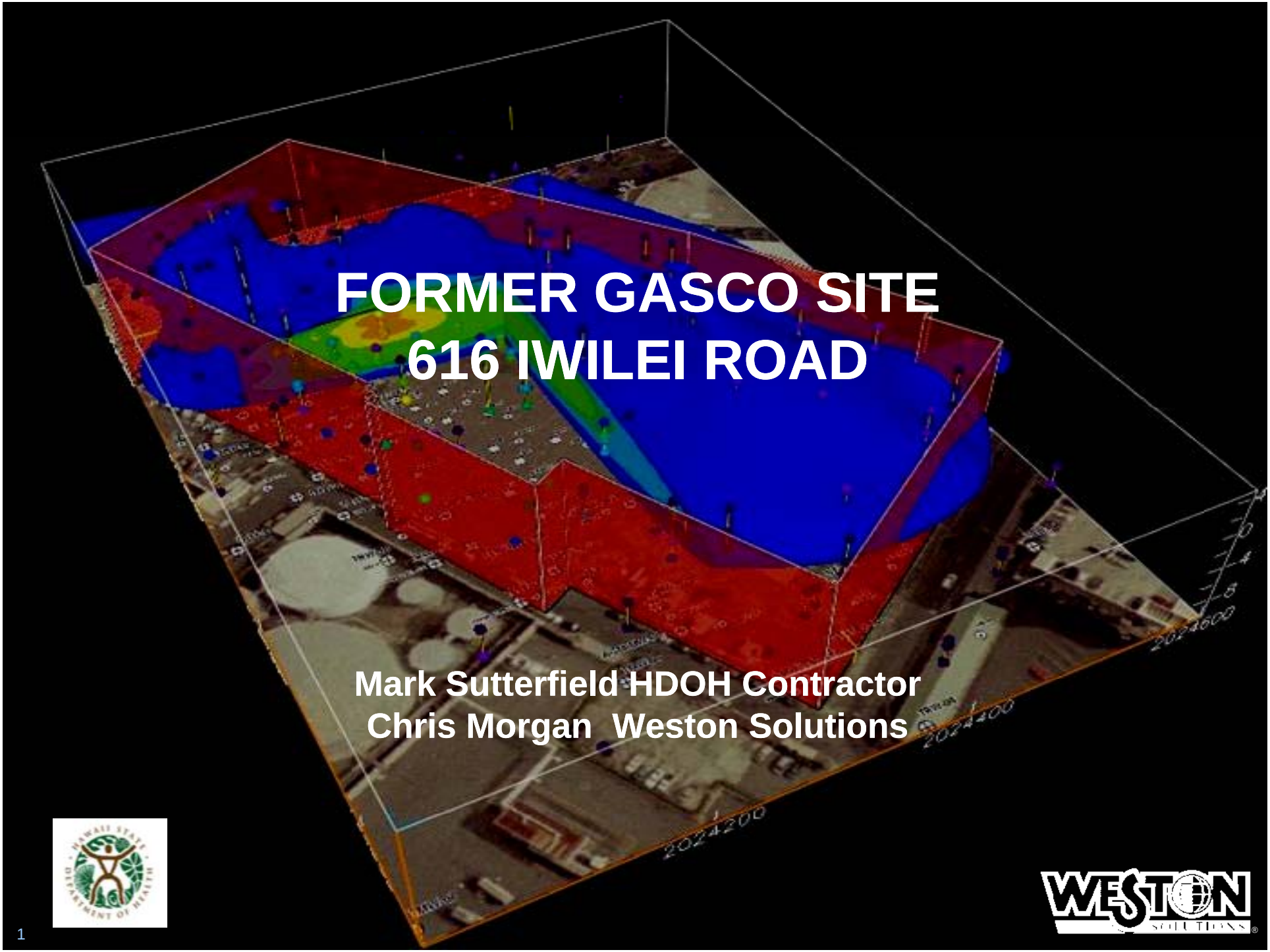
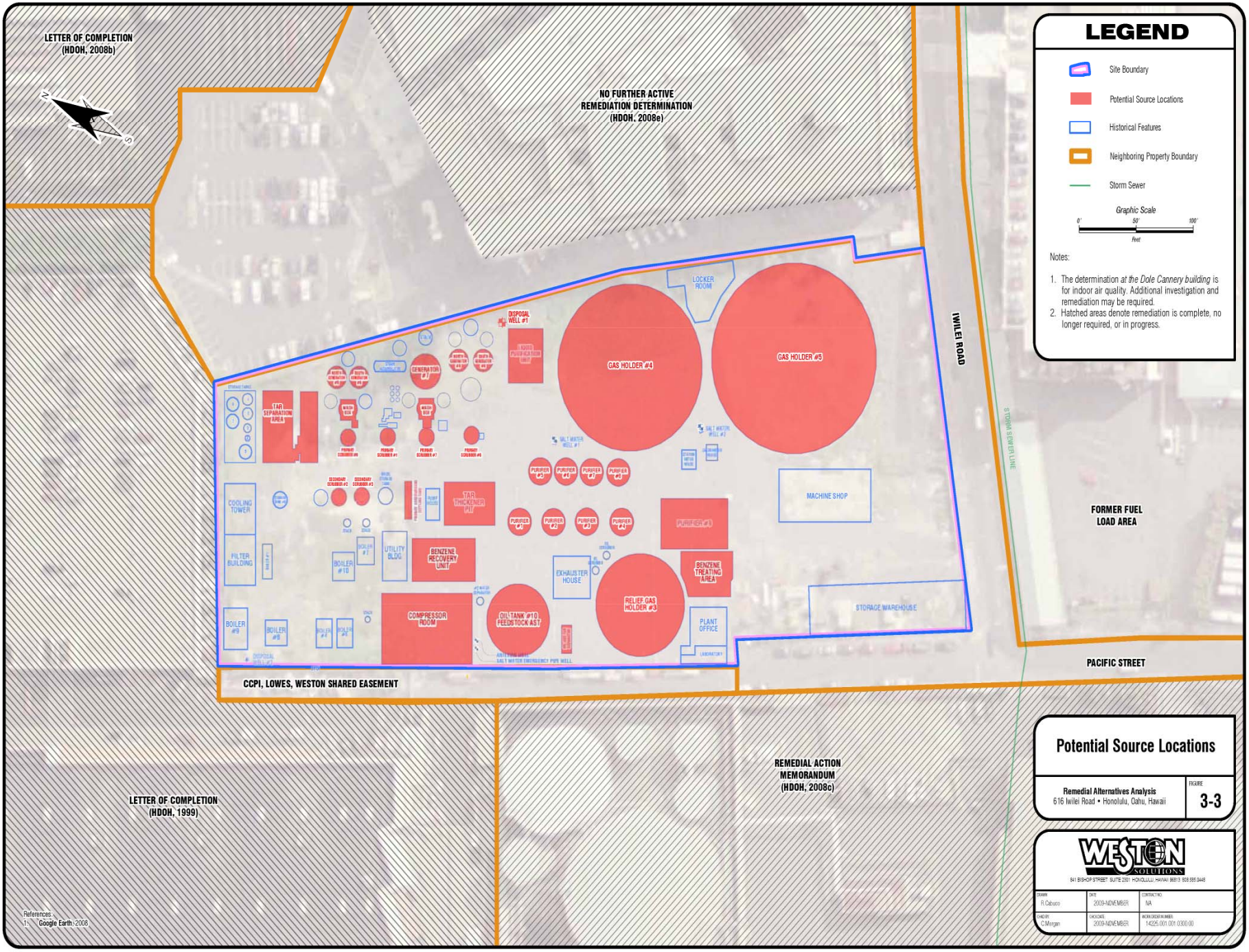


FORMER GASCO SITE
616 IWILEI ROAD

Mark Sutterfield HDOH Contractor
Chris Morgan Weston Solutions

General Overview

- VRP process
- Regulatory history pre-WESTON
- Stakeholders
- HDOH lessons learned
- Site Background
- Acquisition of the Property
- Remedial Investigation/Hazard Evaluation/Exit Strategy/Remedial Alternatives Analysis
- ISCO/Source reduction
- Upcoming events
- Weston lessons learned


