

# Aerial Photography for Oil Spill Response Planning and Prevention

Oil and hazardous material spills can cause considerable damage to aquatic resources, foul shoreline areas, and in some cases, endanger human life. Therefore, under the authority of the 1972 amendments to the Federal Water Pollution Control Act, the U.S. Environmental Protection Agency (EPA) established regulations to prevent the discharge of oil and oil products into the navigable waters of the United States. These regulations require owners and operators of certain kinds of facilities to prepare certified Spill Prevention, Control and Countermeasure (SPCC) Plans and to put these plans into effect. Facilities related to oil production, refining, storage, distribution, and use that have above ground aggregate storage of more than 1,320 gallons or single tanks with a capacity greater than 660 gallons must prepare and implement such plans.

Each of the 10 EPA regional offices is responsible for reviewing the oil-related facilities in its region to deter-

mine if specific SPCC plans are followed. With a nationwide estimate of 30,000 bulk oil storage terminals, tank farms and bulk plants, 285 oil refineries, and several thousand more facilities storing and consuming oil, a visit to each site is virtually impossible. A limited staff can only spot check sites and concentrate on those facilities with high spill potential near major waterways.

To assist the regional offices in this program, personnel at EPA's National Exposure Research Laboratory in Las Vegas collect and examine aerial photographs of oil fields and oil-related facilities throughout the nation. Aerial photography is a relatively inexpensive monitoring tool for identifying potential spill conditions and providing information about oil spills. The imagery is examined to review general operating conditions at a facility, the drainage paths leading to the nearest waterway, and the inventory of tanks and oil handling equipment. In addition, the photographs serve as excellent guides for ground teams if a site visit is desirable.



Figure 1. Photo and site analysis for an SPCC report, showing spill conditions.

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## SPCC Reports

The typical SPCC aerial survey report includes a summary of the project, an index of facilities surveyed, maps showing site locations, a large-scale color photograph (1:6,000 scale) of each site with photo analysis results noted on a transparent overlay, and a written description of observations at each site.

Photo analysis emphasizes specific features that might indicate lack of oil containment and possible spill routes to waterways, such as

- absence or inadequacy of secondary containment dikes provided for storage or holding tanks;
- oil spills outside contained areas;
- probable entry point of spillage into the natural or man-made drainage system;
- leaking or deteriorating tanks;
- damaged vegetation; and
- an oil slick or sheen on a water surface.

Figure 1 is a typical photograph showing the results of analysis. The codes listed indicate the usual photo analysis identifications. The codes used in the photo below are: D = drum storage; V = vegetation damage; 1 = no secondary containment and 4 = product spillage.

## Oil Field Reports

An oil field report provides the same information as a report for an individual facility. However, because of the large areas to be photographed for individual oil fields, smaller scale (1:8,400) photography is used.

## River Spill Contingency Handbooks

To aid EPA planning of appropriate action and cleanup procedures in the event of a spill into a river, scientists at the Las Vegas laboratory also use aerial imagery to prepare spill response planning handbooks for rivers selected by EPA regional offices. The handbook provides photos and maps of a stretch of a river with brief descriptions of the waterway, river flow, river access, and other information about the river and adjacent areas.

In these handbooks color aerial photographs (1:24,000 scale) of the entire waterway with annotated, clear acetate overlays depict information such as:

- river access routes for land and water vehicles and foot traffic;
- river crossings;
- recommended command post locations for spill response teams;
- helicopter landing zones;
- location of resources vulnerable to spill damage; and
- visible industrial plant discharge points.

All industrial and commercial facilities having storage tanks or production and distribution capabilities for oil or hazardous materials are delineated as "sites" on each photograph overlay. The handbook provides a brief written analysis of each site. Those sites which appear to be in violation of SPCC regulations are further marked as potential pollution sources.

## Emergency Spill Reports

In the event of a spill of oil or hazardous material, specialists at the Las Vegas laboratory provide emergency technical assistance to spill response teams. Personnel are available to obtain and interpret aerial photography to determine the extent of the spill and directions of material movement. They immediately relay critical information to team coordinators, and provide photography and maps indicating areas of material accumulation. The on-scene coordinator uses this information to determine possible locations for floating containment boom and to prevent further spread of the spilled material downriver.

On subsequent days, additional aerial photographs serve as a tool to determine the effectiveness of cleanup operations and indicate the amount of damage to the environment. The photographs also serve as a record of cleanup effectiveness.