other contaminants. The small, fenced-off, 2-acre parcel is considered the source area. Following construction of the site's remedy, long-term operation and maintenance activities and monitoring are ongoing.

Hows Corner: Site Boundary defined entirely by extent of groundwater contamination

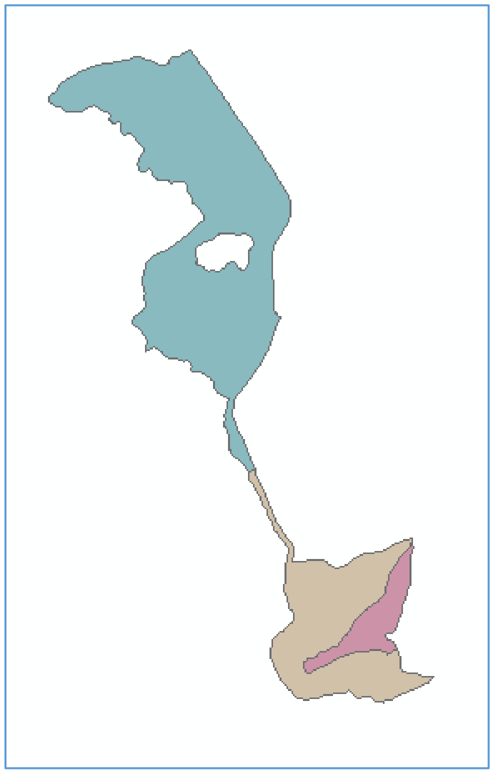
At Hows Corner, the Site Boundary is entirely defined by conditions that are invisible to the observer, an exception to the otherwise-desirable practice of using property or cadastral boundaries where possible. In this case, public understanding of the Site Boundary would be improved if the 2-acre source of contamination (see illustration below) could be added as an additional feature, using the Other Feature Boundary category for SITE_FEATURE_TYPE.



Hows Corner: Tan area at center of site is the source area of contamination

Eagle Mine

The Eagle Mine Superfund Site is located in Eagle County, Colorado, approximately one mile southeast of Minturn. The area was impacted by past mining activity along the Eagle River between the towns of Red Cliff and Minturn. Miners began working the Eagle Mine in the 1880s, searching for gold and silver. The Eagle Mine later became a large zinc mining operation, leaving high levels of arsenic, cadmium, copper, lead and zinc in the soil and in surface and groundwater. Copper-silver production continued at Eagle Mine until the mine workings were allowed to flood and the mine closed in 1984.



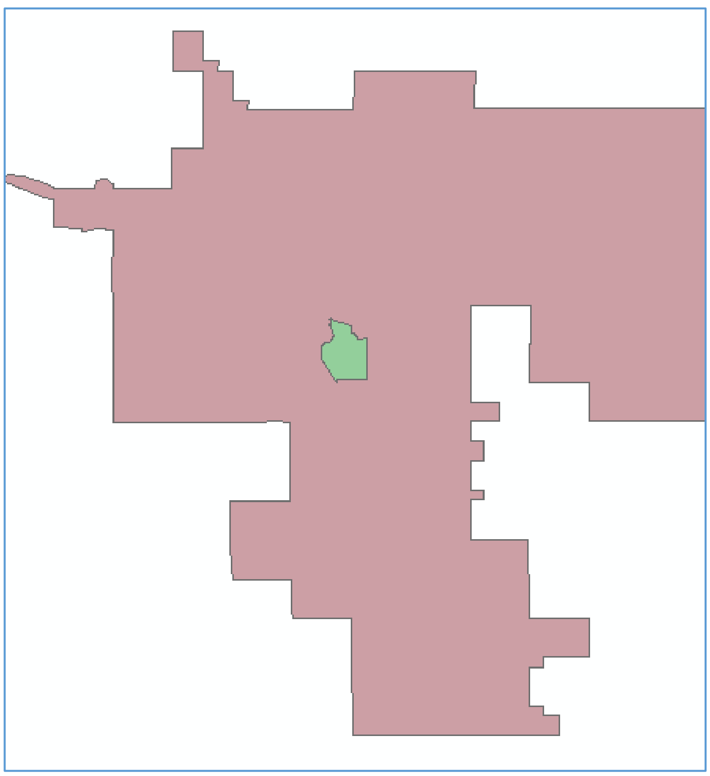
Eagle Mine Operable Units *– Example of contiguous polygons with void area that is not part of an OU*

Although all the OU polygons that make up the overall Site Boundary are contiguous, there is a void in the northern OU that can be included in the Site Boundary as a multipart polygon.