LETTER OF COMPLETION
(HDOH, 2008b)
NO FURTHER ACTIVE
REMEDIATION DETERMINATION
(HDOH, 2008e)
IWILEI ROAD
STORM SEWER LINE
FORMER FUEL
LOAD AREA
PACIFIC STREET
CCPI, LOWES, WESTON SHARED EASEMENT
REMEDIAL ACTION
MEMORANDUM
(HDOH, 2008c)
LETTER OF COMPLETION
(HDOH, 1999)
LEGEND
Site Boundary
Potential Source Locations
Historical Features
Neighboring Property Boundary
Storm Sewer
Graphic Scale
0'
50'
100'
Feet
Notes:
1. The determination at the Dole Cannery building is for indoor air quality. Additional investigation and remediation may be required.
2. Hatched areas denote remediation is complete, no longer required, or in progress.
GAS HOLDER #4
GAS HOLDER #5
LOCKER ROOM
DISPOSAL WELL #1
GENERATOR #1
TAR SEPARATION AREA
COOLING TOWER
FILTER BUILDING
BOILER #10
UTILITY BLDG
BENZENE RECOVERY UNIT
TAR THICKENER AST
COMPRESSOR ROOM
OIL TANK #10 FEEDSTOCK AST
EXHAUSTER HOUSE
RELIEF GAS HOLDER #3
BENZENE TREATING AREA
PLANT OFFICE
MACHINE SHOP
STORAGE WAREHOUSE
References:
1. Google Earth 2008
Potential Source Locations
Remedial Alternatives Analysis
616 Iwilei Road • Honolulu, Oahu, Hawaii
FIGURE
3-3
WESTON SOLUTIONS
841 BISHOP STREET SUITE 2201 HONOLULU, HAWAII 96813 808.595.0448
DRAWN R. Cabuco
DATE 2009-NOVEMBER
CONTRACTOR NA
CHECKED C.Morgan
CHECKDATE 2009-NOVEMBER
WORK ORDER NUMBER 14225.001.001.0300.00

Voluntary Response Program Process Steps

- Phase I ESA
- Site Characterization Work Plan
- Site Characterization Report
- Remedial Investigation Report to include Fate and Transport (often Steps 3 and 4 are combined)
- Remedial Alternatives Analysis Report
- Draft Response Action Memorandum
- Public Participation
- Final Response Action Memorandum
- Remedial Action Report
- Letter of Completion

GASCO pre Weston

- Became Project Manager April 2003.
- Only several recent reports and one HDOH letter on file.
- Presently over 100 reports and 200 letters on file.
- Arcadis won a fixed price bid for remediation of the site.
- Arcadis wanted to submit technical memos instead of technical reports.
- Site is under a confidential court ordered Settlement Agreement dated Dec. 2000.
- Significant infighting between neighbors. Solution; copy all neighbors on everything.
- Site is also under an Agreement for Remedial Action with the State dated March 2004.
- Weston purchased the property including liability for remediation in January 2008.
- Site to be remediated to Commercial/Industrial levels.

Remediation pre Weston

- Original estimate of 6000-7000 lbs of contaminants.
- Present estimate of 3.4 million lbs. (1,540,000 kg) of contaminants including 130,000 lbs of benzene and 264,000 lbs of naphthalene.
- Majority of the contaminant mass is heavy tars that can be handled in place.
- Arcadis first used anaerobic culture enhancement consisting granular sodium nitrate as an alternative electron donor. Failed.
- Next Arcadis used the presumptive remedy of in situ air sparging and soil vapor extraction (IAS/SVE). Perimeter sodium percarbonate injection points were installed to prevent offsite migration.
- The IAS/SVE pilot test proved promising and was system expanded.
- Removed 60,000 lbs of VOCs but little impact on the groundwater.
- System abandoned based on diminishing returns.
- Arcadis reached the RI stage before Weston took over the site.
- Weston rewrote the RI.
- Weston now has an approved RAA and are at the DRAM stage.
- Secret to public participation is to get neighbors to agree to the solution in advance.
- Gasco property and CCPI building following separate remedial pathways.

Players Gasco Remediation

- Gasco Site: BHP, Weston, legal counsel, HDOH.
- Lowe's Site: Lowe's Corp., ESI, Conoco Philips, legal counsel, HDOH.
- Home Depot Site: Home Corp., Geosyntec, CCPI, legal counsel, HDOH
- Costco Site: Costco Corp., KSK Consulting, legal counsel, CCPI, HDOH.
- Chevron TTLR site: Chevron Corp., URS, legal counsel, CCPI, HDOH
- Dole Cannery Site: CCPI, Weston, KSK, legal counsel, HDOH.

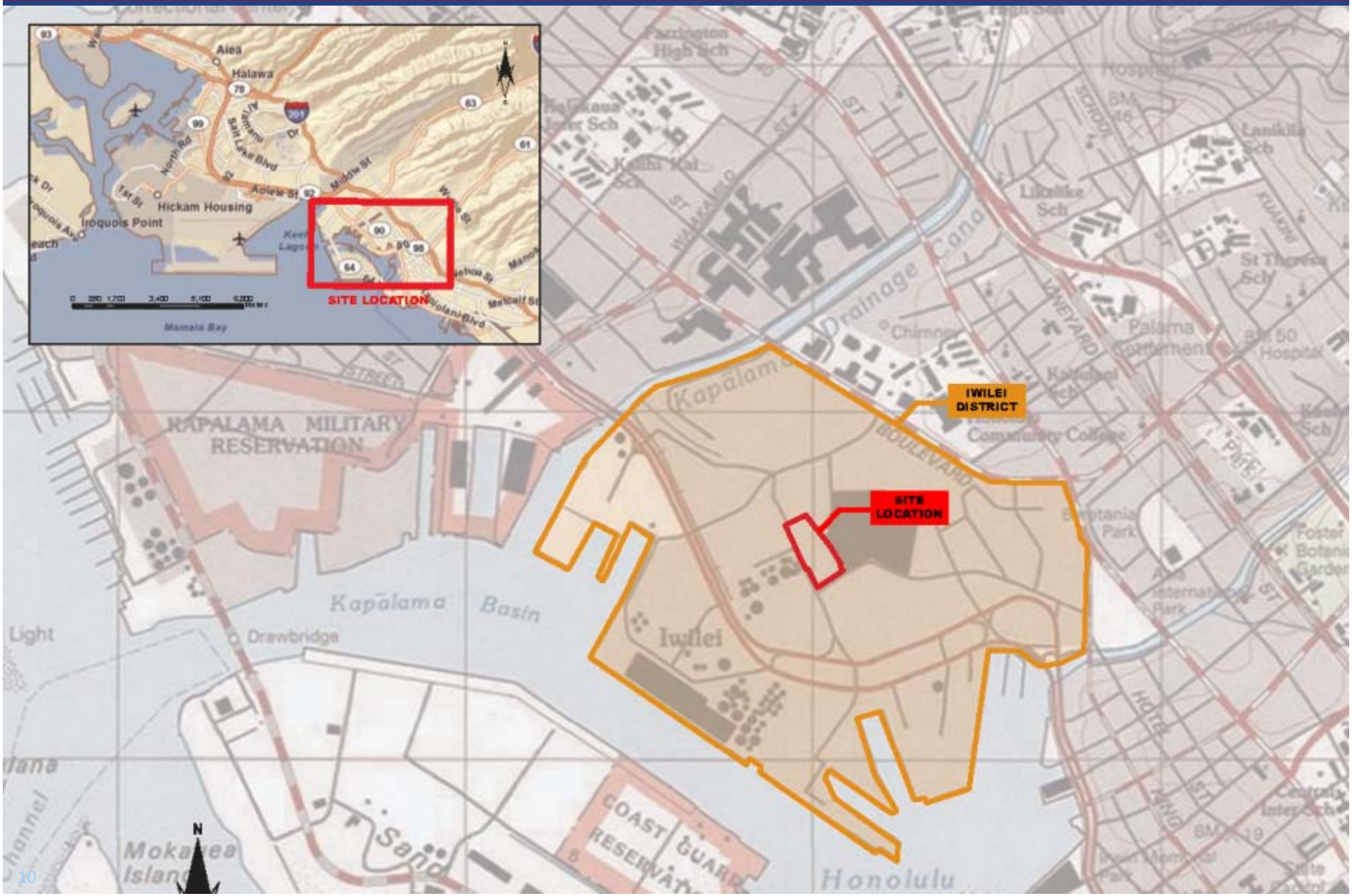
Lessons Learned by Regulator

- Teamwork Essential for Success
- Keep all Interested Parties Informed
- Negotiate Rather than Litigate
- Use Bench and Pilot Tests
- Be Wary of Presumptive Remedies
- Facilitate If Possible
- Stay Out of Internal Conflicts

