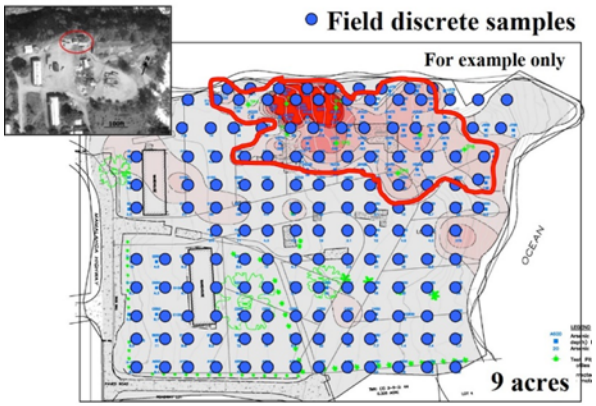
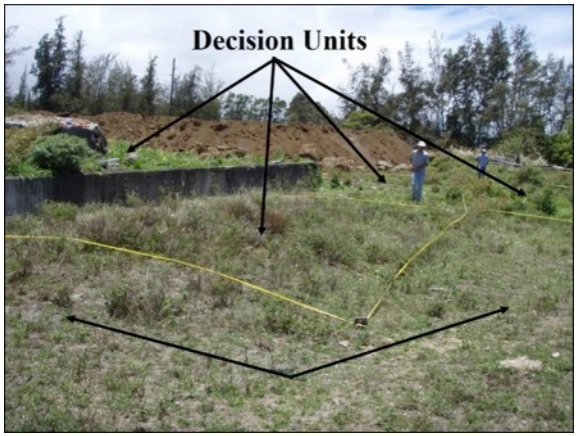
Investigation and Assessment of "Brownfield" Sites in Hawai´i





Roger Brewer (Senior Scientist - Honolulu)

Department of Health

Hazard Evaluation & Emergency Response Office

Brownfields Workshop

Hilo, Hawai‘i, November 2, 2017

Hawai‘i Department of Health

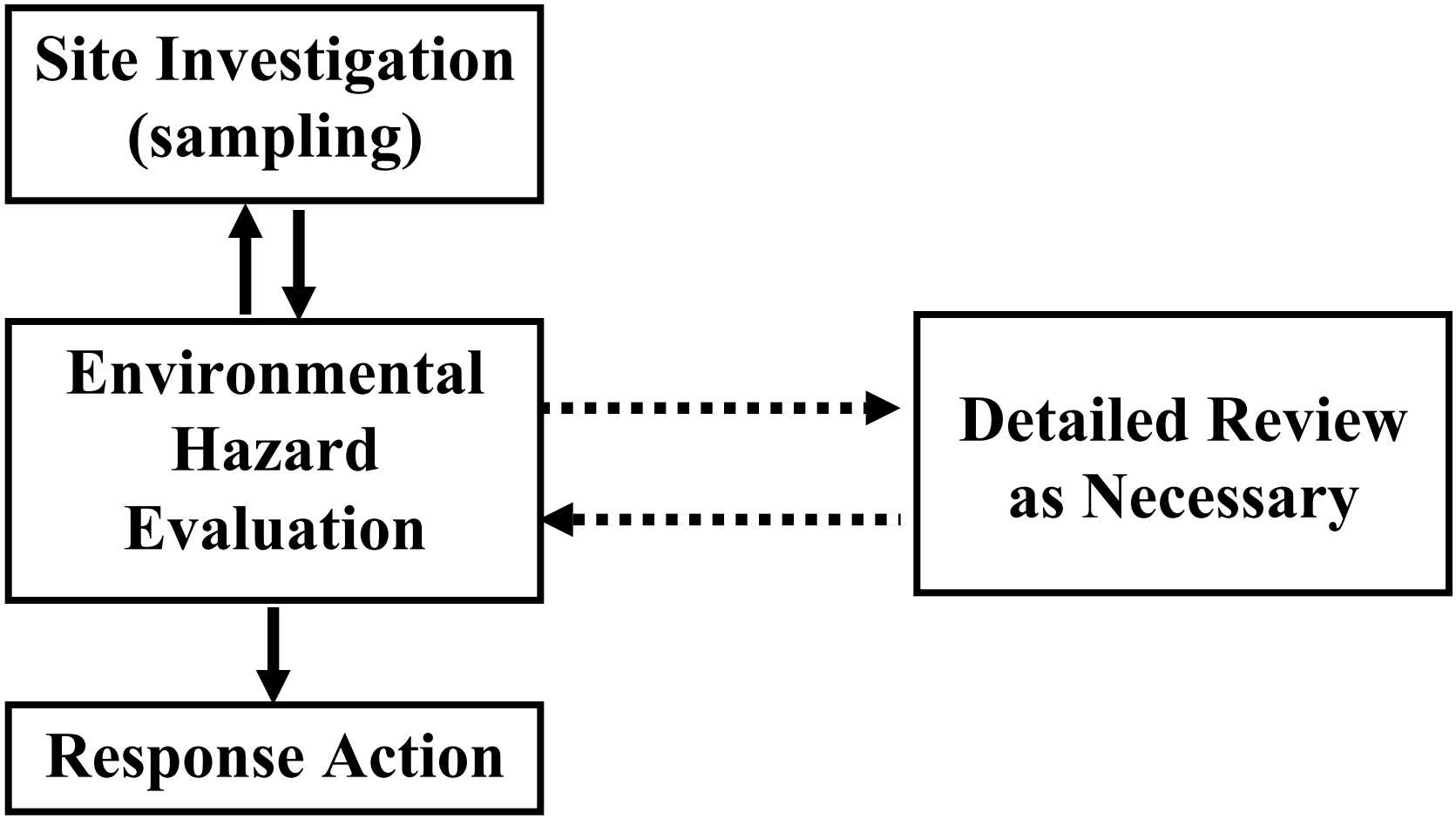
Solid & Hazardous Waste Branch:

- Underground storage tanks;
- Illegal dumps post 1980s;
- Permitted hazardous waste facilities.

Hazard Evaluation and Emergency Response

- Everything else;
- Former industrial properties;
- Tank farms;
- Pesticides, etc.

Environmental Investigation Process



Hawai′i DOH Guidance for the Investigation, Cleanup and Management of Contaminated Properties

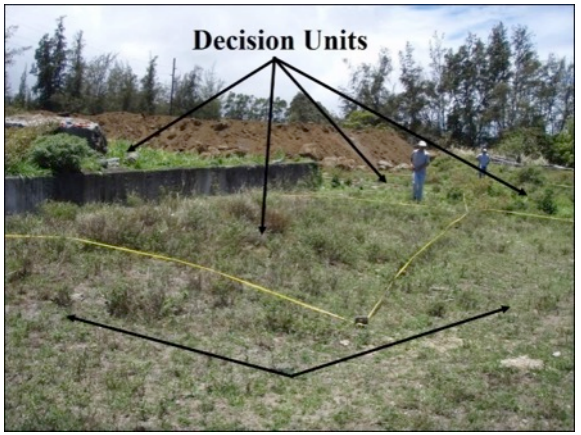
1. Testing Soil, Water and Air for Contamination:
***Technical Guidance Manual*: Hazard Evaluation and Emergency Response: http://eha-web.doh.hawaii.gov/eha-cma/Org/HEER/**

