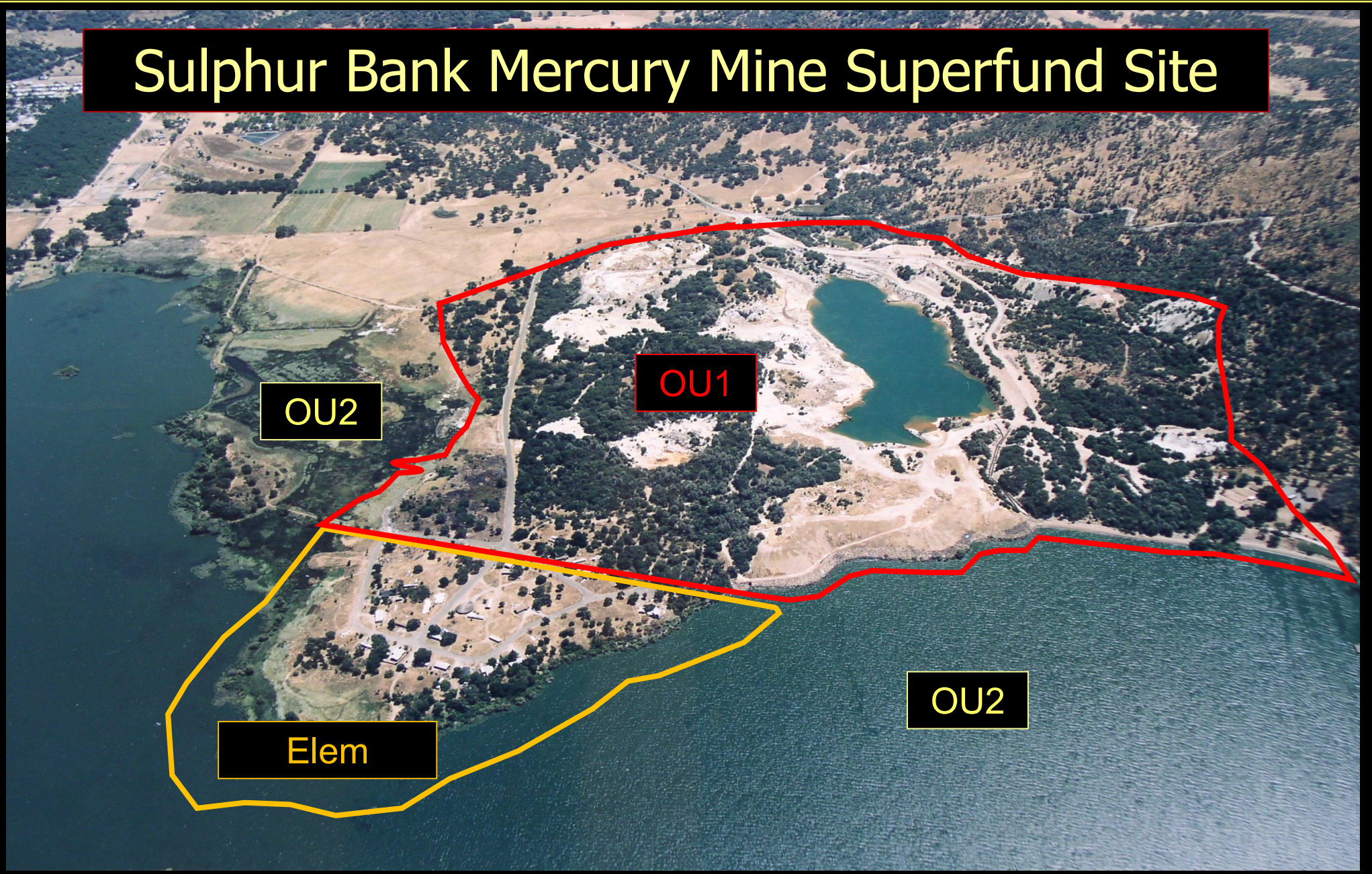