Libby Asbestos

The Libby Asbestos site is located in Libby in Lincoln County, Montana. In the early 1920s, the Zonolite Company began vermiculite ore mining operations in Libby. Vermiculite from the Libby mine, bought by W.R. Grace in 1963, was contaminated with a toxic and highly friable form of asbestos called tremolite-actinolite series asbestos, often called Libby amphibole asbestos (LA). LA has been observed in air (indoor and outdoor ambient), vermiculite insulation and bulk materials, indoor dust, soil, water, animal and fish tissue and various other media in Libby. Investigation and cleanup of the site is ongoing and cleanup at portions of the site is complete.

The Libby Groundwater Contamination site is located in Libby in Lincoln County, Montana. A lumber and plywood mill operated at the site between 1946 and 1969. Mill operations included treating wood with creosote, pentachlorophenol (commonly referred to as PCP) and other chemicals. Spills and disposal practices at the site contaminated soil, groundwater, surface water and sediment with hazardous chemicals. In 1979, EPA discovered PCP contamination in well water at a nearby residence. Following cleanup, operation and maintenance activities and groundwater monitoring are ongoing.



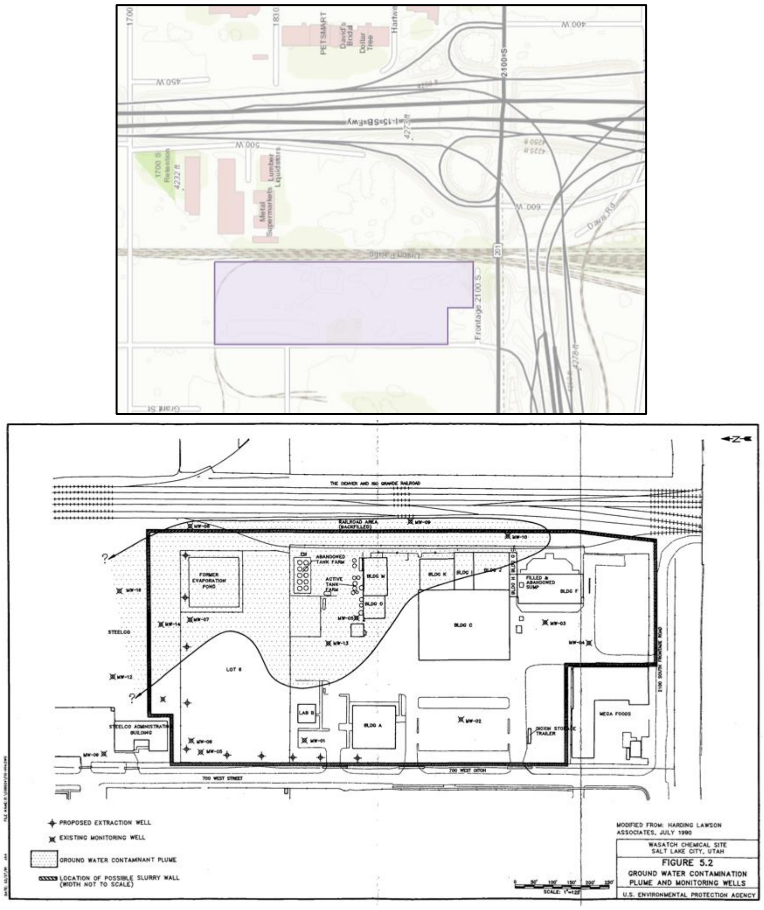
***Libby Asbestos (Mauve) and Libby Groundwater (Green) NPL boundaries** – example of nested polygons. Two discrete sites. Ground water site is inside the larger Asbestos site*

These two sites are unrelated for cleanup purposes, but co-located. The Libby Asbestos Site Boundary would be a multipart polygon. The groundwater site would be a simple polygon. They would show on a visualization as they do above, nested.