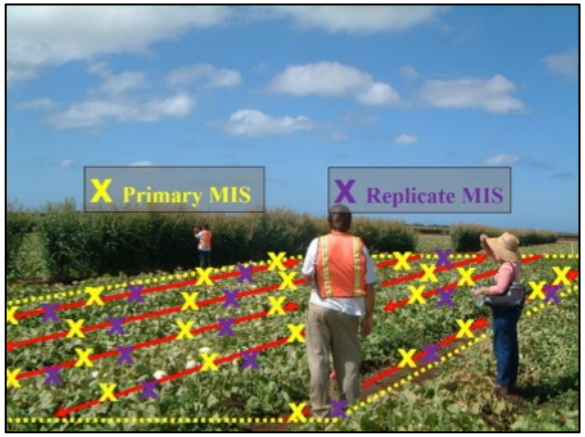
2. Determining if There is a Problem:
***Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater*:**
http://eha-web.doh.hawaii.gov/eha-cma/Leaders/HEER/EALs

3. Long-Term Management:
***Long-Term Management of Petroleum-Contaminated Soil and Groundwater:* http://www.hawaiidoh.org/**

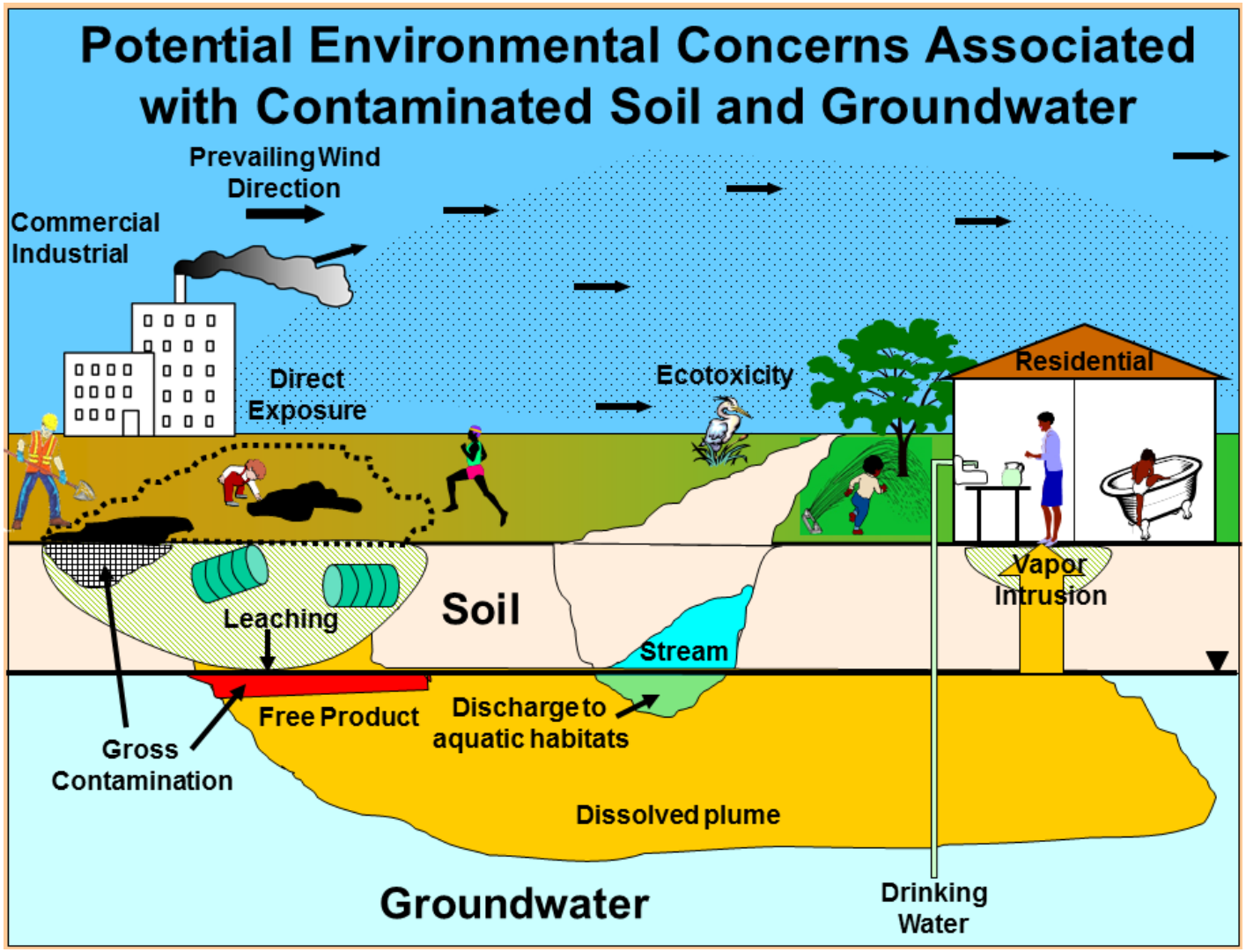
HEER Office Technical guidance Manual

- Site history review;
- Investigation design;
- Sample collection;
- Identification of potential environmental concerns;
- Remediation +/- long-term management.





Environmental Hazards Posed by Contaminated Soil and Groundwater



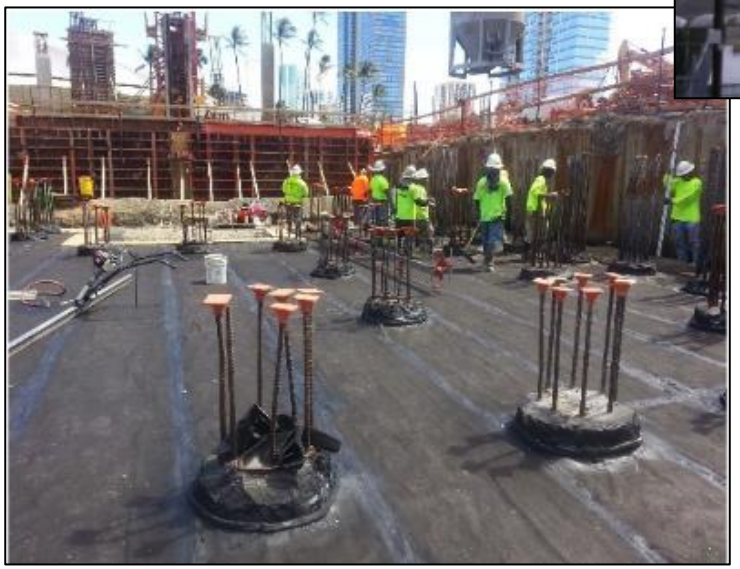
Environmental Hazard Evaluation
- Something for Everyone -

- Chemistry: What is it?
- Geology: Where is it?
- Physics: Where is it going?
- Toxicology: Can it harm me?
- Ecology: Can it harm ecological habitats?
- Combined: What are the concerns?
- Engineering: What can be done?
- Lawyers: Who’s going to pay for it?