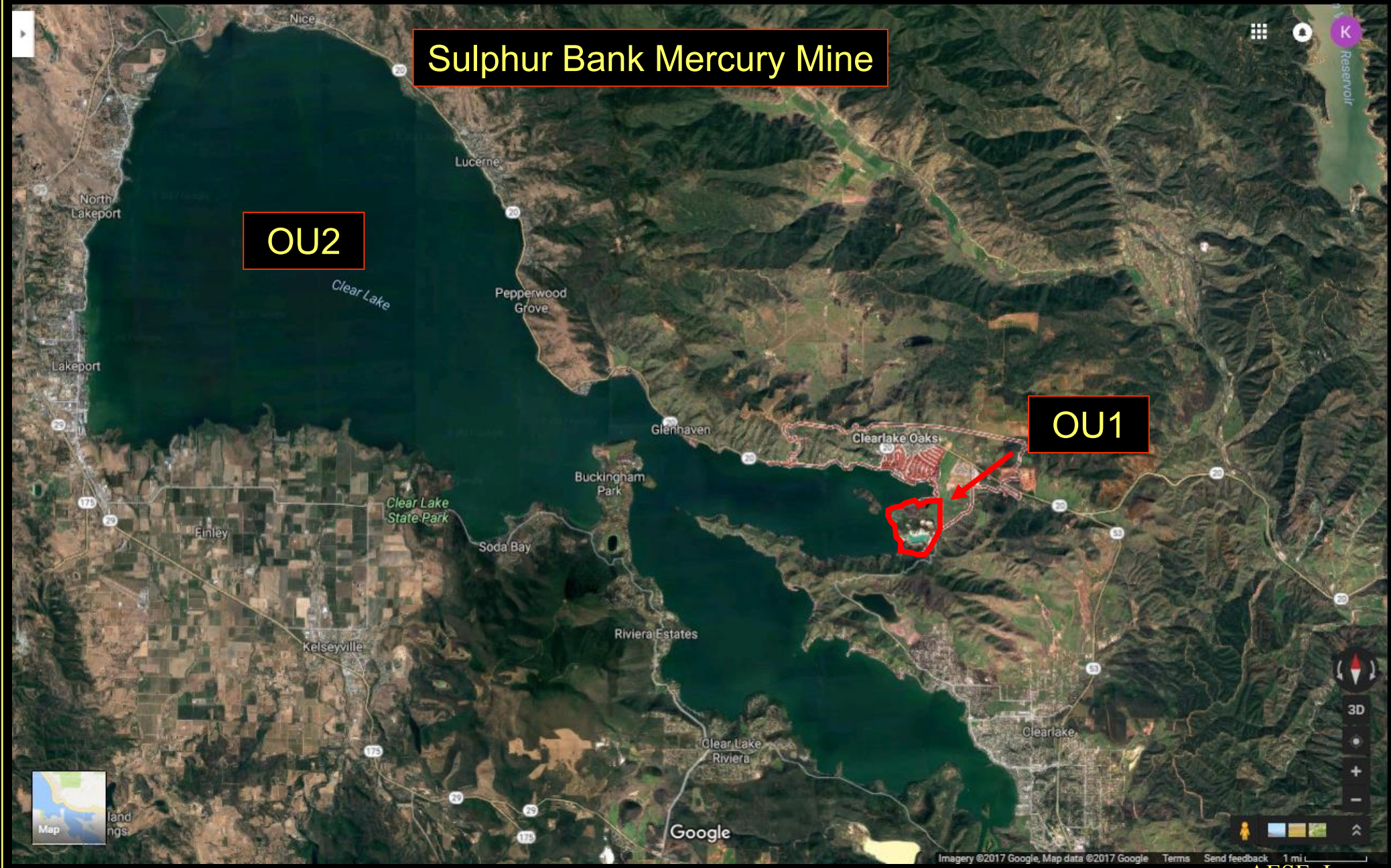
ELEM INDIAN COLONY