The data schema does not offer a way to relate the two sites, except in the description narrative. Whether that is desirable or not is up to the region. In existing EPA documentation, the two site records do not mention each other. The relationship would be noticed purely visually in a display such as GeoPlatform or CIMC.

Wasatch Chem Co

The 18-acre Wasatch Chemical Co. (Lot 6) site is located in Salt Lake City, Utah. From 1957 to 1971, Wasatch Chemical Company used the area to warehouse, produce and package industrial chemical products. Between the 1970s and 1992, site operations included blending and packaging pesticides, herbicides, fertilizers, industrial chemicals and cleaners. The company also discharged wastewater into on-site tanks, evaporation ponds and onto the ground. These activities contaminated soil, sludge and groundwater with hazardous chemicals. Following cleanup, operation and maintenance activities are ongoing.



Wasatch Chemical: Example of a smaller site in an urban area

Wasatch Chemical is an example of a straightforward urban-area site in which the Site Boundary clearly matches the property boundary. Even though the extent of contamination extends beyond the Site Boundary (see lower illustration), the current Site Boundary seems appropriate for public use. Except for the representation of the contamination plume, the detail provided in the lower illustration does not materially add to the public's understanding. The region might opt to include a second polygon showing the plume.

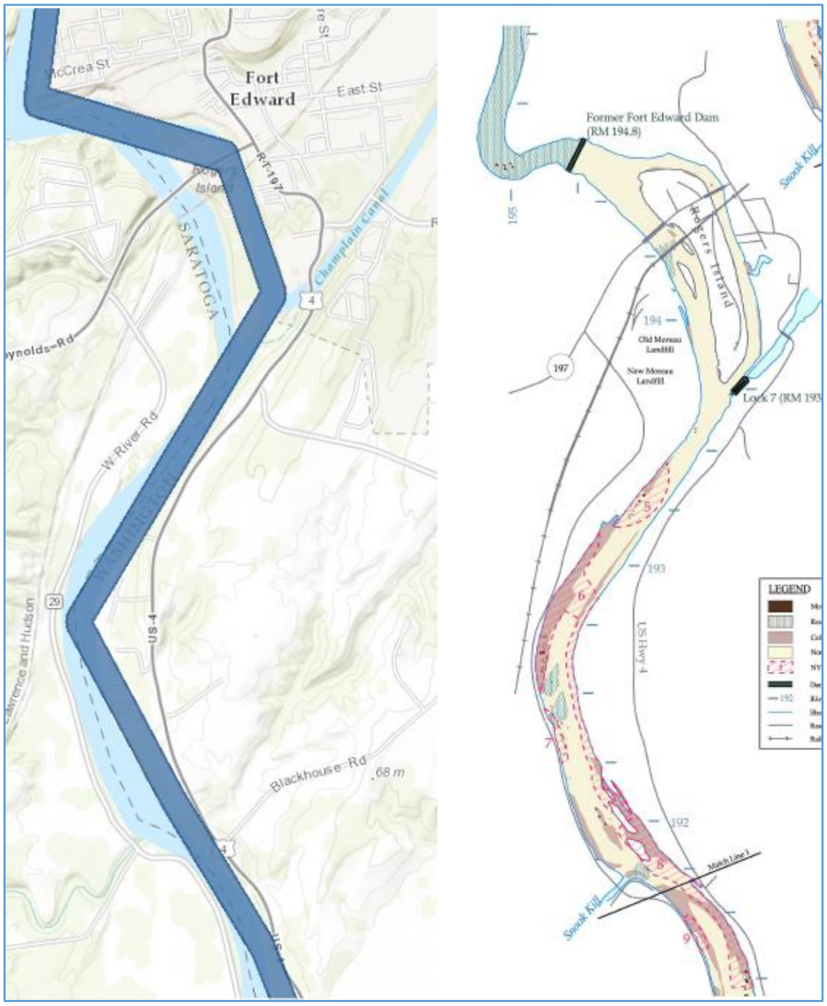
Hudson River PCBs

In 1977, PCBs were banned in the United States. In 1983, the United States Environmental Protection Agency (EPA) declared a 200-mile (322-km) stretch of the river, from Hudson Falls to New

York City, to be a Superfund site requiring cleanup. This superfund site is considered to be one of the largest in the nation. In 2001, after a ten-year study of PCB contamination in the Hudson River, the EPA proposed a plan to clean up the river by dredging more than 100,000 pounds of PCBs. The worst PCB hotspots are targeted for remediation by removing and disposing of more than 2.6 million cubic yards of contaminated sediment.