Safeway-Target Hilo Redevelopment (2010)

- **Ten-acre property;**
- **250,000 ft^2 (?) floor space;**
- **$100++ million development;**
- **Two-year construction period.**

Unexpected Delays Can Cause BIG Problems



Safeway-Target Hilo Redevelopment

Former Maintenance Yard (10-acres)

Former Wood Treatment (arsenic & dioxins)

Maintenance Area (petroleum, solvents, lead)

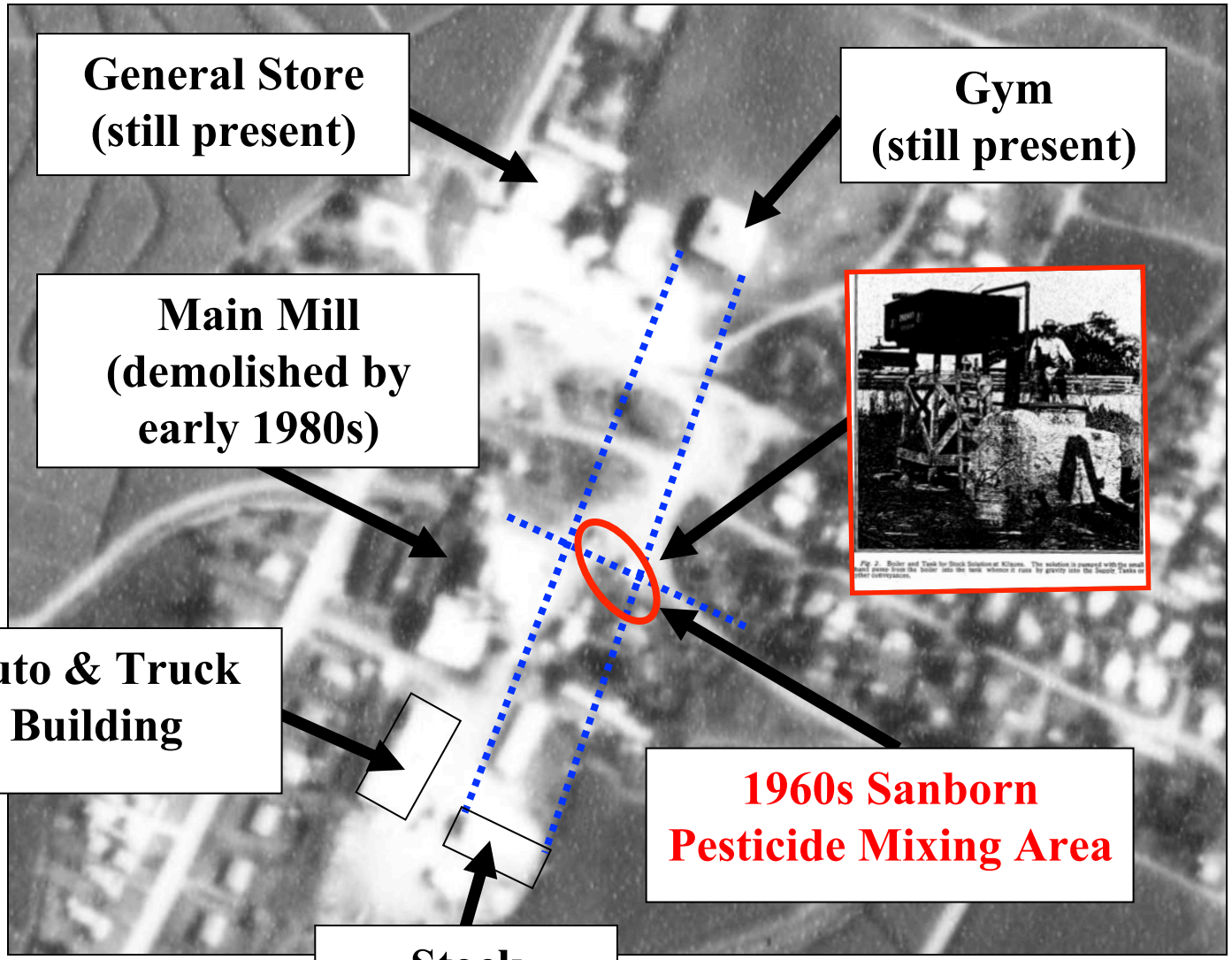
Former Railroad (arsenic)

Safeway-Target Hilo Redevelopment
Former Maintenance Yard (10-acres)

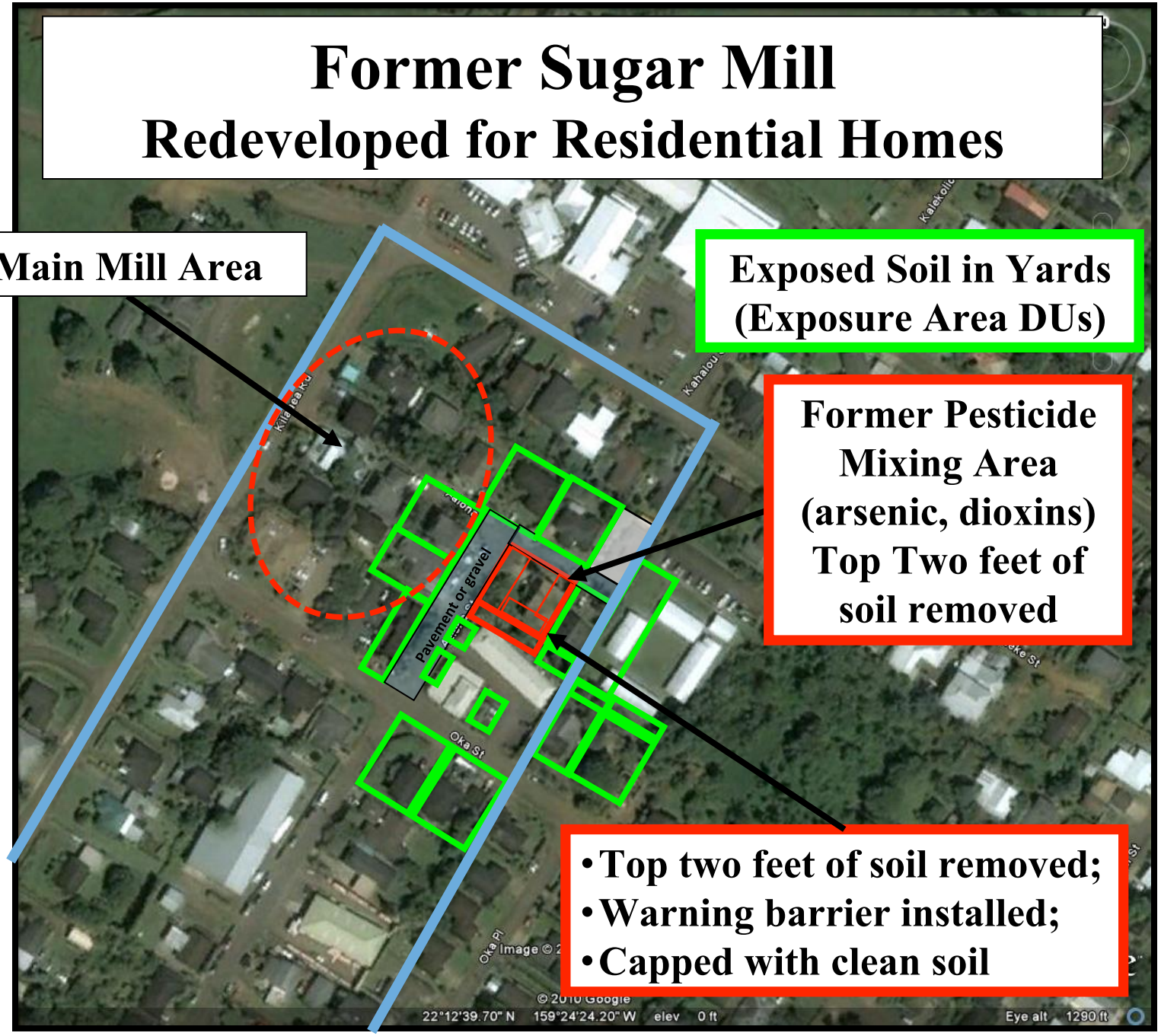
- **Site divided into targeted areas for testing;**
- **Small area of arsenic and dioxin contamination identified adjacent to former wood treatment facility;**
- **Impacted soil consolidated and capped on site (cost to ship to mainland prohibitive);**
- **Small area of petroleum contaminated soil removed;**
- **Property redeveloped without delays.**

Former Sugar Mill Pesticide Mixing Areas

(arsenic, dioxins)



Former Sugar Mill
Redeveloped for Residential Homes



- Top two feet of soil removed;
- Warning barrier installed;
- Capped with clean soil

Contaminated or Potentially Contaminated Sites in Hawai‘i County – A Legacy of the Past

Thanks. John

John Peard, Remediation Project Manager, Hilo Office
Hawai‘i Department of Health
Hazard Evaluation & Emergency Response Office (HEER Office)

Brownfields Workshop
Hilo, Hawai‘i, November 2, 2017

What do these terms mean?