Sulphur Bank Mercury Mine Superfund Site
OU2
OU1
OU2
Elem
AESE, Inc.


Sulphur Bank Mercury Mine
OU2
OU1
Nice
Lucerne
North Lakeport
Clear Lake
Pepperwood Grove
Lakeport
Glenhaven
Clearlake Oaks
Buckingham Park
Clear Lake State Park
Finley
Soda Bay
Riviera Estates
Kelseyville
Clear Lake Riviera
Clearlake
Reservoir
Map
Google
Imagery ©2017 Google, Map data ©2017 Google
Terms
Send feedback
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3D

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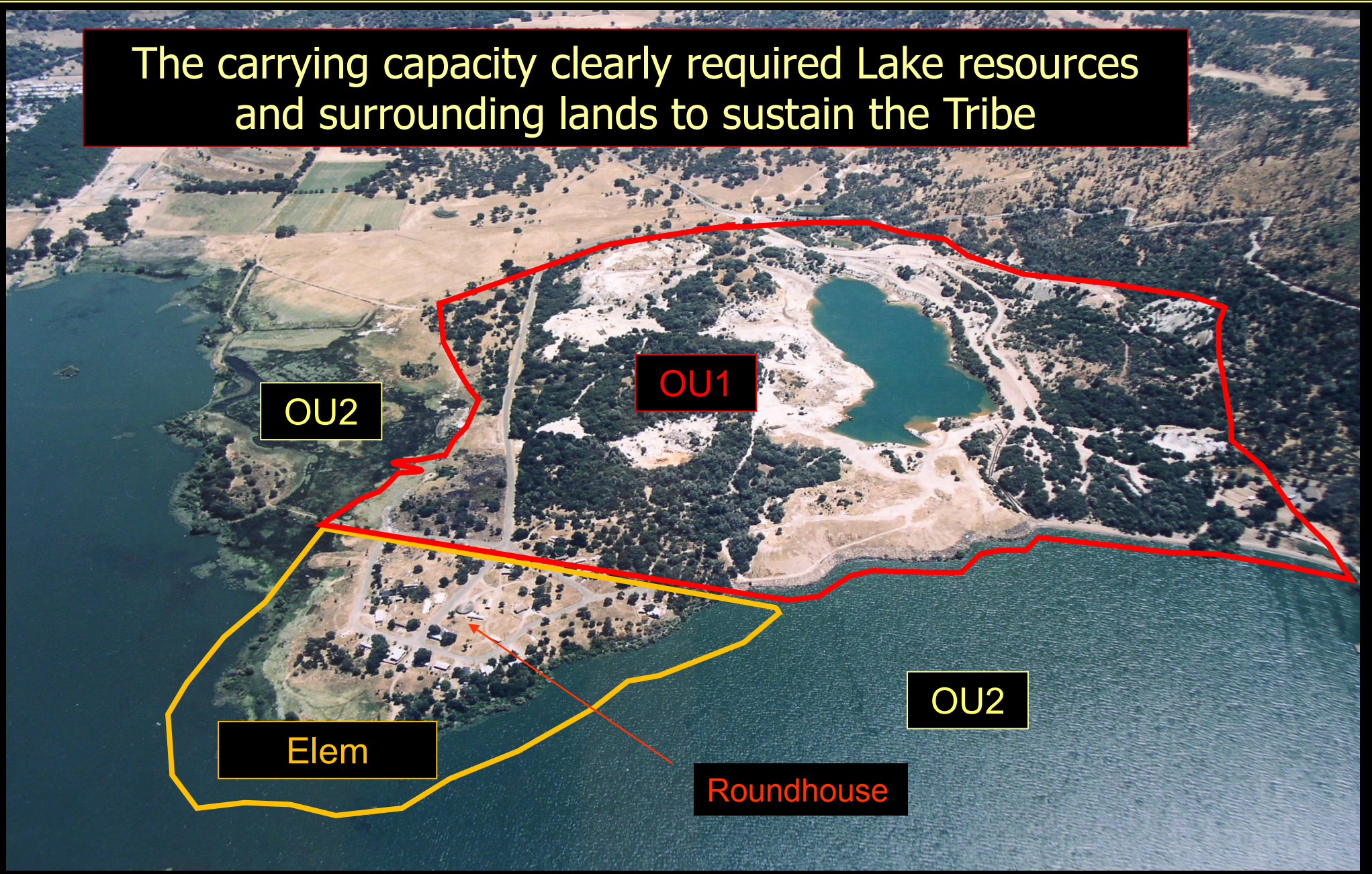
The Area
Launch Google Earth


The carrying capacity clearly required Lake resources and surrounding lands to sustain the Tribe
OU2
OU1
OU2
Elem
Roundhouse
AESE, Inc.

AESE, Inc.

