GPS Receivers & Google Earth Software Tools to Support Closed, Illegal and Abandoned Site Investigations

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GPS & Google Earth

- Google Earth is Interactive 3D Map Software of the World
- Aerial Photogrammetry from 2003 Color Aerial Photos (1m resolution), e.g. you can clearly see a 1 meter object on the ground
- “Geo-referenced”, e.g. aerial photos referenced with Latitude and Longitude Grid
- Includes “Layer Info”: Geology, Roads, Hotels, Restaurants, etc
- GPS Latitude & Longitude = Google Latitude & Longitude (based on WGS 84)
- Commercial Grade Handheld GPS Receivers for Navigation are inexpensive, accurate and easy to use (submeter survey grade equipment available)
- What does this mean? You can locate and map points in Google (and annotate Latitude & Longitude) or go to field and take GPS Latitude & Longitude and verify in Google Earth, e.g. location of gas monitoring wells, flare station, illegal disposal area, flare station, continuous gas monitoring sensors, etc.
GPS & Google Earth

- CIA Site Investigation Applications
  - Review site and adjacent land-uses
  - Review site access
  - Locate existing gas control system and gas monitoring wells
  - Layout proposed drilling, trenching and sample locations
  - Layout proposed gas monitoring wells
  - Overlay and Georeference Historical Aerial Photos and USGS Topographic maps and perform horizontal extents and parcel interference analysis
  - Determine Area of Disposal Site
  - Perform preliminary watershed analysis for vicinity of the site
  - Verify field measurements and sample locations
  - Visualize Terrain and Topography
  - Review Land-uses and Site Access
CIA Investigation Applications

• Review Site Access and Adjacent Land-uses
CIA Investigation Applications

- Locate Existing Gas Monitoring Wells
CIA Investigation Applications

• Layout Gas Monitoring Well Locations
CIA Investigation Applications

- Perform Historical Aerial Photo Analysis (Georeference Aerials)
CIA Investigation Applications

- Measure well spacing, distance to structures, disposal area
CIA Investigation Application

- Site Location Map
CIA Investigation Applications

• Visualize terrain, topography, elevations
CIA Investigation Applications

- Overlay USGS Topographic Maps
CIA Investigation Applications

• Overlay Geophysical Survey Data
CIA Investigation Applications

• Visual Topographic Features
CIA Investigation Applications

- Locate and Show Construction Drawings/Geophysical Surveys
Using Basic Google Earth Tools

- Downloading Google Earth Software (Free)
  - Web: [http://earth.google.com/download-earth.html](http://earth.google.com/download-earth.html)
- Window Views and Panel Settings
- Turning on/off Lat & Lon Grid
- Determining relative elevations
- On-screen Navigation Tools (zoom in and out, pan, tilting view angle (oblique), rotate view, orient north)
- Information layers
- Making and labeling place marks
- Sending View Images (making JPEG)
- Sending Locations (.kmz)
- Measuring Distances
- Creating Overlays
Google Earth

- For a PhD in Google Earth visit the following:
Google Earth Options
Google Earth Measure Tool

Tools > Measure
Select Units
Put cursor on Start point > click > End point > click
Google Earth Toolbar

Add: Placemark, Folder, Image Overlay, Network Link, Path & Polygon
Google Earth Tools: Image Overlay

Click-on Add; Image Overlay; Browse for file; Click OK to insert
Google Earth Tool: Image Overlay

Once image inserted; adjust scale of image using green cursors to the current view’s scale, e.g. by “lining up” landmarks, roads, structures, etc.
Google Earth Toolbar

Google Earth Exercise

- Locate and placemark the 14th Avenue Disposal Site in Sacramento (location is NW of Power Inn and 14th Avenue)
- Locate and placemark the Sacramento City Landfill (Business 80/American River)
- Determine the approximate area (in acres) of Kiefer Landfill?
Handheld GPS Receivers
Handheld GPS Receivers

- Commercial Grade Navigation Receivers
- Used for Recreation (boating, biking, etc)
- Accuracy to 15 feet (5m); depends on number of satellite signal strength
- Survey-grade GPS units have submeter accuracy (Trimble GPS 5800)
- Provides latitude and longitude data and elevation relative to mean sea level (MSL)
Handheld GPS Receivers

• Application to CIA Investigations
• Provide basic navigation information for getting to and from sites (locate disposal sites installation, cities, etc.
• Provide location (lat & lon) and elevation data for field survey of disposal area, gas monitoring well locations, trench locations, etc
• Detailed map info can be uploaded for specific locations (counties, cities, etc)
Handheld GPS Receivers

• Review GPS Unit DVD Training Video
GPS Receivers

- Basic Commands
- On-Off/Basic Menu Screen
- Menu Options
- Latitude, Longitude and Elevation
- Marking locations (or way points)
- Downloading location data
Handheld GPS Exercise

• Collect GPS data (Lat & Lon) for the following:
  – NE corner of Cal-EPA Building
  – Area of the Cal-EPA tower?
  – Distance from Cal-EPA front door to Starbucks?

• Come back and manually load points to Google Earth and pull up aerial with latitude & longitude grid; placemark and label locations and email image, find areas and distances
GPS & Google Earth

• Allows you to locate existing disposal site characteristics; if you can scan drawing or image (historical aerial photos) you can “geo-reference” drawing in Google Earth and obtain Latitude and Longitude data for location (and then use handheld GPS to find).
GPS & Google Earth

• Georeference of Historical Aerial