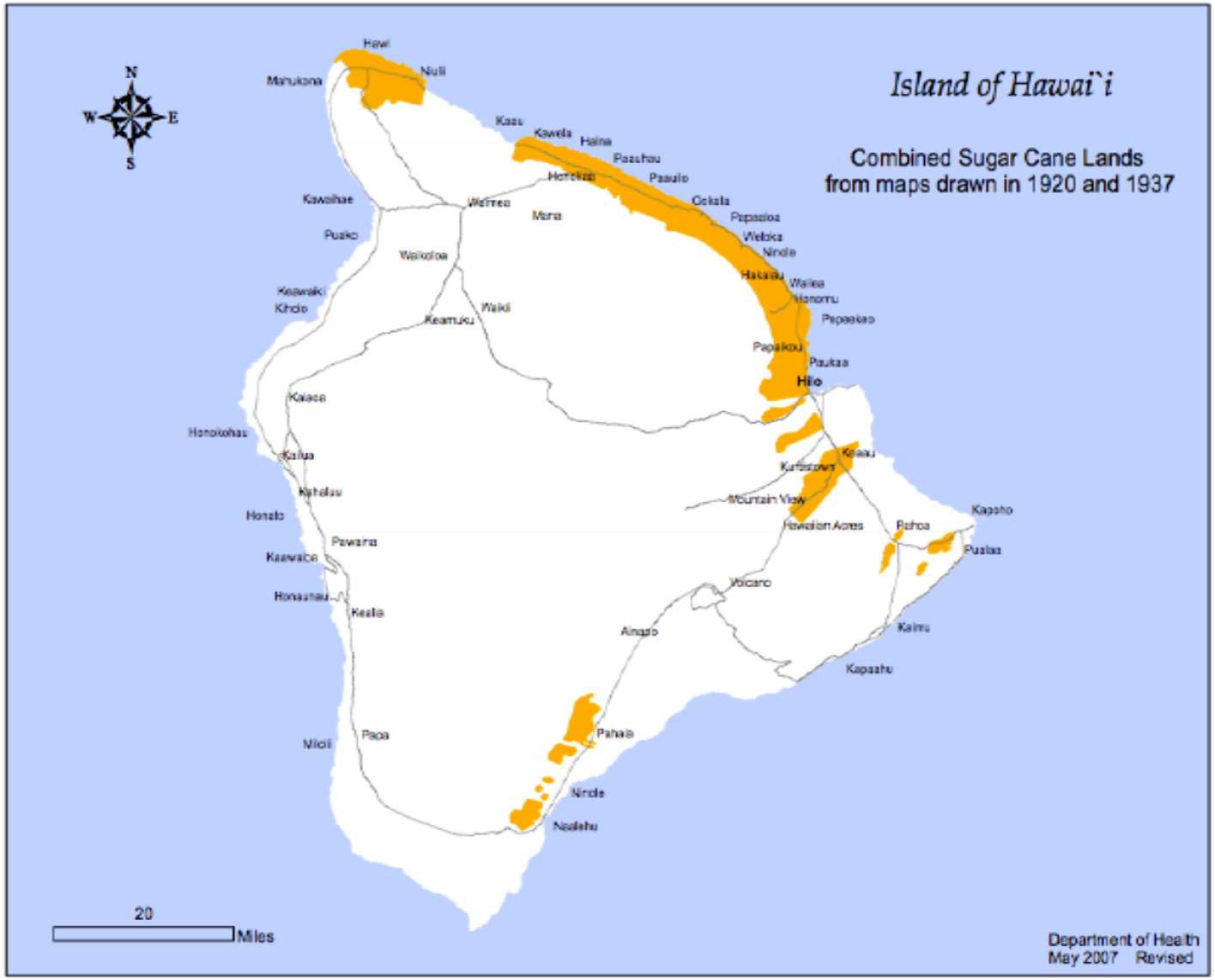
Phase 1 – What happen in the past?

Phase 2 – How bad is it and how far does it go?

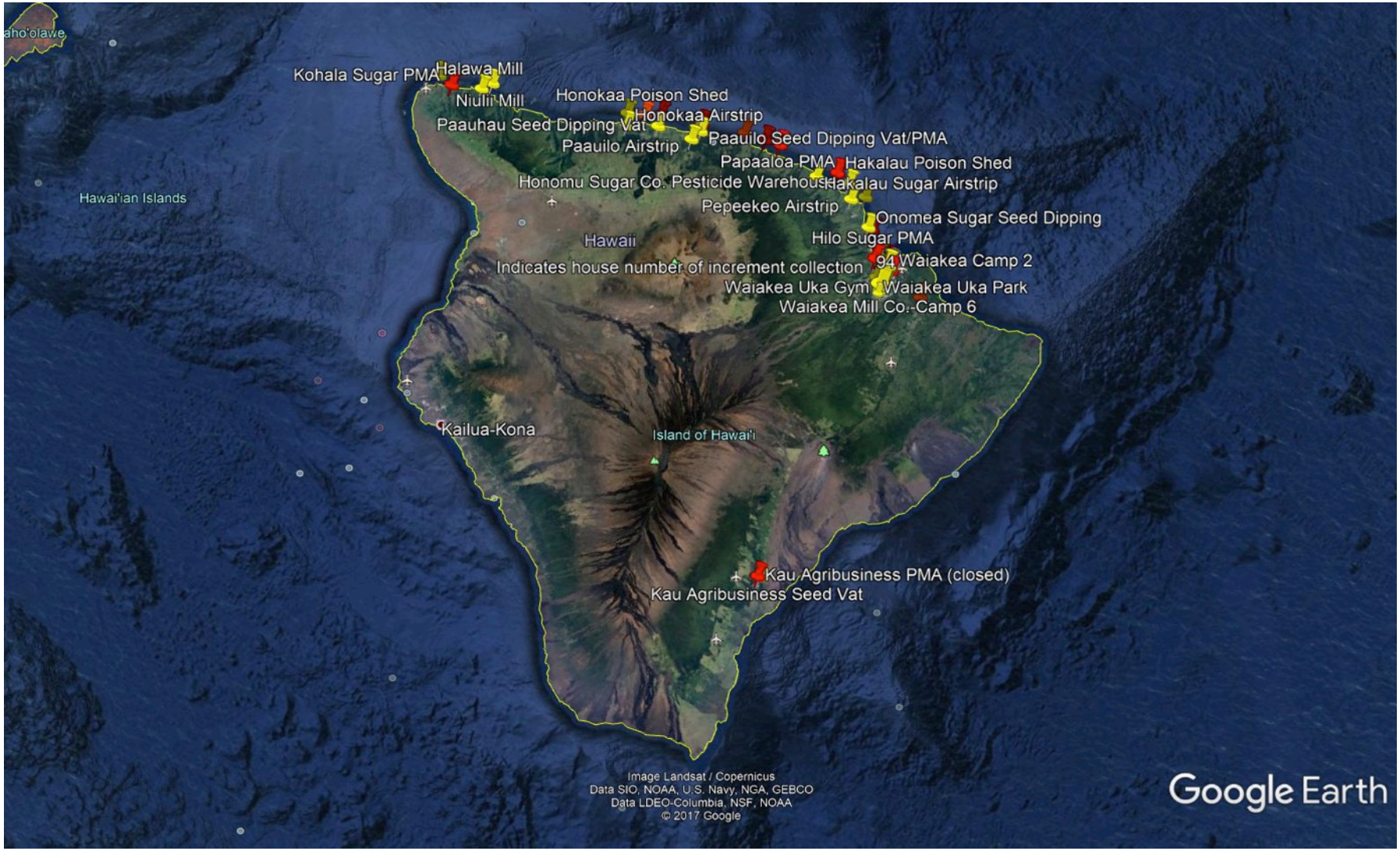
No Further Action (unrestricted) – I can build on it and use it however I want to

No Further Action with Institutional Controls – I can use it as long as I follow the guidance the HDOH gives me.