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1. Indian Reservations are lands set aside or reserved by the U.S. for the benefit of the a Tribe and are designed to provide all the necessary sustenance for the subject Tribe

2. Reservation can be conceptualized as an Island with Finite Resources

3. Each Acre Lost to Contamination (or Stigma Associated with Contamination) or Development Results In:

- Reduction of the Carrying-Capacity of the Land (Number of Members Able to Practice Traditional Cultural Lifeways)
- Members Currently Practicing Traditional Lifeways Must Relinquish Some Uses to Other Members

4. A Reservation is the only place on earth where Tribes can practice self-governance

Bottom Line: ALL Land is Highly Valuable to the Tribe and therefore must be Preserved for All Future Uses (PAFU)

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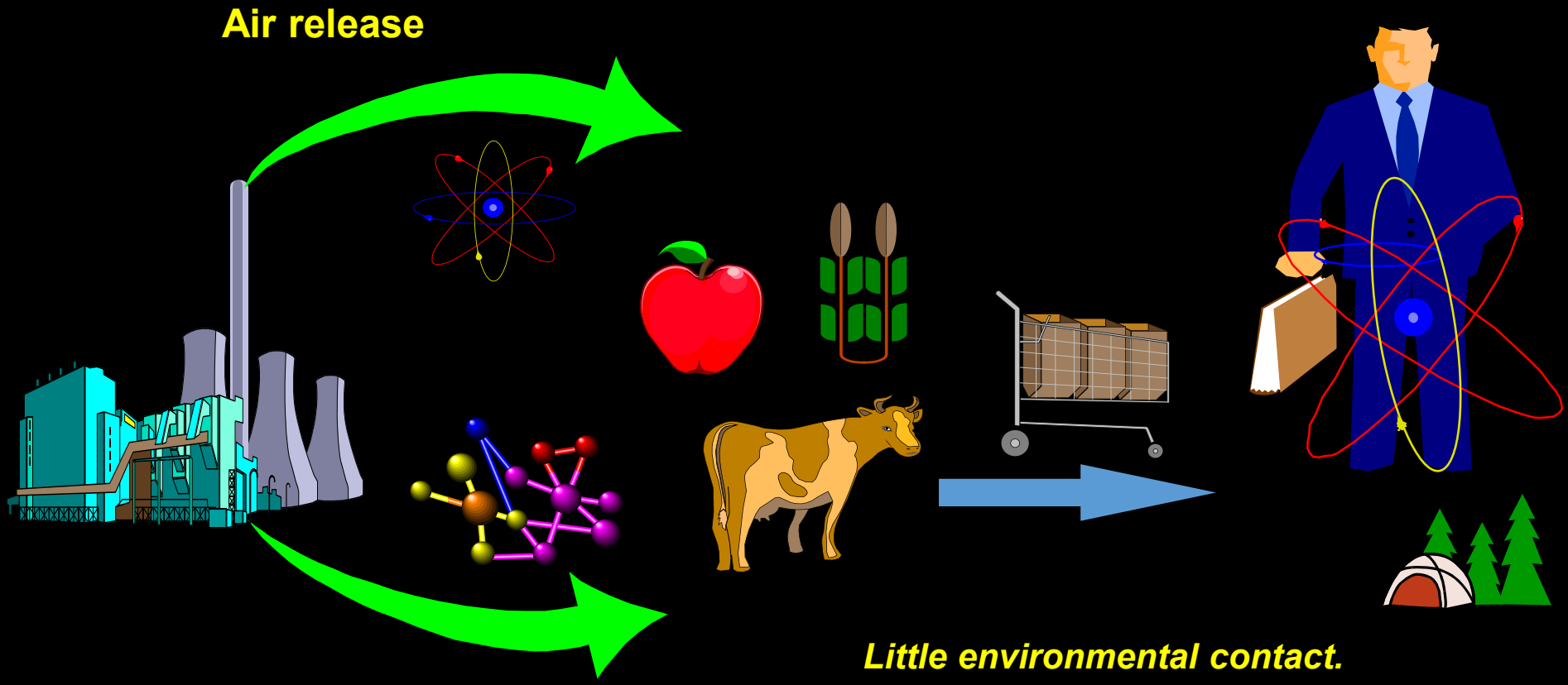
Simplified Concept of a Suburban Exposure Scenario



Little environmental contact.
Few exposure pathways.
Some environmental recreation

