IDENTIFICATION OF HISTORIC FILL USING READILY AVAILABLE INFORMATION SOURCES

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It is frequently necessary to document the presence of historic fill at an MCP site. The identification of historic fill or associated materials may result in a reporting exemption or in the conclusion that reportable conditions are due to background conditions. This article identifies readily available sources of information which can be used to assess the presence and extent of historic fill or associated materials prior to soil borings or sample collection.

REGULATORY CONTEXT

The MCP has two exceptions to notification for releases of OHM associated with historic fill:

• "…related to coal, coal ash, or wood ash, excluding wood ash resulting from the combustion of lumber or wood products that have been treated with chemical preservatives." (310 CMR 40.0317(9));

• "…resulting or emanating from (a) the asphalt binder in bituminous pavement; piers, pilings, and building foundation structures;...(310 CMR 40.0317(12))”.

These exceptions to notification require that coal, coal ash, wood ash, asphalt binder, or piers, pilings, and foundation structures be present (note that asphalt binder and piers/pilings/foundations are not required to be in use for resulting releases to be considered exempt from notification). These materials are collectively referred to in this article as exempt materials. Although the presence of historic fill itself is not a notification exemption, exempt materials are often present within historic fill.

The MCP definition of Background includes OHM "attributable to coal ash or wood ash associated with fill material" (310 CMR 40.0006). To be considered background, coal ash or wood ash must be present and be associated with fill. The definition of background is not an exemption from notification, but allows for the conclusion that site conditions are consistent with background or that the site has been cleaned up to background, therefore achieving a condition of no significant risk. See the LSPA December 2005 News for a discussion of reportable conditions for fill, and the LSPA 1999 white paper for an extensive discussion of the MCP exemptions for coal, coal ash and wood ash.

Ongoing discussions by MassDEP and the regulated community (urban fill workgroup meetings held in 2007 and 2008) recognize that historic fill consistently displays OHM, such as PAHs, lead, and arsenic, and other metals that are not related to identifiable exempt materials or to specific releases. These discussions have focused on revisions to the MCP which would achieve a liability endpoint in the presence of these OHM.

In summary, both the current MCP and ongoing workgroup discussions recognize OHM present in historic fill as having a status similar to background conditions. Therefore the identification and documentation of a) historic fill, b) the presence of exempt materials coal, coal ash, wood ash, asphalt binder, piers, pilings, and foundation structures, and c) the presence of other releases are essential parts of site characterization.
IDENTIFICATION OF HISTORIC FILL

The definition of “fill” or “historic fill” is not provided in the MCP. Since land disposal of waste was controlled by solid waste and other regulations starting in approximately 1972, it has been suggested by MassDEP that filling of land which occurred prior to 1972 is historic fill.

Historically, fill was placed for many reasons, examples of which are listed below:

- Filling of intertidal zones, salt marshes, or shallow-water coastal areas
- Filling of ponds, river channels, wetlands, canals and boat slips
- Culverting or redirection of canals, streams and rivers through or around urban areas
- Filling of low-lying areas to improve drainage
- Creation of road base, railroad beds, construction staging areas, or other areas to provide level ground
- Disposal of solid waste

The presence of historic fill can be demonstrated by documenting the history of filling activities and changes in site topography, changes from wetland to dryland, changes in the locations or shapes of water bodies over time, and/or the appearance of road or railroad beds. Historical and recent maps and air photos can be compared to identify these changes, as well as the approximate dates the filling occurred.

The presence of fill should be confirmed by visual examination and identification of soils and materials by a geologist or similarly qualified person.