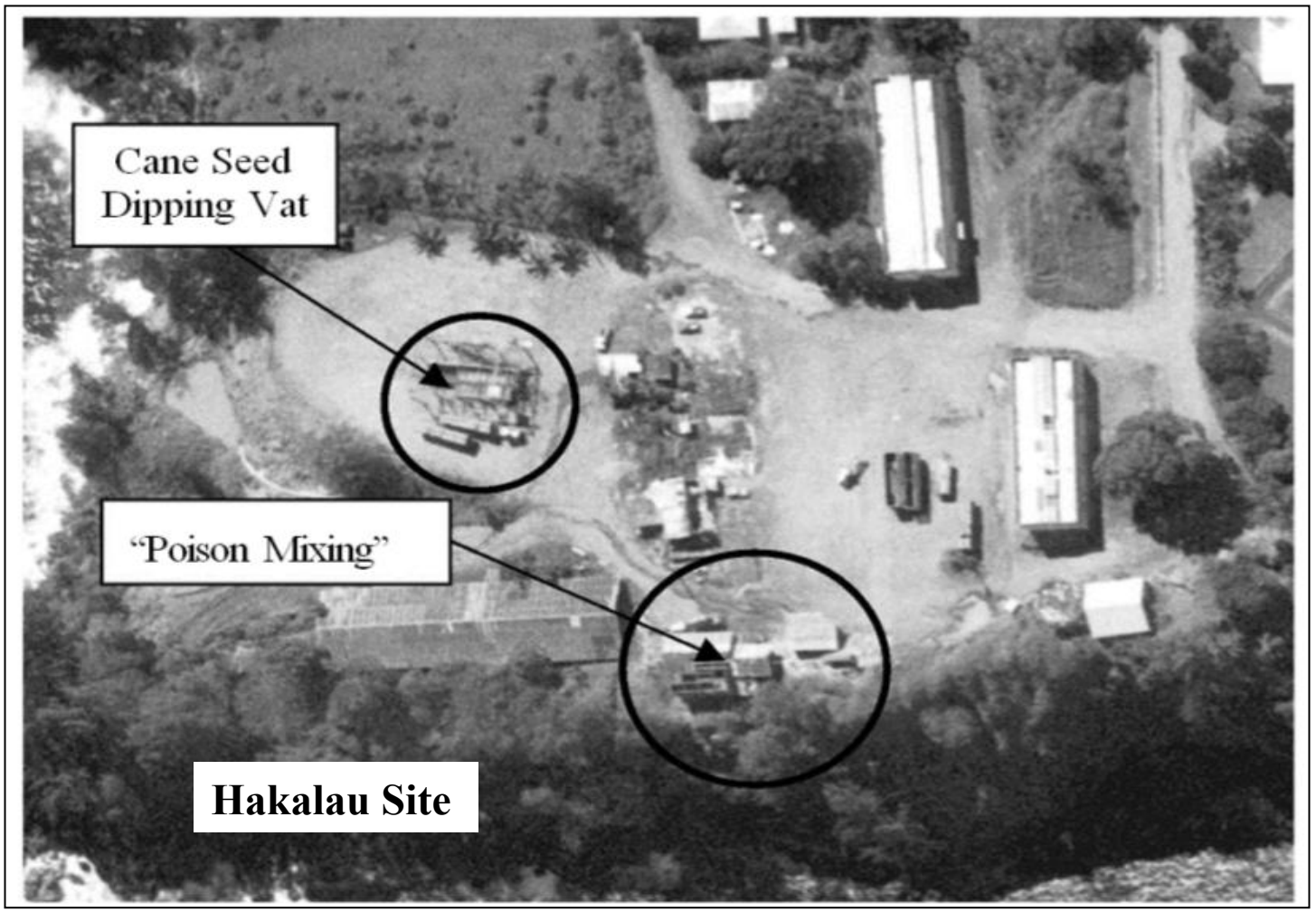
Environmental Hazard Management Plans (EHMP)


Island of Hawai`i
Combined Sugar Cane Lands
from maps drawn in 1920 and 1937
N
W
E
S
Hawi
Niuli
Mahukona
Kaau
Kawela
Haina
Paauhau
Honokaa
Paauilo
Ookala
Papaaloa
Wailoa
Ninole
Hakalau
Wailea
Honomu
Papaikou
Paukaa
Hilo
Kawaihae
Waimea
Mana
Puako
Waikoloa
Keawaiki
Kholo
Keamuku
Waiki
Kalaoa
Honokohau
Kailua
Kaloko
Honalo
Pawaina
Kaawaloa
Honaunau
Keala
Nilolo
Papa
Pahala
Ninole
Naalehu
Kurtistown
Mountain View
Hawaiian Acres
Pahoa
Kapoho
Pualaa
Volcano
Ainapo
Kalapana
Kapaahu
20
Miles
Department of Health
May 2007 Revised

Knapsack Sprayer – Olaʻa Plantation - (Larsen, 1914)


Kohala Sugar PMA
Halawa Mill
Niulii Mill
Honokaa Poison Shed
Honokaa Airstrip
Paauhau Seed Dipping Vat
Paauilo Airstrip
Paauilo Seed Dipping Vat/PMA
Papaaloa PMA
Hakalau Poison Shed
Honomu Sugar Co. Pesticide Warehouse
Hakalau Sugar Airstrip
Pepeekeo Airstrip
Onomea Sugar Seed Dipping
Hilo Sugar PMA
Hawaii
Indicates house number of increment collection
94 Waiakea Camp 2
Waiakea Uka Gym
Waiakea Uka Park
Waiakea Mill Co.-Camp 6
Kailua-Kona
Island of Hawai'i
Kau Agribusiness PMA (closed)
Kau Agribusiness Seed Vat
Hawai'ian Islands
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
© 2017 Google
Google Earth

Overlay of Historic Map on Google Earth Image

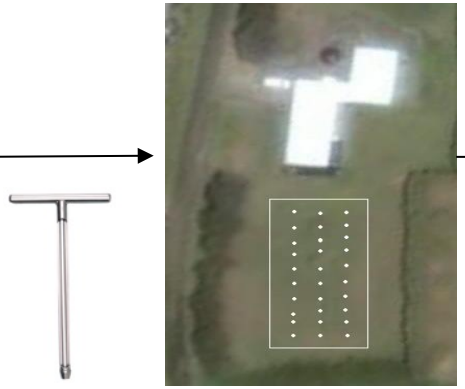

Cane Seed
Dipping Vat
"Poison Mixing"
Hakalau Site

Suspect Pesticide-Mixing Tanks (abandoned)

