



Using Historical Aerial Photographs and Maps to Document Waste Disposal Site Activities

Introduction

The location, extent and history of activities at hazardous waste sites is of great interest to the U.S. Environmental Protection Agency. This information can be documented through the analysis of historical records such as aerial imagery, historical and thematic maps and other cartographic data. Since its inception, the U.S. EPA's National Exposure Research Laboratory through its Environmental Photographic Interpretation Center (EPIC) has been collecting and analyzing these data sources for environmental site analyses and civil and criminal actions. Cases are brought by the Department of Justice, FBI, and National Enforcement Investigations Center. Prosecutions related to CERCLA, RCRA, National Environmental Policy Act, and Clean Water Act violations serve as support for EPA Regional offices' investigations at hazardous waste sites across the country.

Data Sources

Aerial imagery is the cornerstone data source used by EPIC during the completion of an environmental site analysis. Historical aerial photography records the evidence of past commercial or industrial activities as well as changes in topography, hydrology and vegetation brought about by residential or industrial development. Aerial photographic coverage dating back to the late 1920s is available for portions of the industrialized U.S. Other types of aerial imagery used at EPIC include color infrared photographs (useful in detecting vegetation stress) and thermal infrared imagery. Thermal infrared imagery records qualitative variations in surface temperatures and can be used to identify leachate discharge points, past disposal activities, and subsurface pipelines. Historical maps date back to the mid 1850s and consist of U.S. General Land Office land surveys, U.S. Army Corps of Engineers river and harbor charts, fire insurance maps and early U.S. Geological Survey topographic maps (late 1880s). Thematic maps such as soil surveys and bedrock or surficial geology maps date back to 1900 and can provide information on the subsurface environment which may in turn measure the migration of contaminants in ground water.

Acquisition and Archiving

Historical aerial photographs are available from federal agencies (such as USDA, USGS, NOAA, and USEPA), state agencies, and private vendors responsible for their production. Aerial photographs acquired from the above sources are indexed and added to EPIC's film library, which currently includes over 150,000 frames of imagery. When current photography is required, EPIC initiates an overflight of the site being studied. These over-flight photographs are indexed in the EPIC film archive. Historical maps are available through a number of sources such as the National Archives, Library of Congress, state libraries, and state and county offices. Thematic maps are available from the agency responsible for their production, e.g., USDA SCS Soil Surveys, USGS Geologic Quadrangle Maps. These maps are acquired and cataloged as collateral data and are also stored in the EPIC library.

Applications

Analysis of aerial photographs can reveal information regarding the activities, sources, and precise locations of stored or buried hazardous materials or wastes, the possible pathways of contaminant migration, and the potential receptors of migrating contaminants. Historical and thematic map sources provide information regarding pre-aerial photography site activities or subsurface or soil conditions which may affect the migration of contaminants. Combined with the analysis of historical and thematic maps and other cartographically related data, aerial photographs provide an accurate and complete history and description of a site. This information provides a substantial supplement to company records or employee memories. As such, photographic data sources are a vital part of any environmental site analysis.

Using Historical Aerial Photographs and Maps to Document Waste Disposal Site Activities



Hooker S Site in 1938

Site is part of the Niagara River. Dredge and fill operations are creating land upon which the future facility will be located.



Hooker S Site in 1951

Fill operations appear to be completed. The site is now ready for facility construction.



Hooker S Site in 1958

Construction of the site is underway; excavations are seen and roads have been constructed to allow access to the site for building purposes.



Hooker S Site in 1984

The facility is an operating petroleum oil storage facility.

Using Historical Aerial Photographs and Maps to Document Waste Disposal Site Activities

References

Mata, L., and Fanelli, D., 1991. Environmental Property Assessments Utilizing Aerial Photography. In Proceedings, Association of Engineering Geologists, 34th Annual Meeting p. 301-310.

Lyon, J. G., 1987. Use of Maps, Aerial Photographs, and Other Remote Sensor Data for Practical Evaluations of Hazardous Waste Sites. Photogrammetric Engineering and Remote Sensing V53, p. 515-519.

Erb, T.L. and others, 1981. Analysis of Landfills with Historic Airphotos. Photogrammetric Engineering and Remote Sensing V47, p. 1363-1369.