IDENTIFICATION OF EXEMPT MATERIALS

Exempt materials, consisting of coal, coal ash, wood ash, asphalt binder, piers, pilings, and foundation structures, may be present due to historical use onsite, incidental releases, or reuse of waste materials, such as those listed below:

- Disposal of ash from burning of wood and coal for domestic heating and cooking
- Filling/disposal of excess ash near historical coal burning facilities
- Inadvertent mixing of coal into soils in or near historical coal yards
- Deposition of wood ash resulting from building fires, forest fires, or lot clearing
- Incorporation of wood ash into agricultural fields as a liming agent and source of nutrients
- Deposits/spillage of coal or coal ash from trains along railroad beds
- Reuse of roadbed materials containing asphalt binder as fill
- Use of treated wood piles, piers or foundations in historical buildings

The presence of exempt materials is demonstrated by a documented history of land uses associated with exempt materials, fires or disposal of materials. The presence of exempt materials should be confirmed on-site by visual examination and identification of coal, coal ash, wood ash, asphalt binder, and treated wood in soil samples, and/or by laboratory assessment indicating the presence of these exempt materials and wood preservatives. See the LSPA October 2004 News for a discussion of microscopy to identify exempt materials.
INFORMATION SOURCES

The data collection requirements of a Phase I Environmental Site Assessment would typically provide much of the information necessary to identify historic fill and the potential for exempt materials. Historical building plans may indicate the presence of coal-fired boilers or coal storage. In addition, historical foundation plans can be used to identify the presence of treated wood piles, piers, or foundation structures. See the LSFA August 2008 Newsletter for a discussion of identification of asphalt binder in bituminous pavement.

Information is typically available from commercial data search services. However, additional detailed information is available at little or no charge from other public sources, and as microfilm, electronic files, or paper documents.

**Historical USGS Topographic Maps.** Topographic maps provide land elevations, identify wet or marshy areas and outline water bodies. They can be obtained from various commercial data search services. An on-line source is The University of New Hampshire Library Government Information Department.

**Historical Navigation Charts.** Navigation charts are scale documents and identify coastal water bodies and shorelines. National Oceanic and Atmospheric Administration (NOAA) Ocean Coastal Survey produces current charts and maintains a collection of historical charts that can be downloaded and/or viewed online.

**Sanborn Insurance Maps.** Sanborn maps can be used to identify buildings and land uses such as coal storage or kilns. They also typically identify water bodies although they are not scaled documents. These can be obtained from data search services. Sanborn maps for many cities and towns are available at the Massachusetts State Library Special Collections and at the Harvard Map Collection. Sanborn maps may be available at some local public libraries and local historical societies.

**Bromley Maps.** Bromley City Maps are generally to scale and identify land use and water bodies. These can be obtained from data search services. Bromley maps for some but not all municipalities are available at the Massachusetts State Library Special Collections and the Harvard Map Collection. Bromley maps may be available at some local public libraries and local historical societies.

**Other Historical Maps.** Other historical maps, panoramic views (birds-eye), and specialty maps not falling into the above categories may also provide information on water bodies and land uses. Local public libraries or historical societies typically have collections of such maps. The Massachusetts State Library Special Collections, the University of Massachusetts-Amherst W.E.B. DuBois Library Special Collection and the Harvard Map Collection have collections of miscellaneous historical maps which can be found in their online catalogs or through consultation with their staff. The U.S. Library of Congress has an extensive collection of historical maps and panoramic views.

**City Directories.** City directories identify landowners and businesses at addresses of interest and may indicate land uses where exempt materials were used or disposed of. Historical directories can be obtained from data search services. Printed historical directories for most cities and towns are available at the Massachusetts State Library Special Collections.
Chapter 91 Licenses. Chapter 91 licenses were implemented by the Commonwealth in 1866 to record the alteration of tidelands and great ponds (greater than 10 acres in area). Jurisdiction for navigable rivers and streams was added in 1939. The Waterways Division also has determined the historical high water mark for filled land which is used when a request for determination of applicability is received. Based on a discussion with a representative of the Waterways Division, virtually all filled tidal lands were documented by Chapter 91 licenses. Filling of inland waterways may be less well documented. Chapter 91 licenses and plans are maintained in the MassDEP Waterways Regulation Program and can be viewed by appointment. Licenses are also recorded with the deeds of impacted properties covered by the license.

Historical Aerial Photos. Historical aerial or satellite photos can be used to identify fill areas and water bodies. These can be obtained from data search services, commercial services, and public agencies. Photogrammetric pairs of photos can be viewed with a stereoscope in to provide a three-dimensional view of site topography and features.