Procedures for Soil Sample Collection and Processing

Study Area Selection

30+ Increments Collected



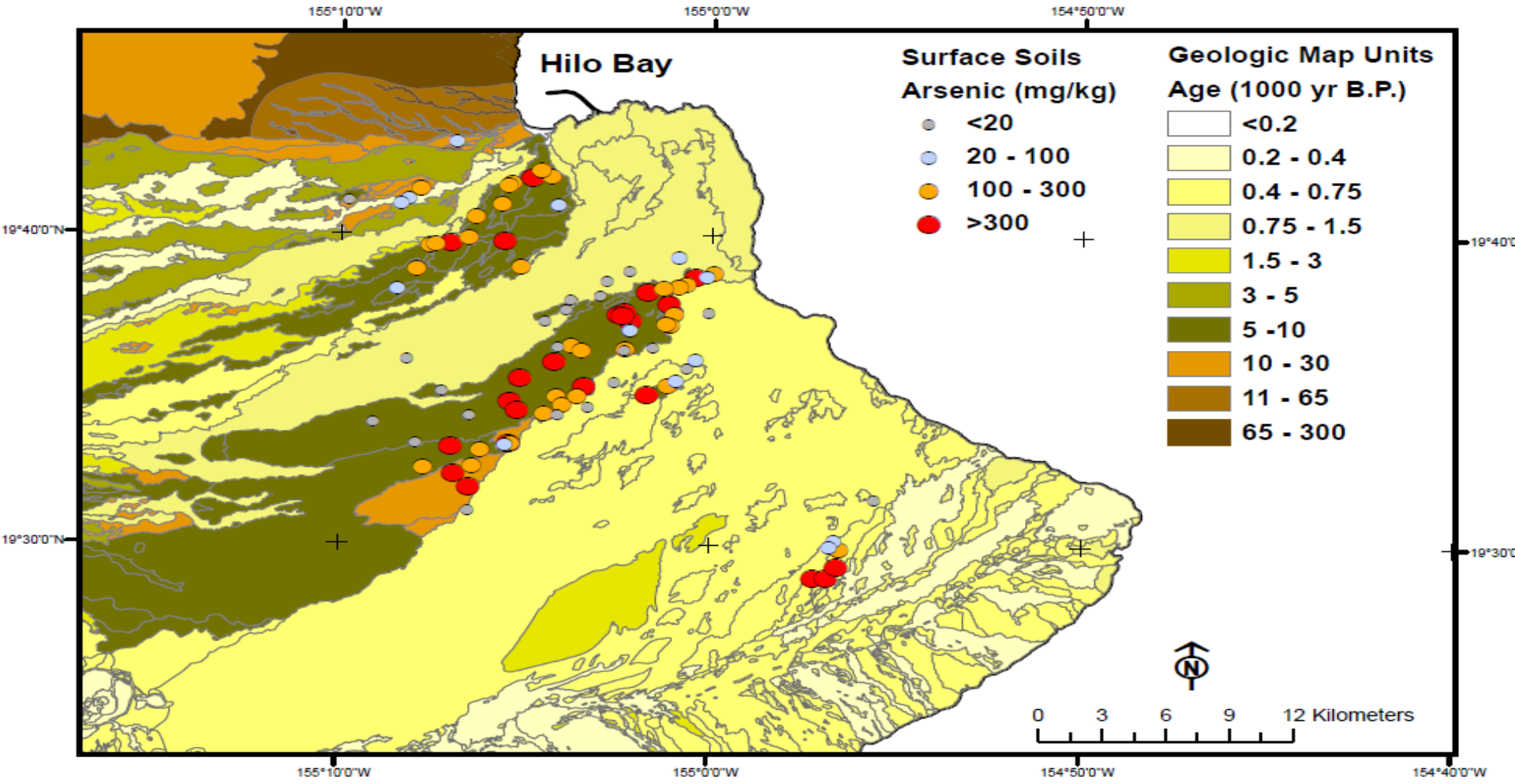
Sample Processing

Potential Sampling Areas (Decision Units or DUs):

- Gardens
- Yards
- Bare Soil
- Children's Play Area

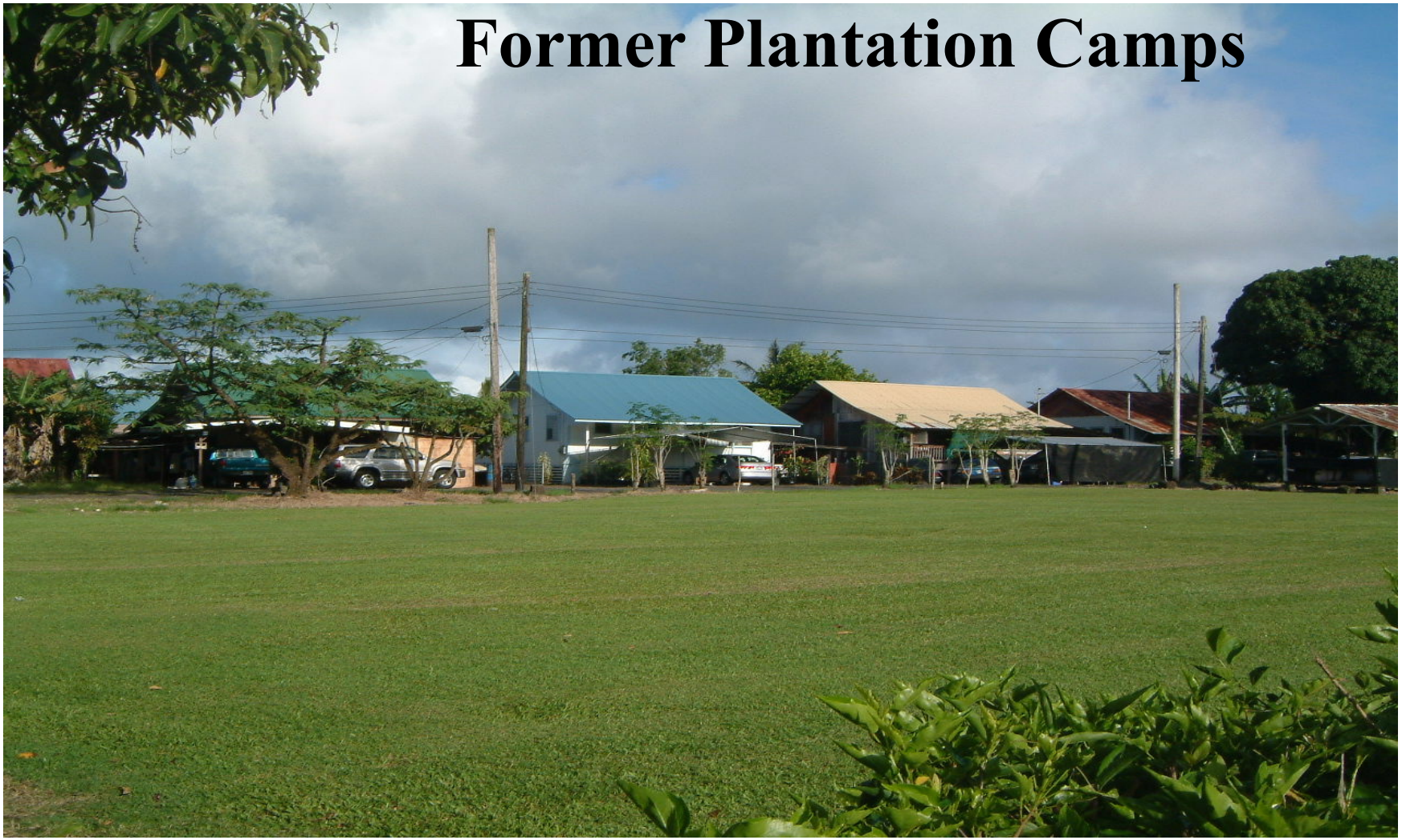
- Study area boundaries marked (DUs)
- Soil increments spaced regularly across area
- Top 2 – 6 inches soil sampled, typically

- DU Increments combined to one sample
- Taken to lab for processing and analysis
- Sample can also be screened by XRF for metals in the field before sending to lab