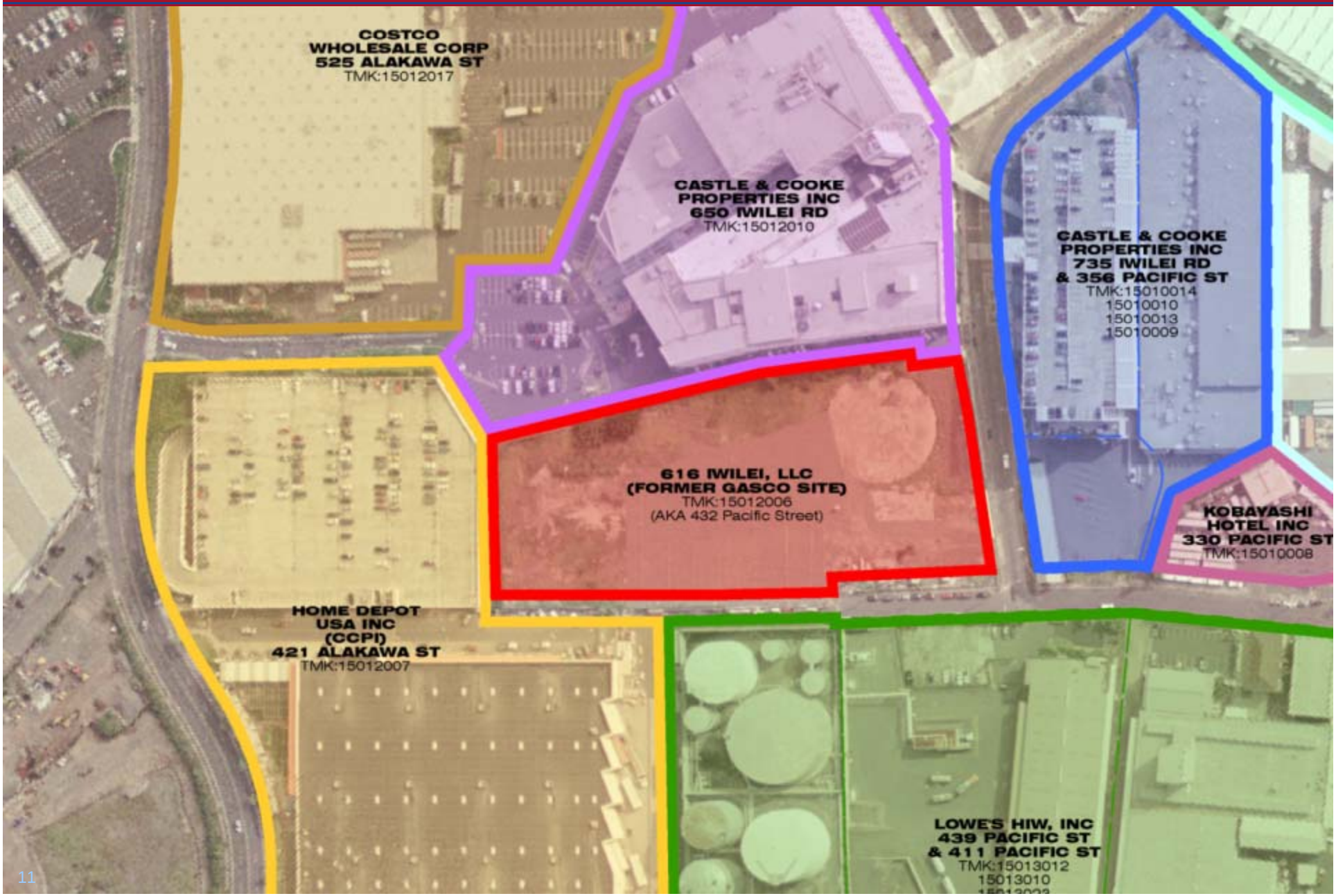
Site Background

- 4 Acre Former MGP located in Honolulu, HI
  - Produced gas for lighting and domestic/ commercial/industrial uses.
- Operated between 1905 and 1977
- Petroleum (not coal) based process
- Demolished in 1990
- Site Investigations 1980 through 2004

