

## INDUSTRY CONTAMINATION DETECTION

## DIGITALGLOBE INFORMATION PARTNER



## Non-Intrusive Industrial Site Monitoring

### Detecting Contamination with Satellite Imagery

Damage caused by industrial activity has serious repercussions for a company's reputation, social license to operate and access to financing. A growing concern for the oil industry is the environmental and ecological impact of exploration, extraction and processing of hydrocarbons. While companies take steps to limit environmental damage, it can be difficult to accurately assess the level and nature of contamination to the surrounding environment. Using high resolution satellite imagery, Auracle Remote Sensing identified potential soil and water contamination in a location with historically intensive industrial activity.

### Direct Detection of Potential Contamination

The site includes industrial facilities and power lines and is geographically situated south of a major water body. It contains past producing oil wells and refinery equipment as well as metal and other refuse materials. Auracle's analysis was part of an environmental analysis of existing conditions to form a baseline and evidence of pre-reclamation activities. Using archived and newly acquired satellite imagery, Auracle extracted spectral information associated with signals that indicate the likelihood of hydrocarbon contamination to soil and water within the project area.

Hydrocarbons are represented by distinct absorption features which can present as man-made materials such as asphalt, plastics and paint. Auracle corrected classification errors through identification of rooftops, roads, refuse piles, parking lots and oil stains and detected no remarkable direct hydrocarbon contamination. However, one metallic contamination site was delineated.



IMAGE 1: WorldView-2 Multispectral Ortho Image of the Potentially Polluted Site

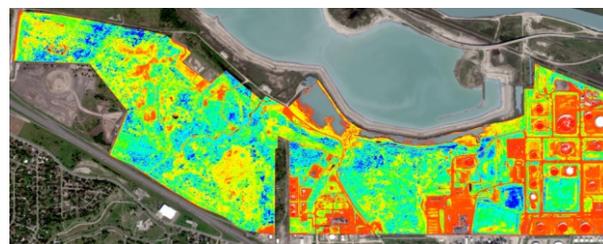


IMAGE 2: WorldView-2 with Normalized Difference Vegetation Index (NDVI) shows anomalous signals, suggesting stressed vegetation with potential link to hydrocarbon contamination.



IMAGE 3: WorldView-2 with Classifications of Man-Made Materials used to rule out hydrocarbons present in roads, refuse piles or oil stains.

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### Indirect Detection of Potential Contamination

Hydrocarbon contamination can also present as botanical anomalies. These anomalies are represented either as vegetation stress due to oxygen depletion or as specific vegetation types at inappropriate locations. Using a standard stress vegetation indices, the Normalized Difference Vegetation Index (NDVI) and the Anthocyanin Reflectance Index (ARI), Auracle identified 21 potential contamination locations within water courses.

### Key Advantages of Remote Sensing for Potential Contamination

Satellite images allow us to distinguish and measure surface features at the resolution dictated by the needs of the project. This makes our techniques particularly useful in areas where ground access is impractical due to geographical barriers or concerns over environmental impact. Remote sensing is not limited by extremes in terrain or hazardous conditions that may be encountered during an on-site appraisal. The large coverage area provided by our satellite imagery enables cost-effective monitoring of wide scale changes over time.

Auracle documents historical and current environmental conditions, whether they are naturally occurring or human-induced. Using before and after satellite images to monitor and quantify changes of specific features over time to show:

- geohazard potential
- project progress
- the effectiveness of the reclamation measures
- any corrective action that may be needed
- the impact of industrial activity on the surrounding environment

### COMPANY INFORMATION

Auracle Remote Sensing uses satellite imagery to produce GIS maps and models that are useful in land use planning, monitoring industrial activity and in evaluating land development or reclamation.

Our environmental applications include both baseline mapping and subsequent monitoring for

- forestry and agricultural management
- mineral exploration
- oil and gas development or urban planning.

Our geospatial information details current environmental and ecological conditions and how these change over time.

Our methods create no unnecessary human footprint, require no social license and do not cause cultural interference.

#### CHALLENGE

Monitor industrial sites for potential contamination of soil and water due to extraction, storage of byproducts and waste disposal.

#### SOLUTION

Advanced technology combines multispectral classification and indirect signals to identify and monitor hydrocarbon contamination of soil and water.

#### RESULT

Establishing an accurate environmental baseline, timely detection of potential contamination areas, and a detailed understanding of potential environmental impact from industrial activity over time.