Books. Several books are available documenting historical shorelines, landscapes, geography, and land uses in the Boston area (Seasholes, 2003; Kreiger and Cobb, ed. 1999, Sinclair, 2009). These and documents for other localities can be found in local public libraries.

Municipal Office Documents. Although some Cities or Towns may have local fill permit requirements, based on an informal survey of City and Town Engineering offices, specific documentation of local filling activities is not maintained unless the work falls under the wetlands protection regulations, which would not have been in existence prior to 1972. However, historical building permits maintained by inspectional services departments may indicate the placement of fill materials. Although as-built documents for municipal projects are typically maintained by Cities and Towns, they do not routinely keep records of boring logs or placement of fill from these projects. Some municipal offices maintain historical aerial photos and provide current aerial photos on request. Records are typically available for public review. Contacting City or Town Engineers, Planners or redevelopment authorities is recommended to identify locations of historical maps and aerial photos.

Fire Records. Fire station logs and incident reports can be used to document the potential presence of ash resulting from building, brush, or forest fires. Station logs are to be maintained at the station in perpetuity, while incident reports are to be maintained for seven years. Based on an informal survey of City and Town Fire Departments, records are recorded by address on an annual basis. However, the records prior to the mid 1990s are not electronic and therefore not searchable by address. The State Fire Marshall maintains an electronic record of all reported fires in the Commonwealth after 1982 which may be viewed at the office in Stowe by appointment. The State Fire Marshall also maintains paper records of older fires, which are organized by year and not searchable by address.

Local Historical Society and Local Public Library Documents. As noted above, historical societies and/or public libraries frequently have historical and insurance maps, City Directories, and published local histories.
PUBLIC COLLECTIONS AND CONTACTS

When visiting libraries and collections listed below, a flash drive is useful to copy electronic files and a digital camera is recommended to copy large-format paper maps.

The University of New Hampshire Library Government Information Department. [http://docs.unh.edu/nhtopos/nhtopos.htm](http://docs.unh.edu/nhtopos/nhtopos.htm). This resource holds a working collection of over 55,000 paper USGS maps and includes an online collection of over 1500 USGS topographic maps with complete geographical coverage of New England and New York from the 1890s to 1950s. Online maps can be downloaded.

Harvard Map Collection. Pusey Library, Harvard Yard. Harvard University, Cambridge, MA, 617-495-2417, [http://hcl.harvard.edu/libraries/maps/](http://hcl.harvard.edu/libraries/maps/). Online catalog at [http://hollis.harvard.edu/](http://hollis.harvard.edu/). Sanborn maps and Bromley maps for some municipalities are available on paper with many also available as electronic files. Other miscellaneous maps are available. USGS Topographic maps are available as paper documents. The online catalog lists available materials. Electronic files are available online to those with Harvard library accounts. Others may visit the collection and copy or print electronic files and view or photograph paper documents.

University of Massachusetts-Amherst W.E.B. Dubois Library Department of Special Collections and Archives. 413-545-2780, [http://www.library.umass.edu/spcoll/maps/](http://www.library.umass.edu/spcoll/maps/). Historical maps including some Bromley maps and panoramic maps are available for Massachusetts Cities and Towns. The online searchable catalog lists available maps. The collection consists primarily of paper maps which may be photocopied or photographed.

University of Massachusetts-Amherst W.E.B. Dubois Library Map Collection. 413-545-2397, [http://www.library.umass.edu/aerial-photo-collection/](http://www.library.umass.edu/aerial-photo-collection/). Photogrammetric (viewable in 3-D) photos at 20,000 feet and dating from 1951 for much of Massachusetts are available for viewing and copying. Library staff will assist visitors in using the 3-D stereoscope viewer. Additional photos at varying heights dating from 1971 through the 1990s are also available. The aerial photos are not searchable online.

Massachusetts State Library Special Collections. Massachusetts Statehouse Room 55, Boston, MA, 617-727-2595, [http://www.mass.gov/lib](http://www.mass.gov/lib) (See Historic Collections); Sanborn maps (microfilm) and city directories (paper) are available for many but not all municipalities. Other local maps, Bromley maps, and panoramic maps are available, primarily for the Boston area. Microfilm images can be copied on-site as electronic files. Paper images can be scanned on-site for a fee. The online catalog lists all available maps (including Bromley maps) and panoramic views. Sanborn maps and City Directories are not in the on-line catalog but are listed by municipality on separate web pages. The web site also provides links to other historical mapping resources.