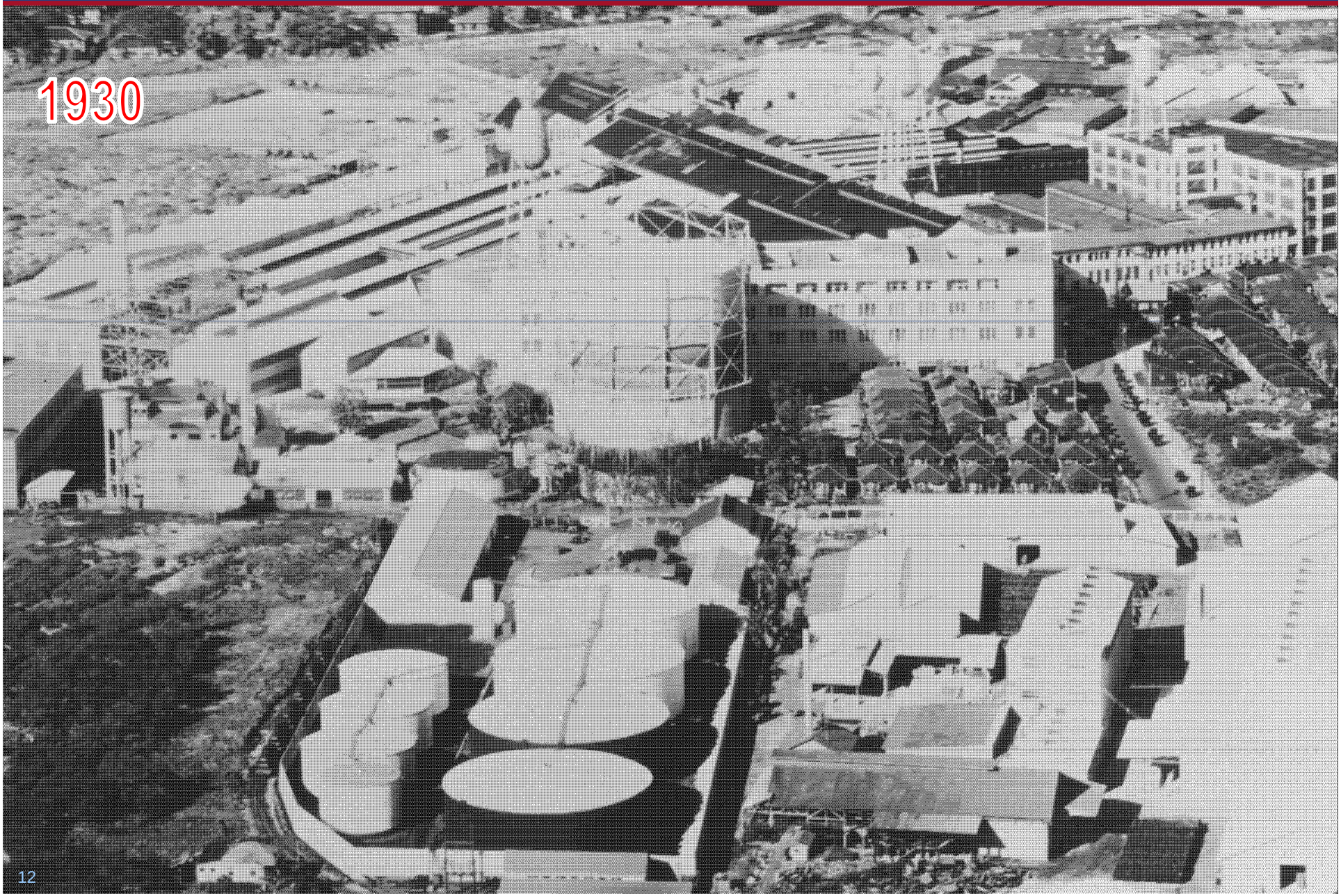
Site Background - Location Map



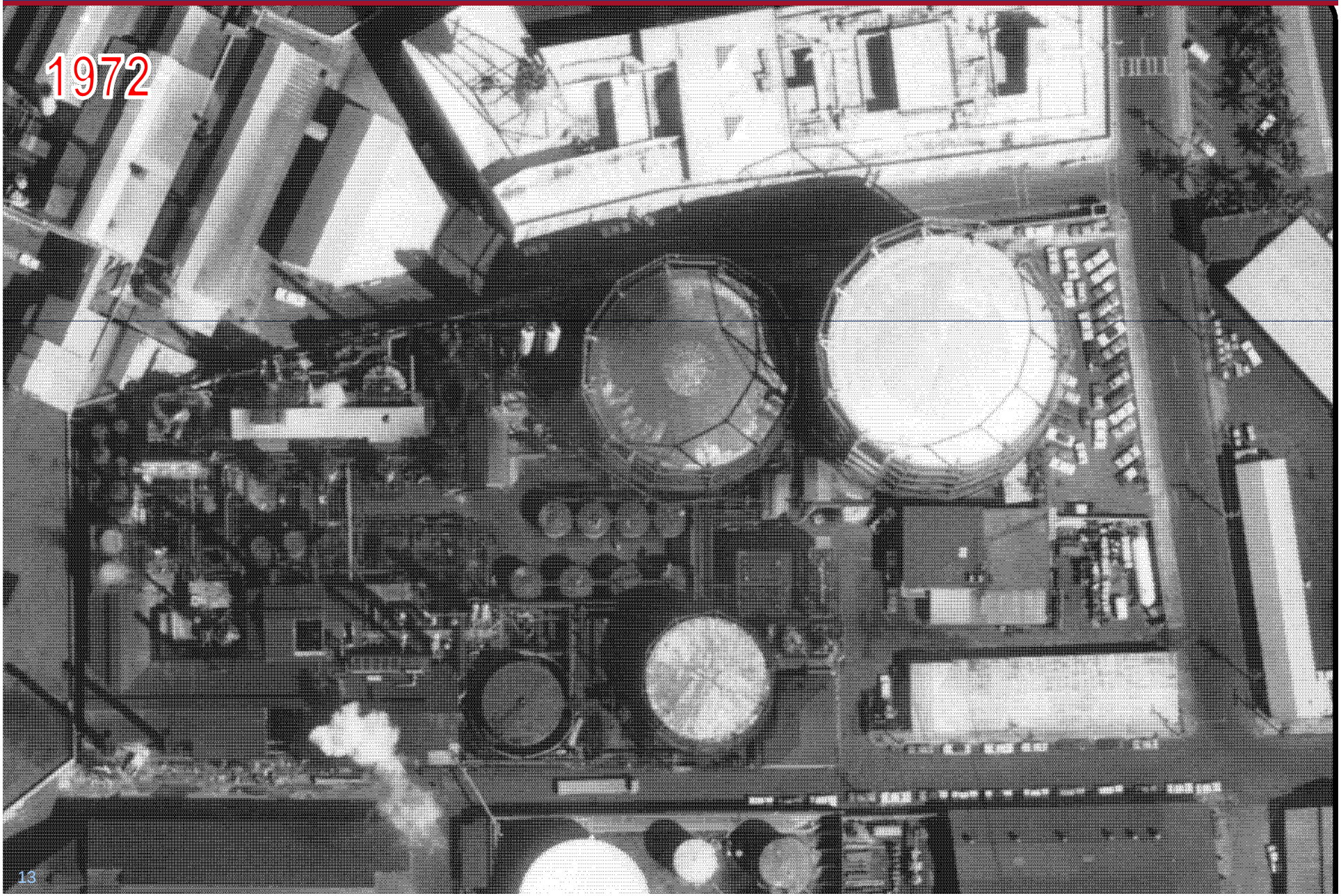
Site Background - Vicinity Map



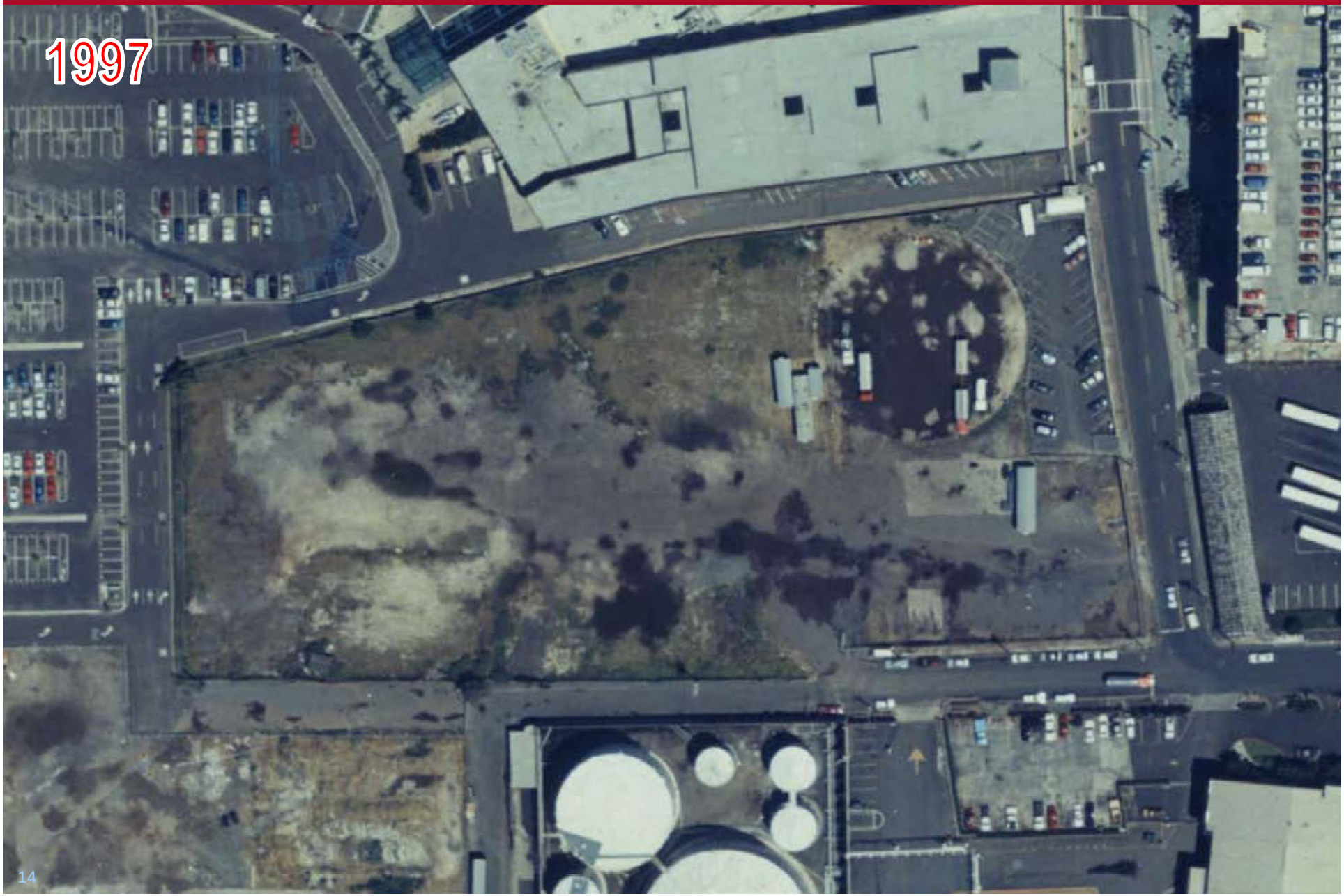
Site Background - Photos



Site Background - Photos



Site Background - Photos



Site Background - Photos

Acquisition

- Completed ELTA and acquired property in 2008
- Why (i.e., are we crazy)? Corporate vision to bring contaminated properties into productive reuse
- How? Networking, patience, and lots of imagination