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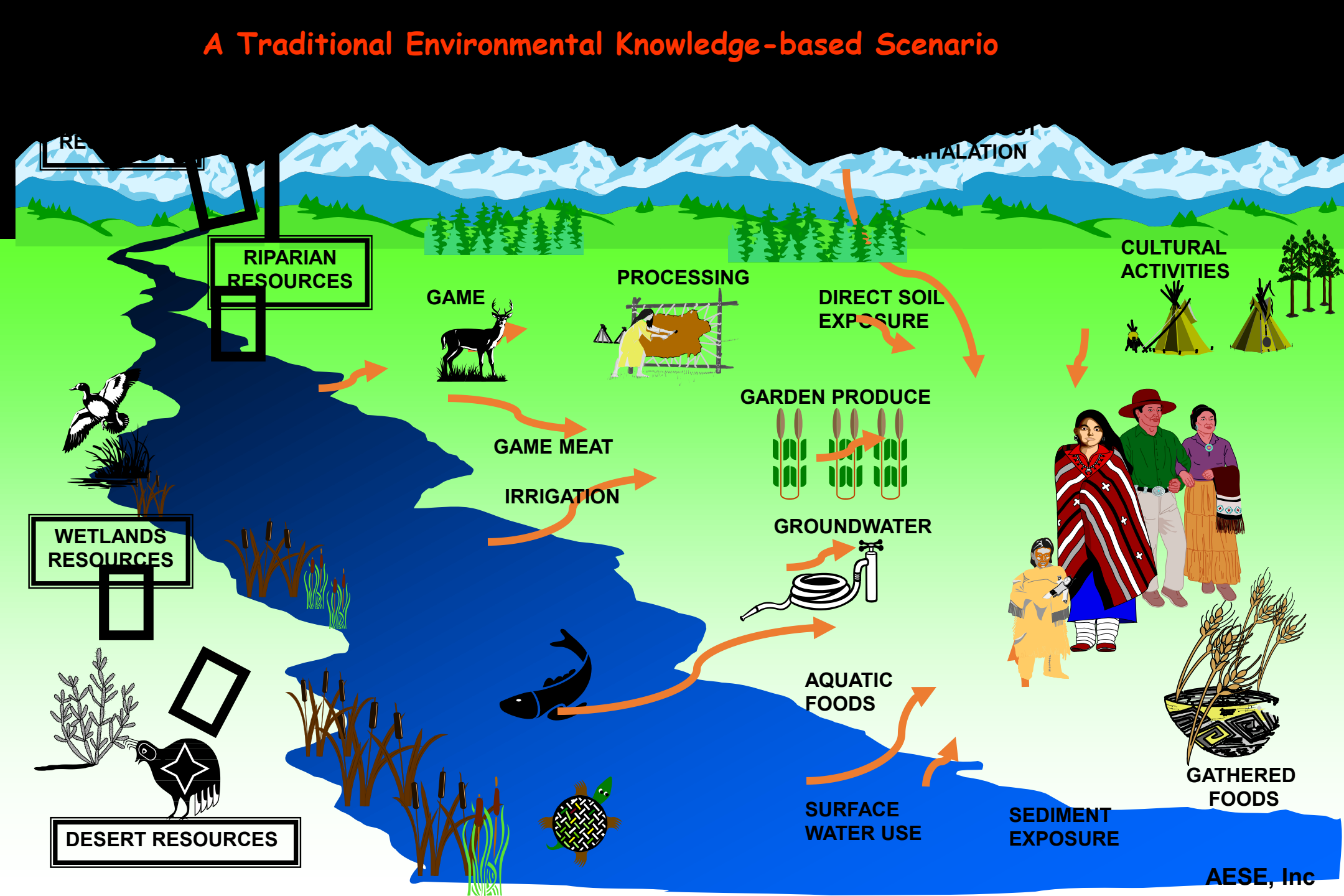