The lower section of Hudson River PCBs

The Hudson River PCB site is the largest in Region 2. The Site Boundary shown above is, on close inspection (enlarged), not detailed or very accurate. On the other hand, the ROD contains abundant local detail—perhaps too much detail to be reasonably incorporated into the SEMS geospatial record. The illustrations below compare the Site Boundary to the rich detail of the ROD analyses.



Hudson River PCBs: Site Boundary detail on left, ROD contamination analysis on right

One approach to creating a useful public export of this information might be to replicate the ROD detail for selected sections of the river as illustrations of the site's overall structure. Given the scale of the site (over 200 miles long), it does not seem worth the effort to refine the overall Site Boundary, but it might be useful to provide representative detail and provide a link to the complete documentation of the ROD.

APPENDIX 4: THE USE OF "PARTS" AS AN OPTIONAL RCRA CA GEOMETRY

Region 7's RCRA Corrective Action program has developed the idea of a "Part" ID to provide flexibility in mapping and describing sub-facility boundaries that do not correspond with SWMU or AOC areas, or to other units stored in the RCRA national database (RCRAInfo) as an Area Name. Part IDs refer to boundaries provided in the legal description of a control document. They may refer to ownership parcels or to a parcel surveyed out to document the affected area where either institutional or engineering controls are necessary. When the Parts are merged together, they may or may not make up the entire facility boundary.

Because control documents may refer to these boundaries in non-standardized terms such as parcels, areas, properties or other descriptive names, the field name "Part" was chosen as a generic label to provide flexibility in using this field for the many differing types of descriptive terms that may be encountered in the various types of control documents.

During data collection, Part boundaries will need to be digitized to identify the associated control boundaries, especially if these boundaries are described in separate legal descriptions within the same control document. The usual practice of dissolving these boundaries into one general facility boundary results in a significant loss of data—data whose collection required a substantial amount of effort. The geospatial data schema therefore provides Part as an optional Area Name type so that this level of detail can be retained for future use.

Within Region 7, the concept of the Part has proven to be useful during the long-term stewardship (LTS) of controls. LTS management and communication is aided by having a readily available graphical depiction of Part boundaries for the following reasons:

- Often these Parts are based on ownership boundaries. If ownership has changed or a property has been transferred to multiple owners based on Part boundaries during the life of the control mechanism, the evaluation of the long-term effectiveness of the controls becomes more clear when reviewing property legal document records, determining ownership changes for each Part, reviewing current zoning designations for each Part, or reviewing other property records.
- Part boundaries aid in communication with owners of multiples properties under one control mechanism, such as when discussing land use and reporting requirements.
- During project management communication, understanding control mechanisms and their applicability is difficult for those that do not have direct knowledge of geographic and legal descriptions. By having these boundaries mapped and clearly depicted, project communication becomes more efficient and effective.

Case Study – Blackhawk Foundry, Davenport, Iowa

As part of the final remedy decision for the Blackhawk Foundry facility, the state placed activity use limitations (AULs) on the facility property through the use of an environmental covenant attached to the property deed in 2011. Through this institutional control, land use restrictions and reporting requirements run with the deed of the property, thus directing both current and future land owners to comply with these restrictions. Because these restrictions are land-based, the covenant includes a legal description of the property (see Figure 1) to which the AULs apply.

This covenant provided six separate legal descriptions, denoted by Parcel IDs 1, 2, 3, 4, 5 and 6. Within one of the parcel descriptions, an additional portion of the property (alley slice) was described as being included in the area restricted by the AULs, but was not given a Parcel ID. These Parts do not correspond with facility SWMUs, AOCs or Area Names recorded in RCRAInfo, but are actually based on local ownership records, as many institutional control legal descriptions are. Together, these Parts make up the whole facility boundary (see Figure 2).