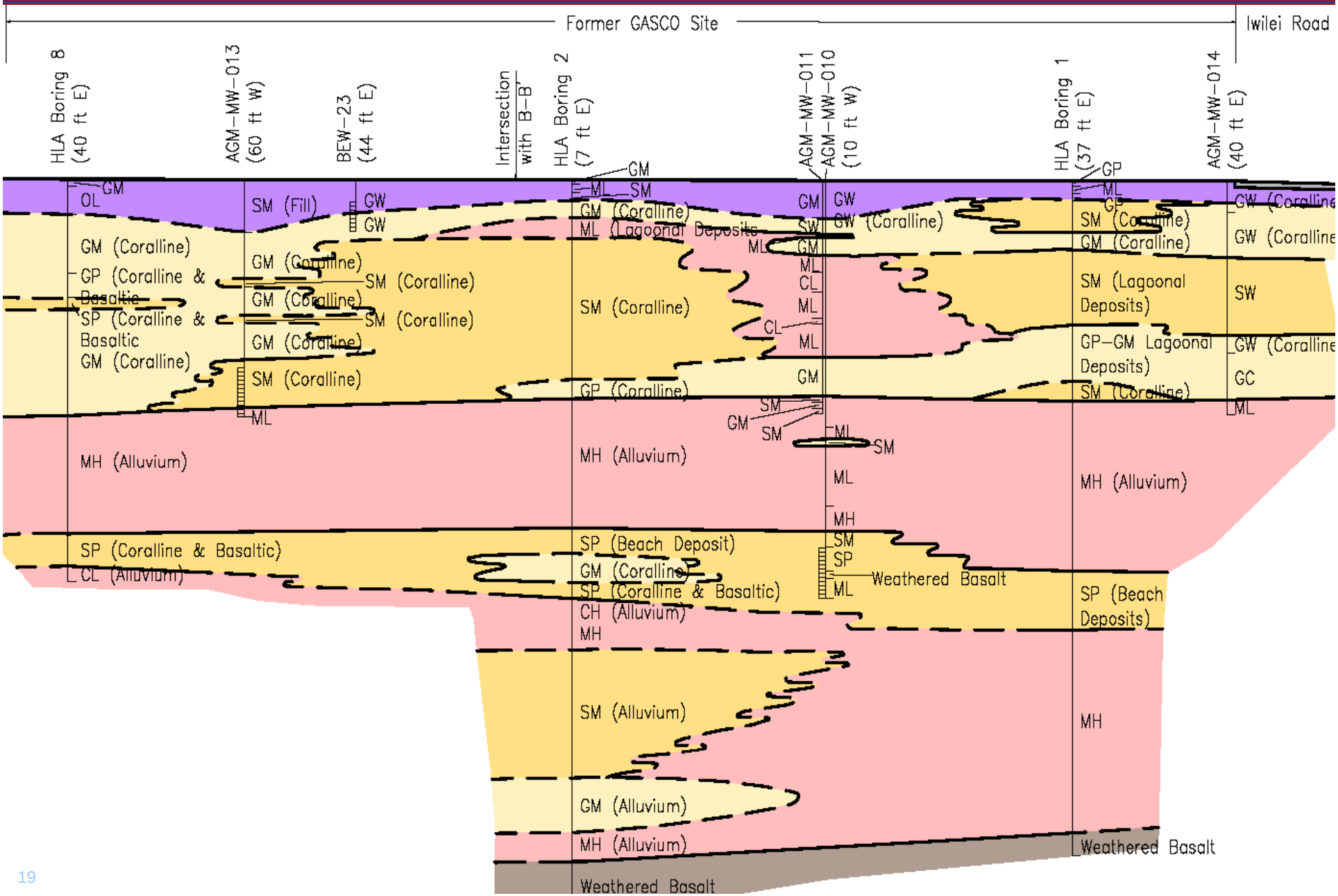
Acquisition – Due Diligence

- Iterative Process
  - Research/Investigation, Regulatory Process/Climate, Agreements, Neighbors, & Potential outcomes
- Response Action Plan
  - Preliminary RI/RAA, Risk analysis, Internal/external remediation experts, Internal reviews, Insurance, Financing, & Third party reviews
- Coordination
  - ELTA, Insurance, & Financing

Remedial Investigation

- Used existing investigation data
  - Extent defined with exception of Dole Cannery
  - Over 200 soil samples
  - Decade of groundwater monitoring at more than 60 locations
- Understand process
  - History
  - Potential source
  - Nature of contamination

Remedial Investigation - Lithology



Remedial Investigation - Chemicals of Concern

VOCs	PAHs	TPH
benzene	anthracene	TPH-g
toluene	benzo(a)pyrene	TPH-d
ethylbenzene	benzo(b)fluoranthene	TPH-o
xylenes	dibenzo(a,h)anthracene	
	fluorene	
	indeno(1,2,3-c,d)pyrene	
	1- and 2-methylnaphthalene	
	naphthalene	
	phenanthrene	
	pyrene	

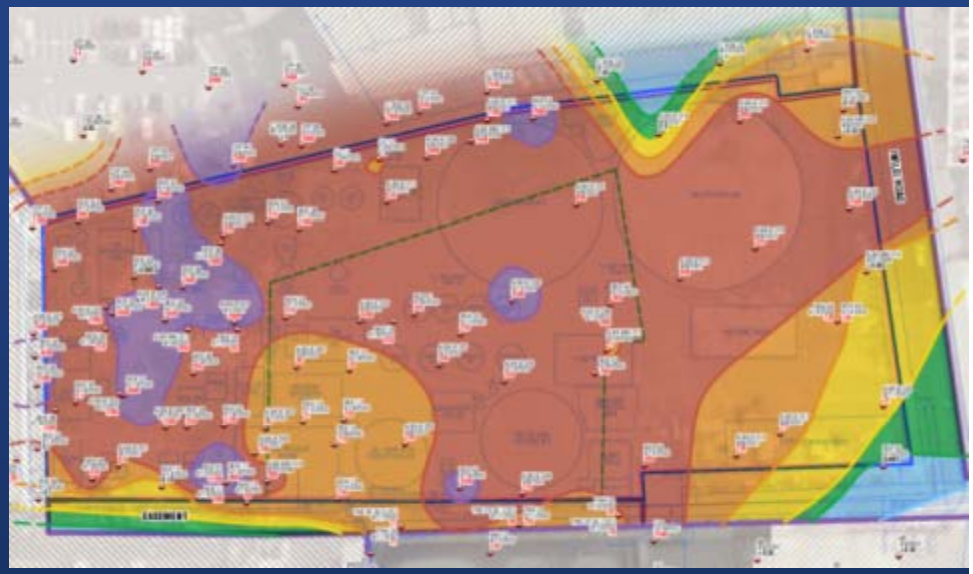
Remedial Investigation - Estimated Mass SP3

COPC	Vadose Soil (kg)	Shallow Saturated Soil (kg)	Deep Saturated Soil (kg)	Ground water (kg)	COPC Total (kg)	% of Total Mass
Benzene	340	49,000	7,300	3,000	60,000	3.9 %
Toluene	250	18,000	4,500	190	23,000	1.5 %
Ethylbenzene	220	12,000	2,800	<100	15,000	1.0 %
Xylenes	100	7,600	5,000	<100	13,000	0.8 %
Naphthalene	5,500	54,000	63,000	<100	120,000	7.8 %
Benzo(a)pyrene	1,500	530	8,300	180	11,000	0.7 %
TPH-g	2,700	230,000	50,000	5,000	290,000	19 %
TPH-d	13,000	500,000	380,000	n/a	890,000	58 %
TPH-o	37,000	220,000	98,000	n/a	360,000	23 %
				Mass of Contamination	1,540,000	100 %