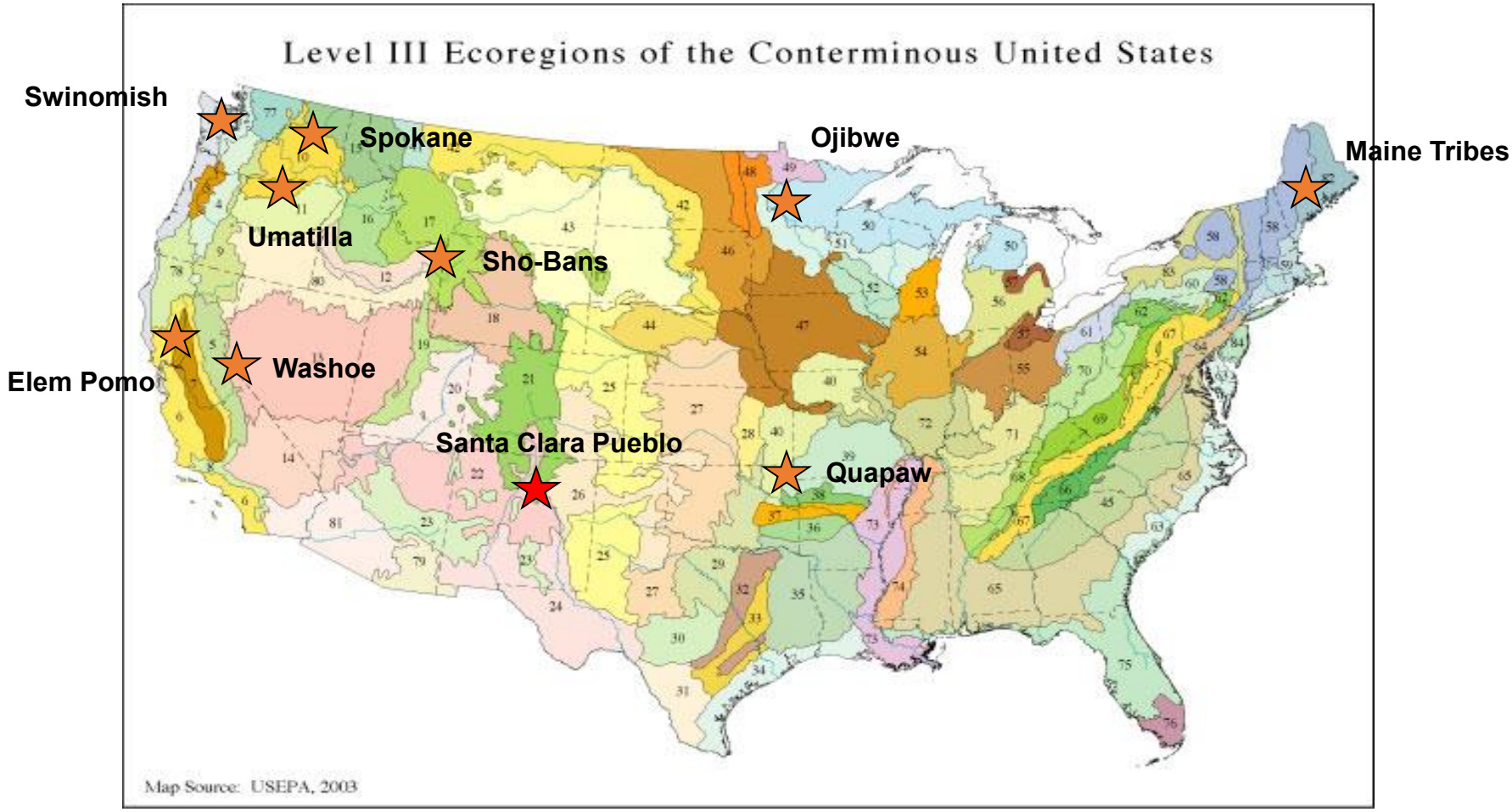
A Traditional Environmental Knowledge-based Scenario