Cutler, W. G., PhD Thesis, 2011

Former Plantation Camps



Plantation Camp Gardens

Schools

School Garden

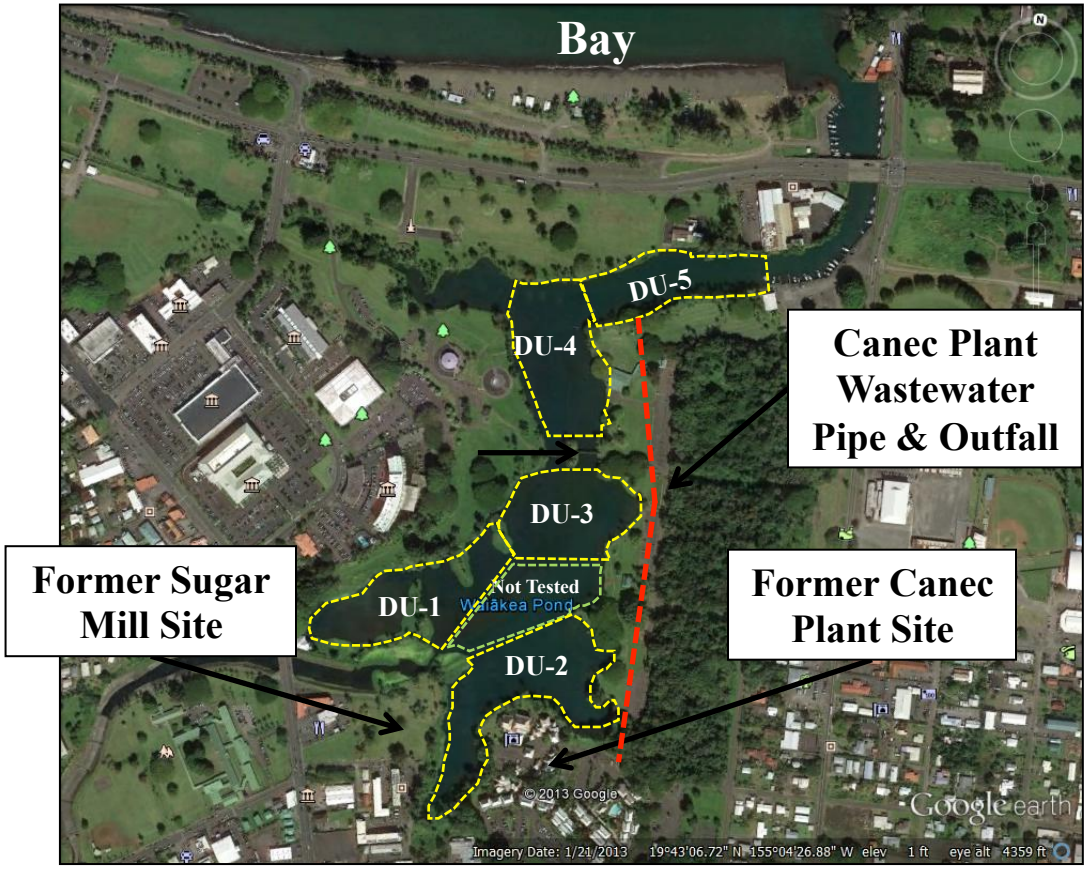
Soil Arsenic and Lead Bioaccessibility Testing

- **Estimates the fraction of arsenic or lead in soil that could be solubilized in stomach acid and be available for uptake.**

- **Remaining portion assumed to pass through the body without potential adverse effects.**

Canec Plant, Hilo, Hawai'i – 1930-1960 - Arsenic Impacts

Waiakea Pond Sediment Investigation (arsenic contamination of sediment)