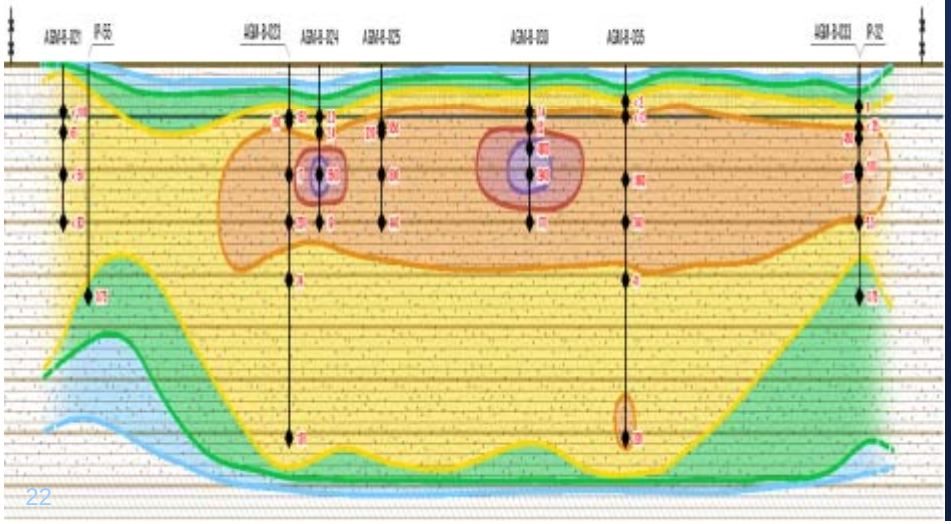
Slide 21

SP3 suggest making this pounds to match slide 6
Sims, Paige, 5/10/2011

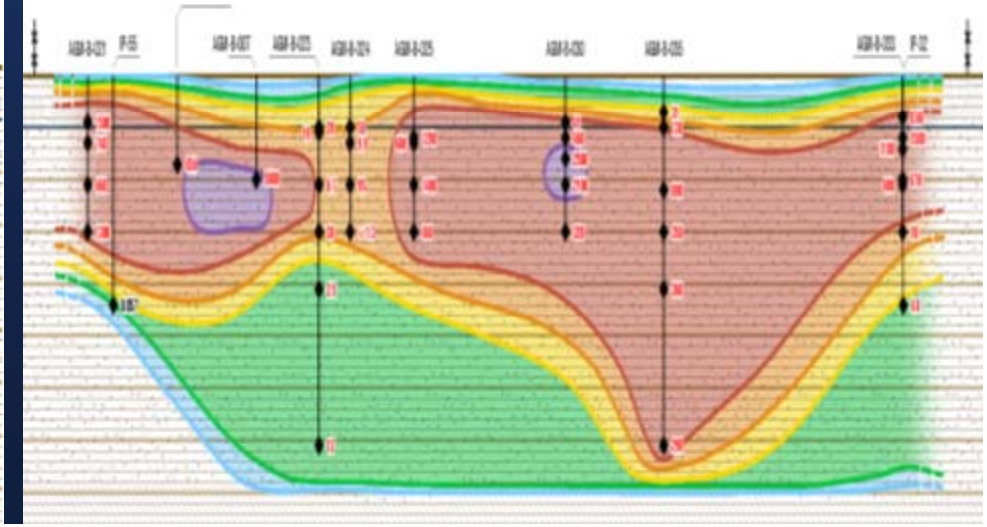
Remedial Investigation - Extent



Benzene



Naphthalene

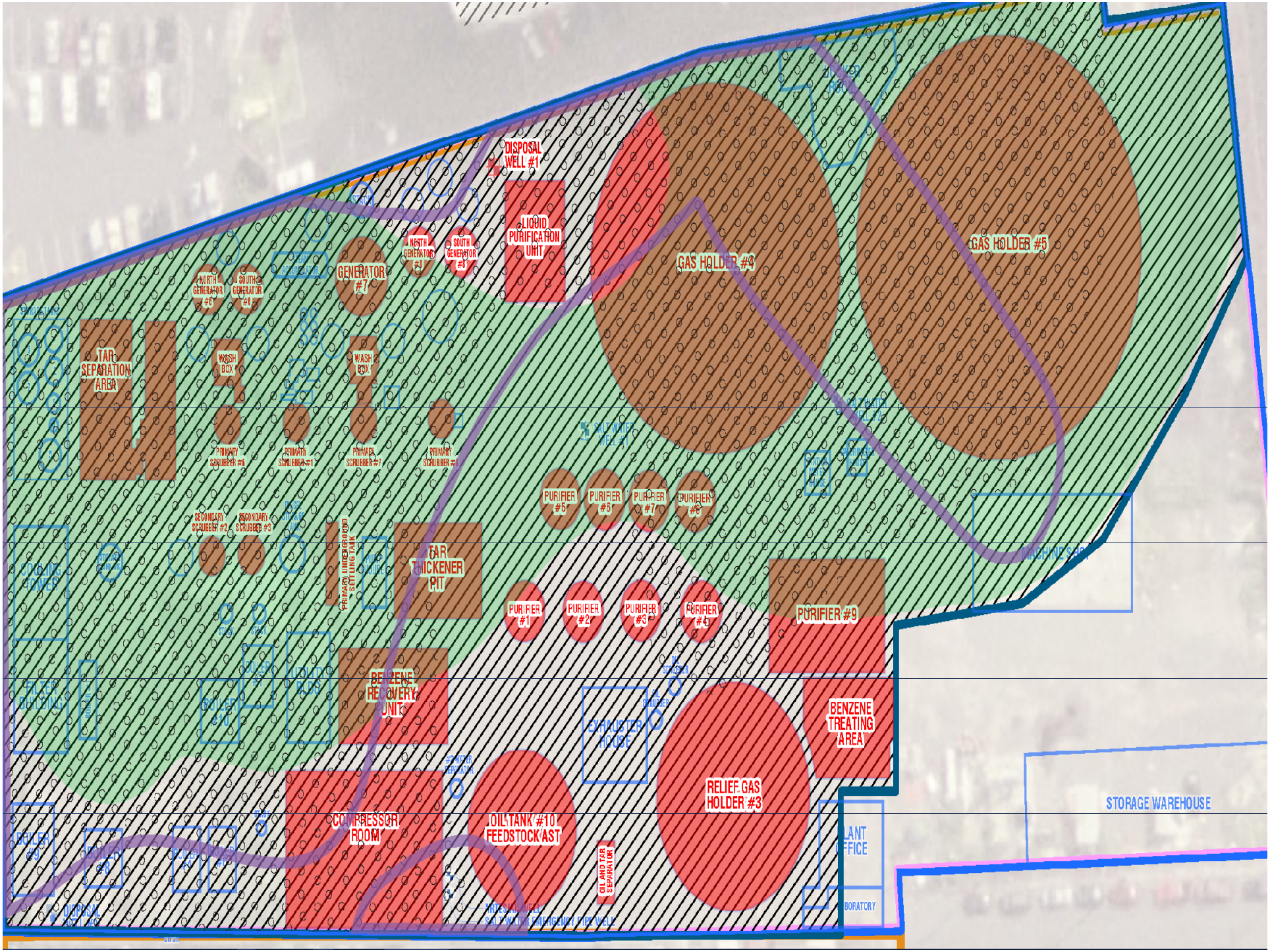


Remedial Investigation Highlights

- Extent
  - Spans the site
  - Several potential sources
  - Mainly shallow with isolated areas of deeper contamination
  - Broad extent attributed to mobilization caused by water extraction & hot fluid injection
  - Most migration likely occurred during operations
  - Extent undefined offsite at Dole Cannery
- Nature
  - Mass mainly heavier hydrocarbons (TPH-d and o)
  - High fraction aromatic compounds
  - Tar-like NAPL highly immobile and acts like VOC sponge