EPA (Omernick) Ecoregions



Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual

Three Rivers, Idaho (Courtesy of Barbara Harper)

Principal Investigator:

Barbara L. Harper, Oregon State University Department of Public Health and Confederated Tribes of the Umatilla Indian Reservation

Co-investigators:

Anna K. Harding, Oregon State University Department of Public Health
Therese Waterhous, Oregon State University Department of Nutrition and Exercise Sciences
Stuart G. Harris, Confederated Tribes of the Umatilla Indian Reservation

Elem (Pomo) Human Health Risk Assessment Exposure Scenario

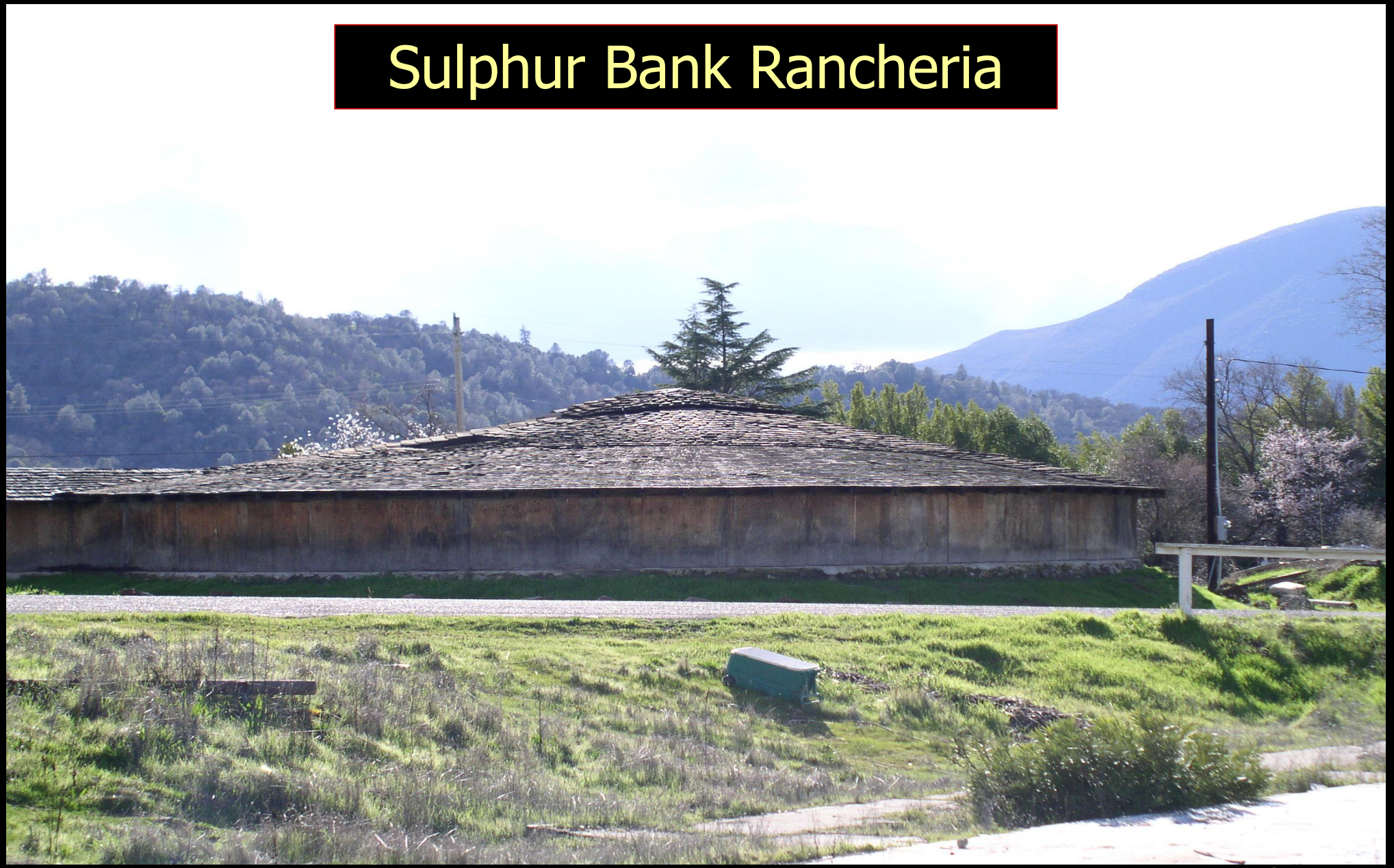
Clear Lake[1]

Clear Lake Pomo Hunter on a Tule Raft[2]

[1] Photos by Charles Webber, posted at http://calphotos.berkeley.edu/cgi/img_query?where-genre=Landscape&query_src=photos_landscape_index&rel-location=like&where-location=clear+lake&rel-plant_comm=like&where-plant_comm=&where-continent=any&where-country=any&where-state=California+%282716%29&rel-county=eq&where-county=any&where-collectn=any&rel-photographer=eq&where-photographer=any&rel-kwid=equals&where-kwid=