NOAA. [http://www.nauticalcharts.noaa.gov/mcd/OnLineViewer.html](http://www.nauticalcharts.noaa.gov/mcd/OnLineViewer.html) Historical and current navigation charts and other maps of interest for navigable waters in Massachusetts can be downloaded or viewed online.

Boston Redevelopment Authority. The BRA has a large collection of historical maps for the City of Boston available online (including Bromley and USGS maps from other collections referenced herein). The Boston Atlas, [http://www.mapjunction.com/bra/](http://www.mapjunction.com/bra/), is
the BRA’s public internet mapping application. It includes data from many city agencies, including the Assessing Department and the Boston Water and Sewer Commission, as well as information from neighboring towns and state agencies. Information such as building footprints, planning areas, land parcels, and streets can be combined with aerial photography and historical maps to make custom maps. In particular, an extensive collection of historical maps can be compared to current conditions to evaluate the presence of historical fill.

Norman B. Leventhal Collection (Boston Public Library).  
http://maps.bpl.org/view_collection/. The map collection is available for viewing, downloading, and purchases online. Maps in the collection are from all over the world, but there are a significant number of maps and panoramic views available for cities and towns in Massachusetts.

Library of Congress Cities and Towns Map Collection.  
http://lcweb2.loc.gov/ammem/gmdhtml/cityhome.html. Panoramic maps and other maps for many cities and towns in Massachusetts are available online and can be downloaded from the Cities and Towns Map Collection.

Massachusetts Historical Society. 1154 Boylston Street, Boston, MA 02215, 617-536-1608. Selected printed city and town map manuscripts can be viewed online at http://www.masshist.org/online/. The ABIGAIL online catalog (not yet completed) at http://www.masshist.org/library/abigail.cfm can be used to identify additional manuscripts and printed maps. Additional maps can be identified through the card catalog at the Historical Society.

Local Historical Societies. The extent of information available from historical societies is variable and they may be staffed part-time or by volunteers.  
http://www.masshome.com/histsoc.html provides a partial list of historical societies in Massachusetts.

Office of the State Fire Marshal. State Road, P.O. Box 1025, Stow, MA 01775, 978-567-3110, 800-654-5460, www.mass.gov/dfs/osfm/. The Office of the State Fire Marshal maintains a public browser which may be used to search for fire incidents after 1982 for any address in the Commonwealth. Records for fires prior to 1982 are not electronic and are organized by year; therefore a search for a particular address would likely require a Freedom of Information Act request and associated charges would apply.

MassDEP Waterways Division. One Winter Street, Boston, MA 02108, 617-556-1134. This office maintains Chapter 91 licenses and plans. Review is by appointment only. Paper documents may be reviewed or photographed; not all licenses can be photocopied.

Aerial Photo Sources. In addition to the W.E.B. Dubois Library Map Collection noted above, several sources are listed below with photos of varying quality, altitude, and age:

- USGS Earth Resources Observation and Science Center (EROS): Includes satellite maps and aerial photos from Federal agencies (USGS, Air Force, and NASA) dating from 1939. Photos may be searched, viewed online, and purchased at
http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/Aerial_Products/; Select “aerial photo single frames” and use the “additional search criteria” option.

- USDA Farm Service Agency Aerial Photography Field Office. Photos are available for purchase and can be selected from an online index at http://www.fsa.usda.gov/FSA. They are not available for on-line review. Photos date from the 1950s.

- National Archives and Records Administration (NARA) Archival Research Catalog (ARC) http://www.archives.gov/research/arc/. Includes aerial photos which are indexed and available for review at various NARA locations. Limited digital copies of aerial photos for Massachusetts are available online at this time.

- http://www.historicaerials.com. This site has digital aerial photos available for viewing and purchase.

- Col-East, Inc. www.Col-East.com, a regional aerial photography service, has historic aerial photos available for purchase.


REFERENCES