Hazard Evaluation

- Environmental Hazard Evaluation (streamlined risk assessment) using HDOH EALs
- Considered site-specific factors
  - Likely receptors (understand future use)
  - Potential impacts to drinking water & surface water
- Identified potential hazards to human health & the environment
  - Agglomeration of individual chemical hazards
  - Specific hazards (e.g., vapor intrusion, direct exposure, ecological toxicity) evaluated separately


DISPOSAL WELL #1
LIQUID PURIFICATION UNIT
NORTH GENERATOR #3
SOUTH GENERATOR #3
GENERATOR #7
NORTH GENERATOR #6
SOUTH GENERATOR #6
GAS HOLDER #4
GAS HOLDER #5
TAR SEPARATION AREA
WASH BOX
WASH BOX
PRIMARY SCRUBBER #8
PRIMARY SCRUBBER #1
PRIMARY SCRUBBER #7
PRIMARY SCRUBBER #2
SECONDARY SCRUBBER #2
SECONDARY SCRUBBER #3
PURIFIER #5
PURIFIER #6
PURIFIER #7
PURIFIER #8
TAR THICKENER PIT
PURIFIER #1
PURIFIER #2
PURIFIER #3
PURIFIER #4
PURIFIER #9
BENZENE RECOVERY UNIT
EXHAUSTER HOUSE
BENZENE TREATING AREA
RELIEF GAS HOLDER #3
COMPRESSOR ROOM
OILTANK #10 FEEDSTOCK AST
OIL AND TAR SEPARATOR
STORAGE WAREHOUSE

Hazard Evaluation Highlights

- No immediate threat to human health or the environment
- Not a threat to drinking water
- Potential hazards across most of the site
- Development cannot begin without treatment
- Vapor intrusion primary hazard
- Benzene and naphthalene are hazard drivers

Exit Strategy

- Requested by HDOH to define future use and remedial targets
- Achieving "unrestricted use" unlikely; risk-based goals (based on State Contingency Plan) required
  - Target ECR of 10-4 for PAHs and 10-5 for benzene
  - Engineering controls likely required to achieve an ECR of 10-6 or less.
  - Post treatment hazards to be evaluated using soil vapor and groundwater concentrations

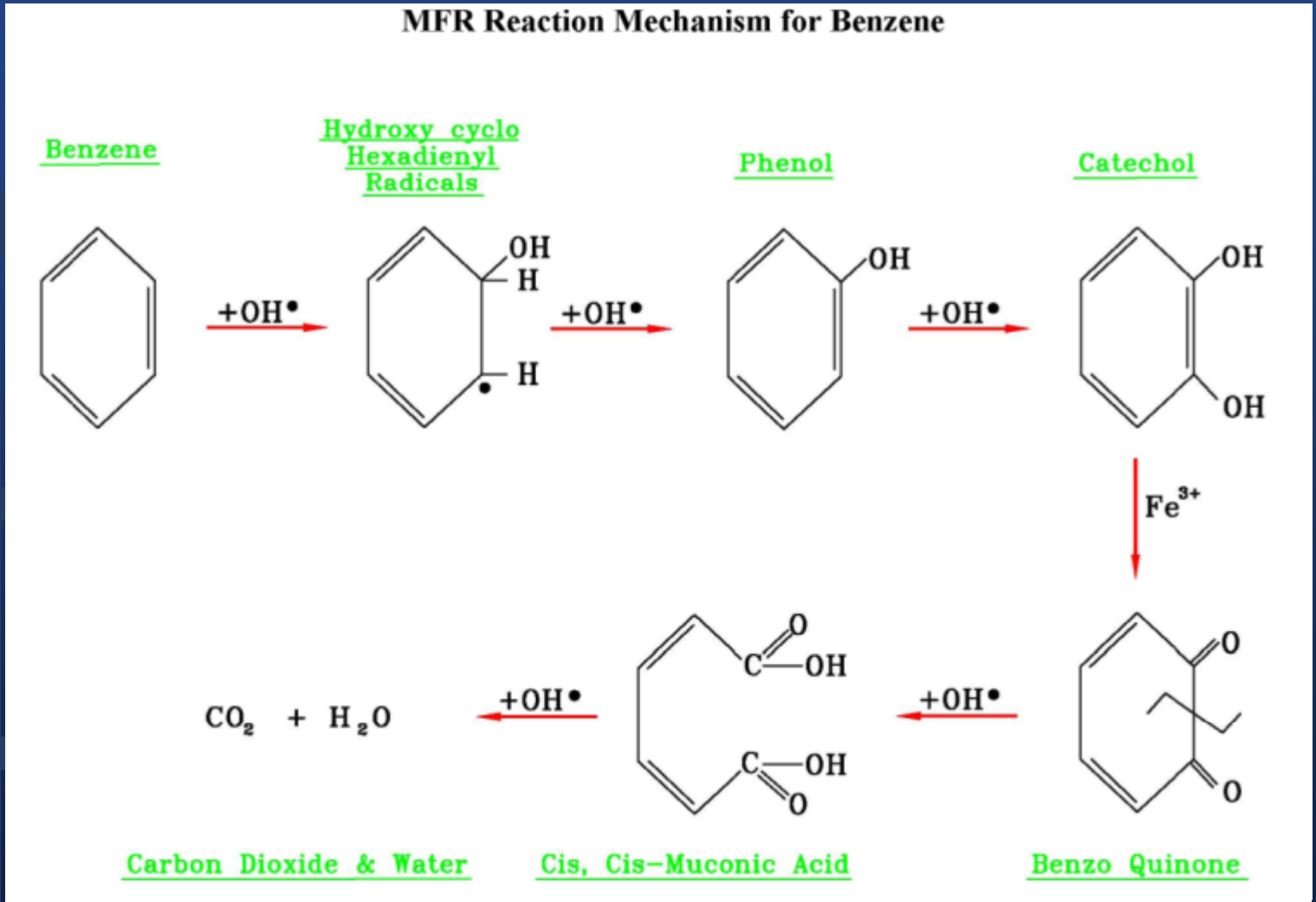
Remedial Alternatives Analysis

- Alternative analysis began during due diligence
  - EPA guidance
  - Collaboration with other offices
  - Third party consultants
  - Technology experts and suppliers
- Effectiveness, Implementability & Cost
  - Site specific conditions: Location, availability, lithology, regulations, impacts & energy
- ISCO pilot testing
  - Modified Fenton's Reagent
    (hydrogen peroxide activated by an iron catalyst)
  - Activated Sodium Persulfate
- MGP conference