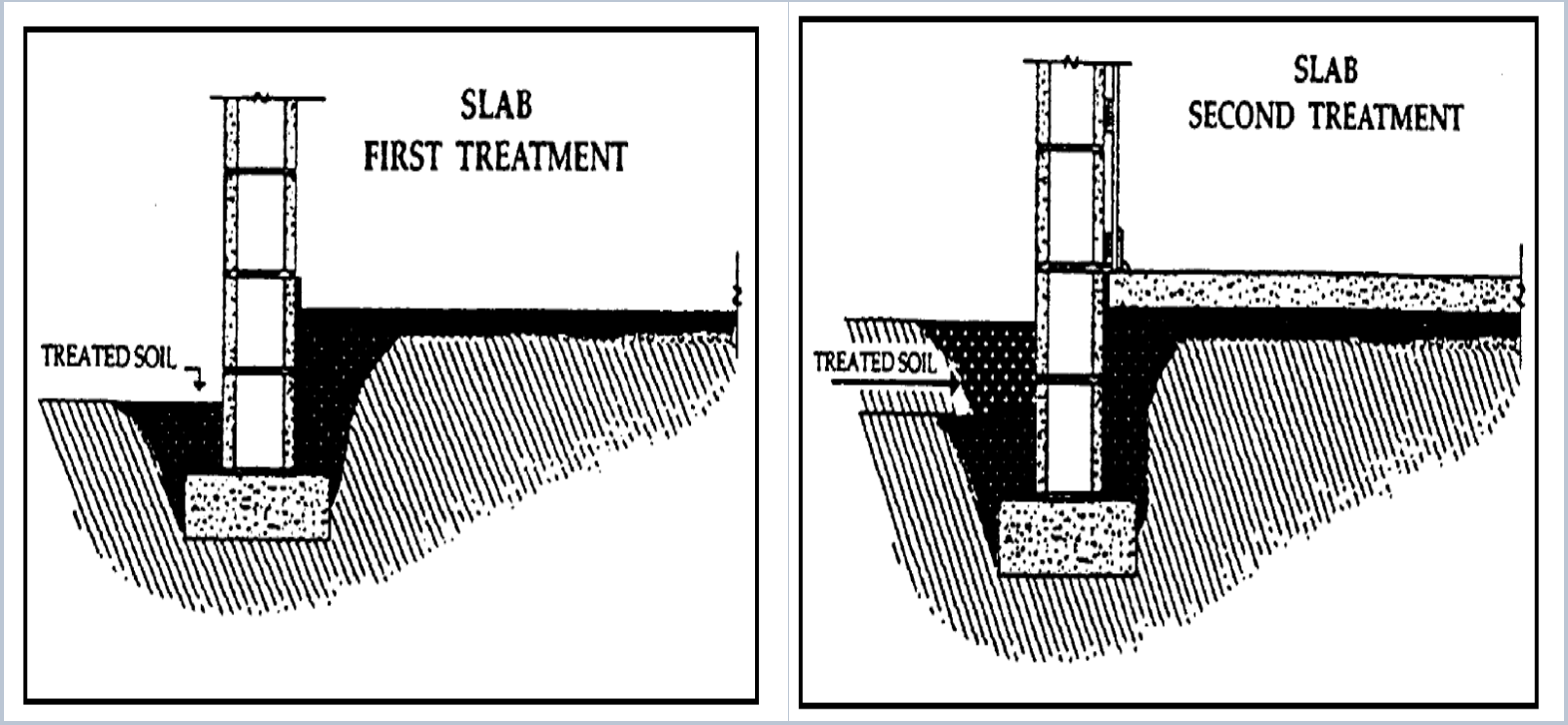
Replacement of Older Steel Water Tanks

Former Sugarcane Land Planned for Residential Development

Screening Building Perimeter Foundation Area for Lead and Arsenic Contamination

Former Housing Foundation Pads

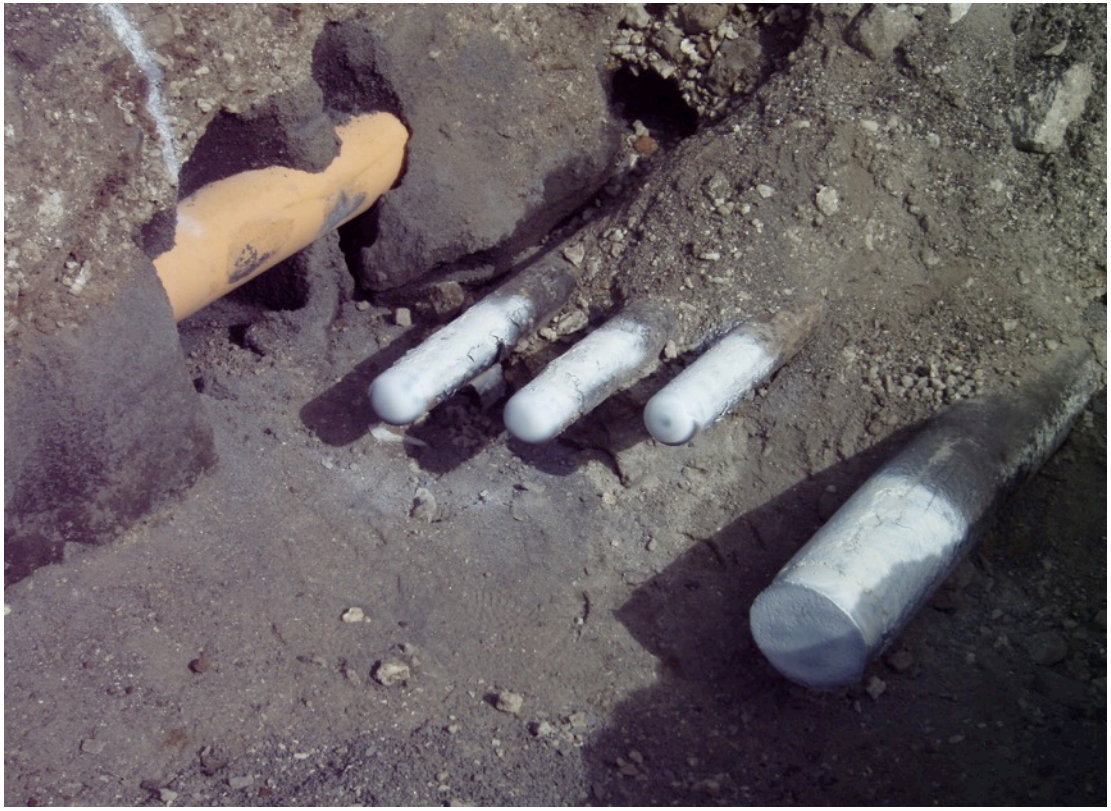
Termiticide Treatments of Building Foundations



Steel Bridges and Impacts from Past Use of Lead-based Paints

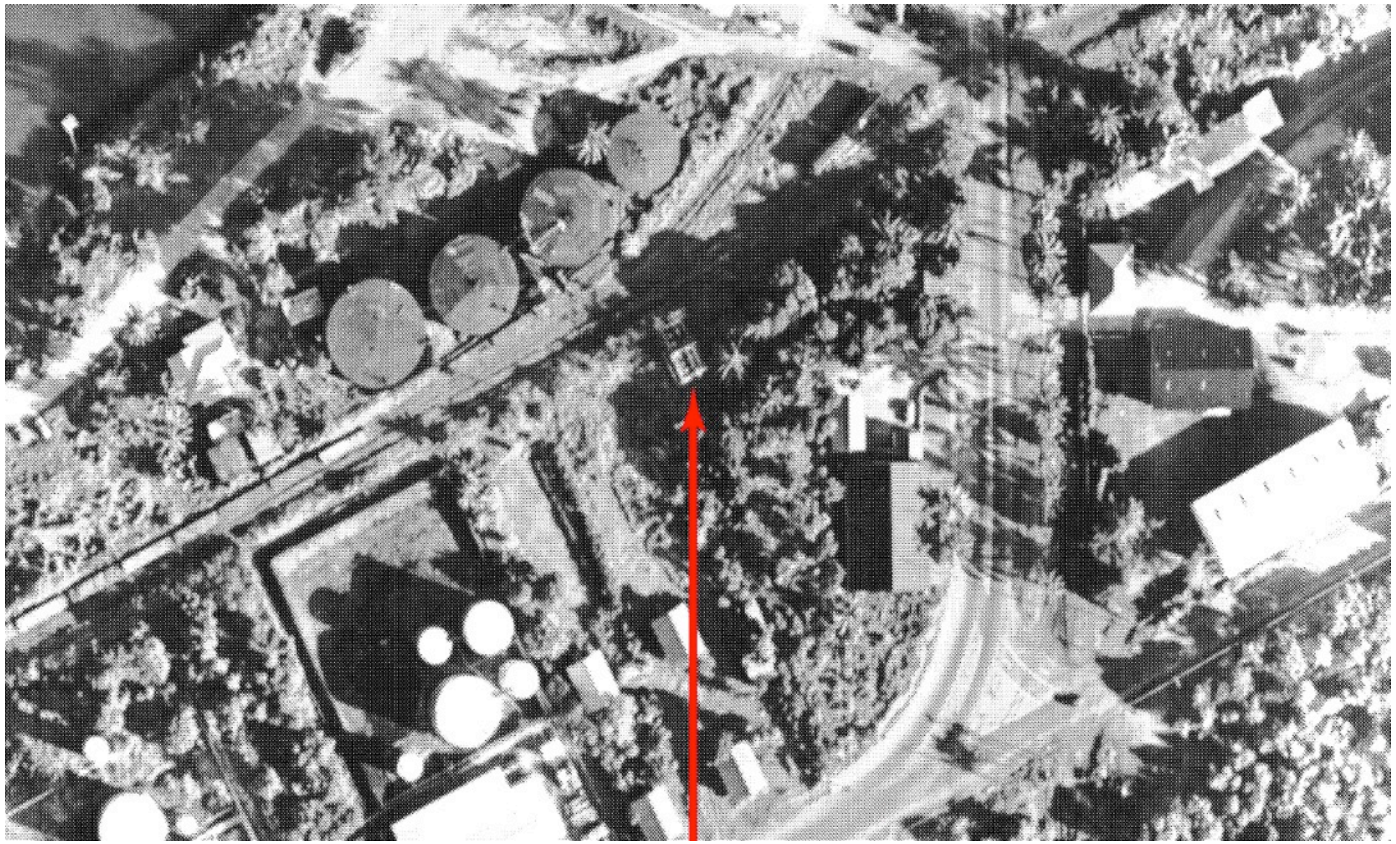
Hilo Harbor Petroleum Terminals

Abandoned/Sealed Petroleum Pipelines in Hilo Harbor Area



Oil Sheen on Shallow Groundwater in Hilo Harbor Area

1949 Aerial Photo of Hilo Harbor – Arrow Shows former HELCO Electrical Substation



Soil Sampling in a Waste Pile at a Landfill Site

Rights-of-Way – Potential for Soil Contamination from Historic Weed Control Activities.

Multiple Historic Contamination Sources are Identified in Soil in Hawai‘i County, including:

- Former Sugarcane Pesticide Mixing, Seed Dipping, and some field areas: **arsenic, and dioxins, mercury**
- Harbor areas: **petroleum**
- Historic Steel bridges: **lead**
- Former Landfills: **Metals, PAHs, or other**
- Former Large Above Ground Tanks: **lead**
- Building Foundation areas (<1988): **lead, arsenic, termiticides**
- Former Rights of Way: **arsenic or dioxins**
- Specific Commercial/Industrial Operations, e.g. Gas Stations and Auto Maintenance, Wood Treatment, Canec Mfg., etc. : **(site-specific contaminants)**

Questions?