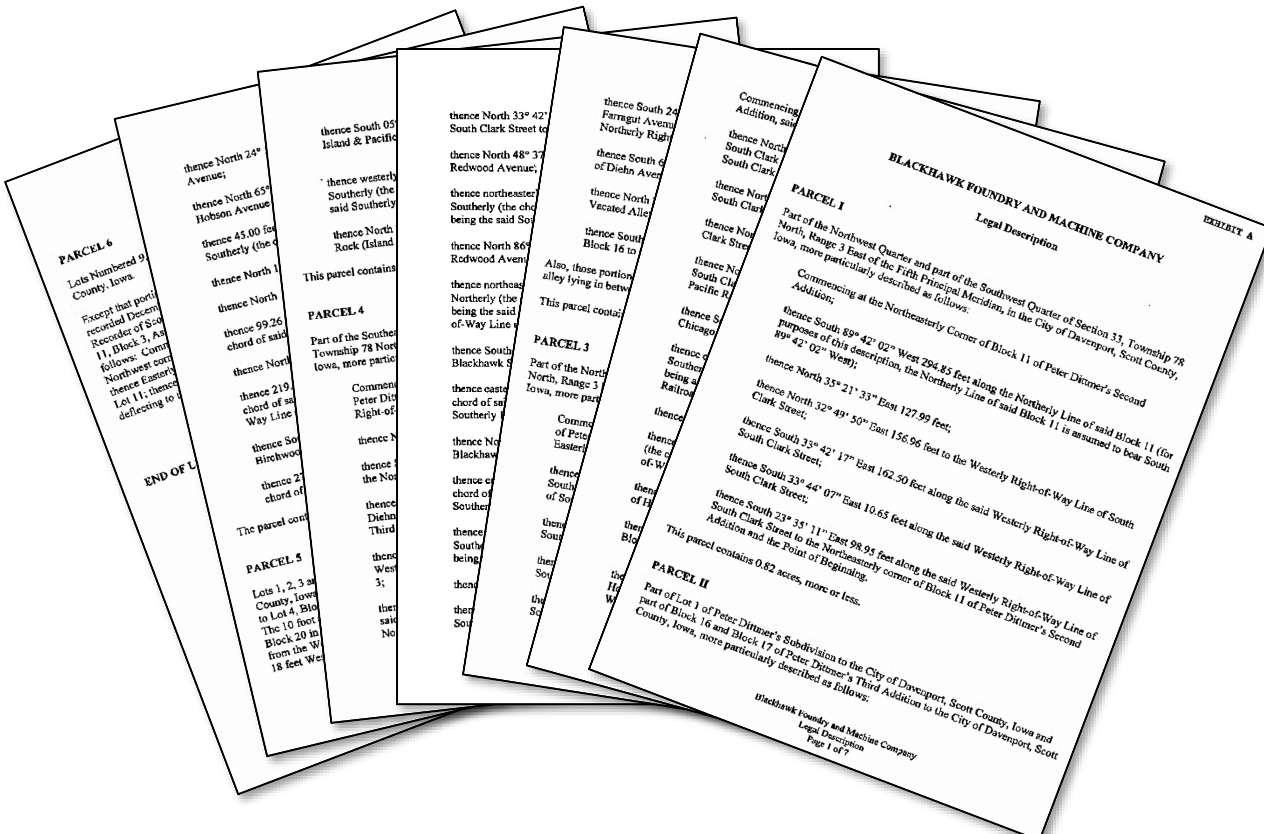


Figure 1: Seven-page legal description in same environmental covenant for the facility.