Remedial Alternatives Analysis Report

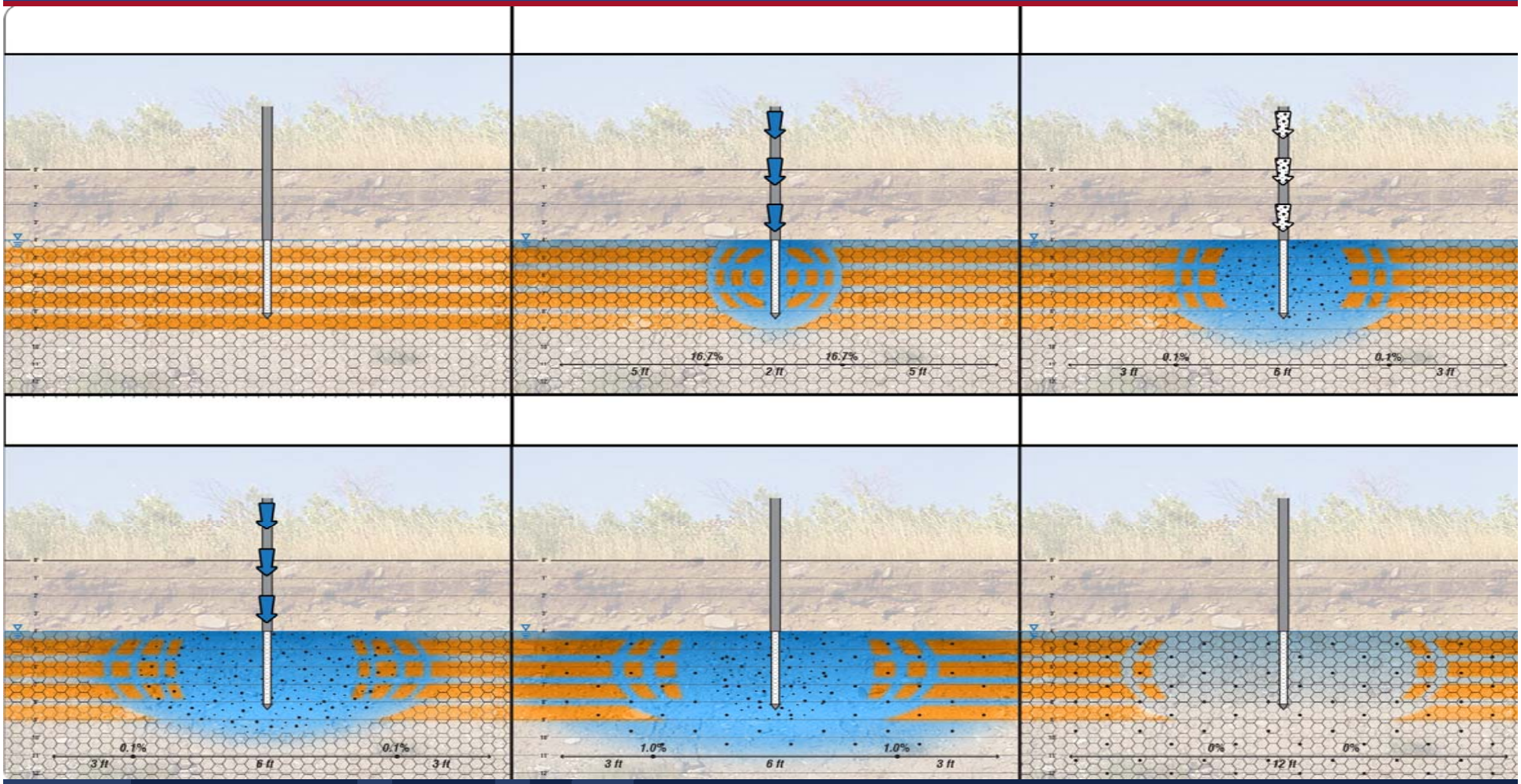
- Remedial Investigation & Exit Strategy are basis
- Three potential remedies
  - In situ chemical oxidation (ISCO)
  - In situ thermal desorption (ISTD)
  - Excavation and Ex situ thermal desorption
- ISCO determined to be the best alternative
  - SVE required to control vapors.
  - MFR (hydrogen peroxide) could not be used near building due to potential off-gassing
  - More expensive but slow reacting (no off-gassing concern) activated sodium persulfate recommended near buildings
- Contingency actions included to help mitigate regulatory risks

ISCO – MFR Reduction Pathway



Courtesy: ISOTEC

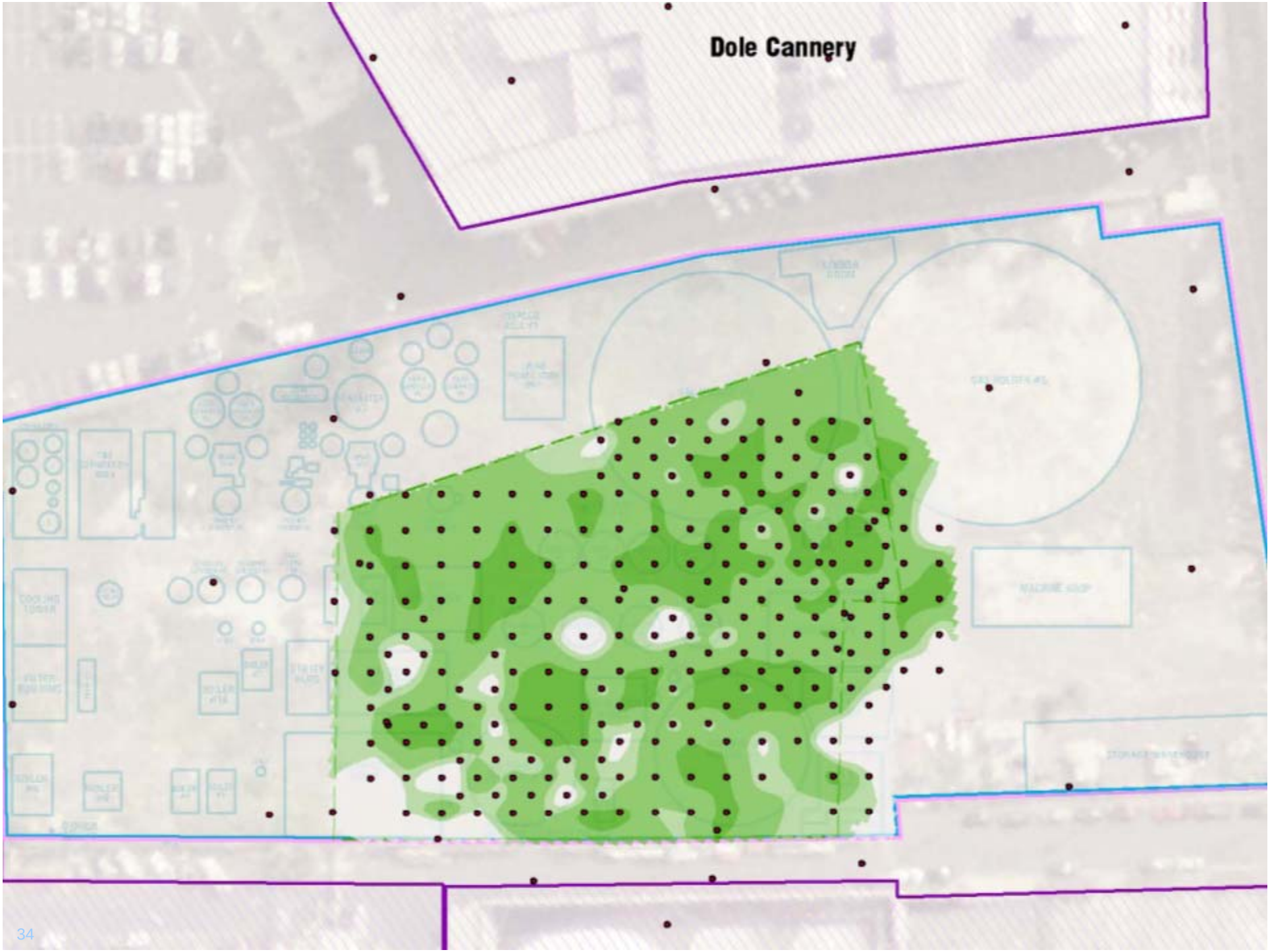
ISCO Sequence



RAA – Pilot Injection Photos

Source Reduction

- Pilot treatment using MFR and SVE expanded to entire SVE area (~30% of the site)
- Goal: Significantly reduce contamination in SVE area and validate MFR/SVE treatment process
- Approximately 250,000 gal. of 17% HP solutions and 70,000 gal. of iron catalyst solution were injected in 220 injection points over an 8-week period
- More than 50% reduction of benzene in groundwater
- Estimated 38,000 to 53,000 pounds of contaminant destroyed, mostly benzene
- Treatment prematurely halted after incident on 10 September 2010


Dole Cannery

Upcoming Events

- Draft Response Action Memorandum (DRAM)
- Public Participation
- Final RAM
- Remedial Design
- Remedial Action
- Remedial Action Report
- Conditional Letter of Completion
- Redevelop Site

Weston Lessons Learned

- Invest in due diligence; more is better
- Thoroughly understand all of the risks and potential downsides and provide funding to cover potential downsides
- Collaborate with peers and request third party evaluations
- Patience
- Negotiate agreements (such as access) as early as possible
- Communication
- Work with regulators to establish realistic treatment goals early
- Pilot test
- Contingency actions with defined triggers may help mitigate regulatory risks

Contact Info

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