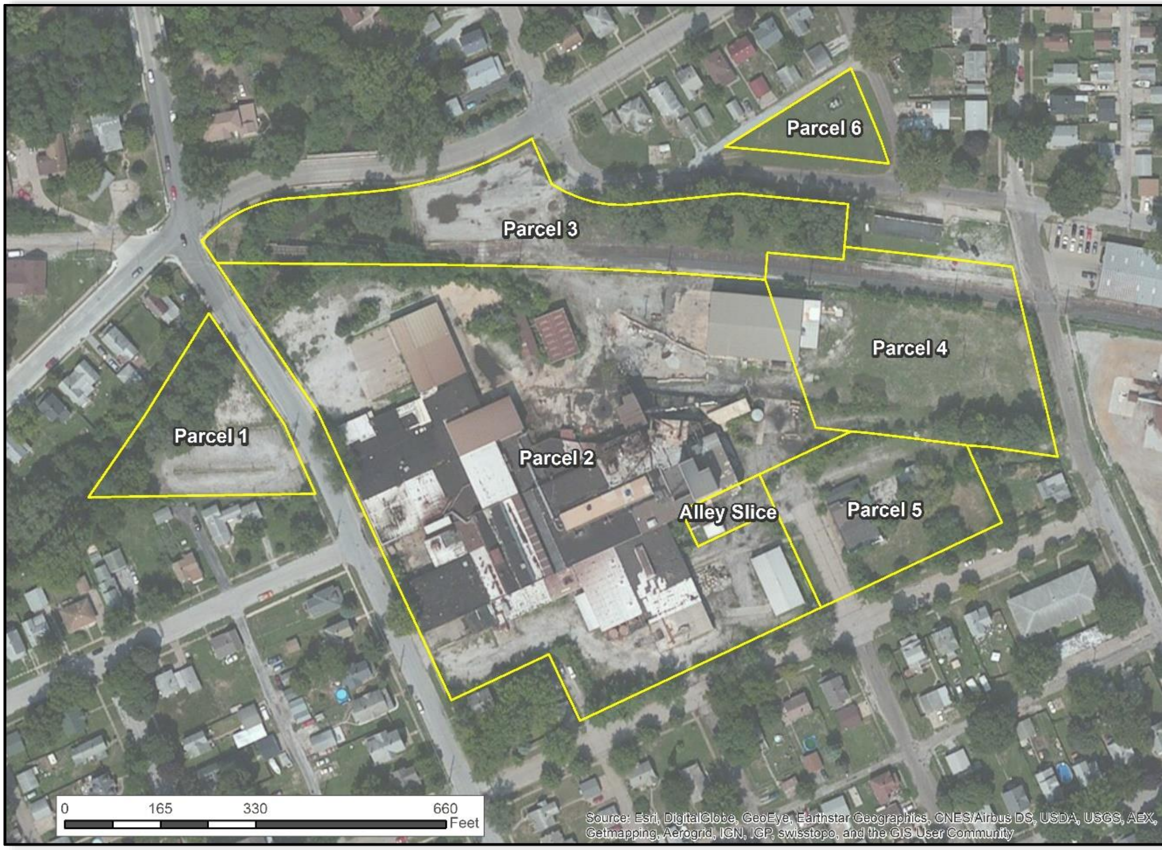


Figure 2: Part boundaries as legally described in the environmental covenant.

Thereafter, the facility property was transferred to multiple owners via the tax lien foreclosure process, with which the same parcel boundaries applied. EPA was not notified of the ownership transfer at the time due to the way the process was handled, but was made aware of the situation when the new owner of two of the Part boundaries notified EPA afterward. EPA subsequently took the initiative to contact all the other new property owners to remind them of the 5-year reporting AUL, which required them to provide a statement to the EPA documenting that they were either in or out of compliance with the control mechanism (which also included engineered capped area) and that the control remained effective.

How the availability of Parts supports LTS

During this process, the geographical depiction of this detailed boundary information was crucial in searching local property records and owner information when making initial contact, as well as when discussing the requirements of the covenant and applicability to each new owner.

This became particularly important when it was discovered that <u>one of the Parts described in the covenant had actually been re-zoned to residential use during property transfer during the foreclosure process.</u> Since an AUL listed in the covenant requires that land use of the Property remain non-residential only, it was determined that action was necessary to come into compliance with the covenant. Communication with the new property owner and local officials to act on re-zoning this Part back to a non-residential use was clearer and more efficient with the use of these maps.

The detailed boundary information continues to be useful during ongoing LTS efforts by the Agency to ensure that property owners remain aware of their requirements to comply with AULs stipulated in the covenant, as well as ensuring that the control remains effective in the long-term. Because the Part boundaries were retained, additional information can be housed in the GIS database, including county Parcel IDs, owner names and contact information, current zoning designations and other local and property records that directly relate to controls at the facility. Without having these Parts mapped in the GIS database, control management and LTS efforts for this facility would be more difficult and less efficient.