[2] CURTIS, Edward Sheriff, The Hunter—Lake Pomo; http://www.donaldheald.com/browse18.html

Sulphur Bank Rancheria



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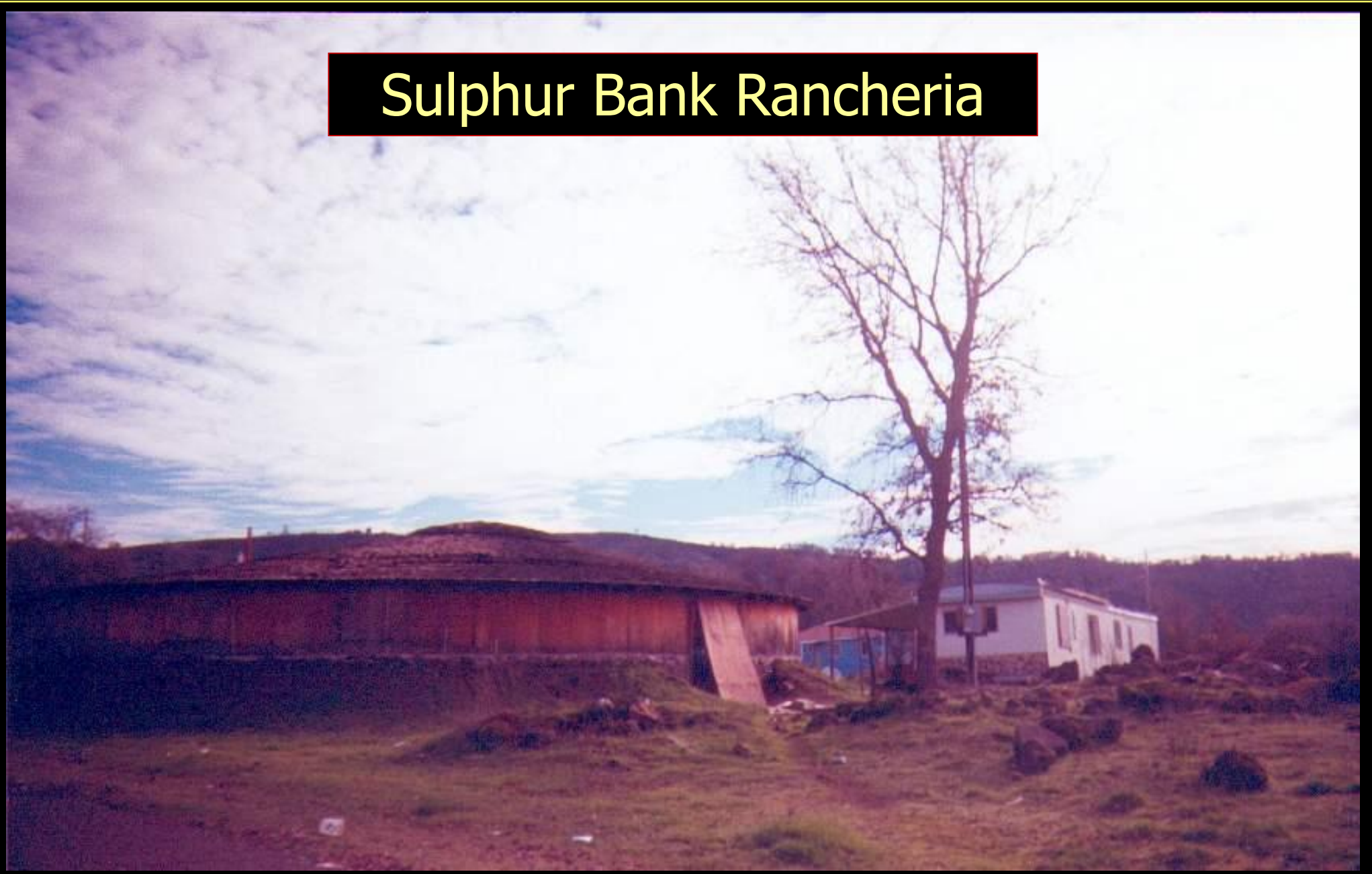
Sulphur Bank Rancheria



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Tar Creek Chat Piles

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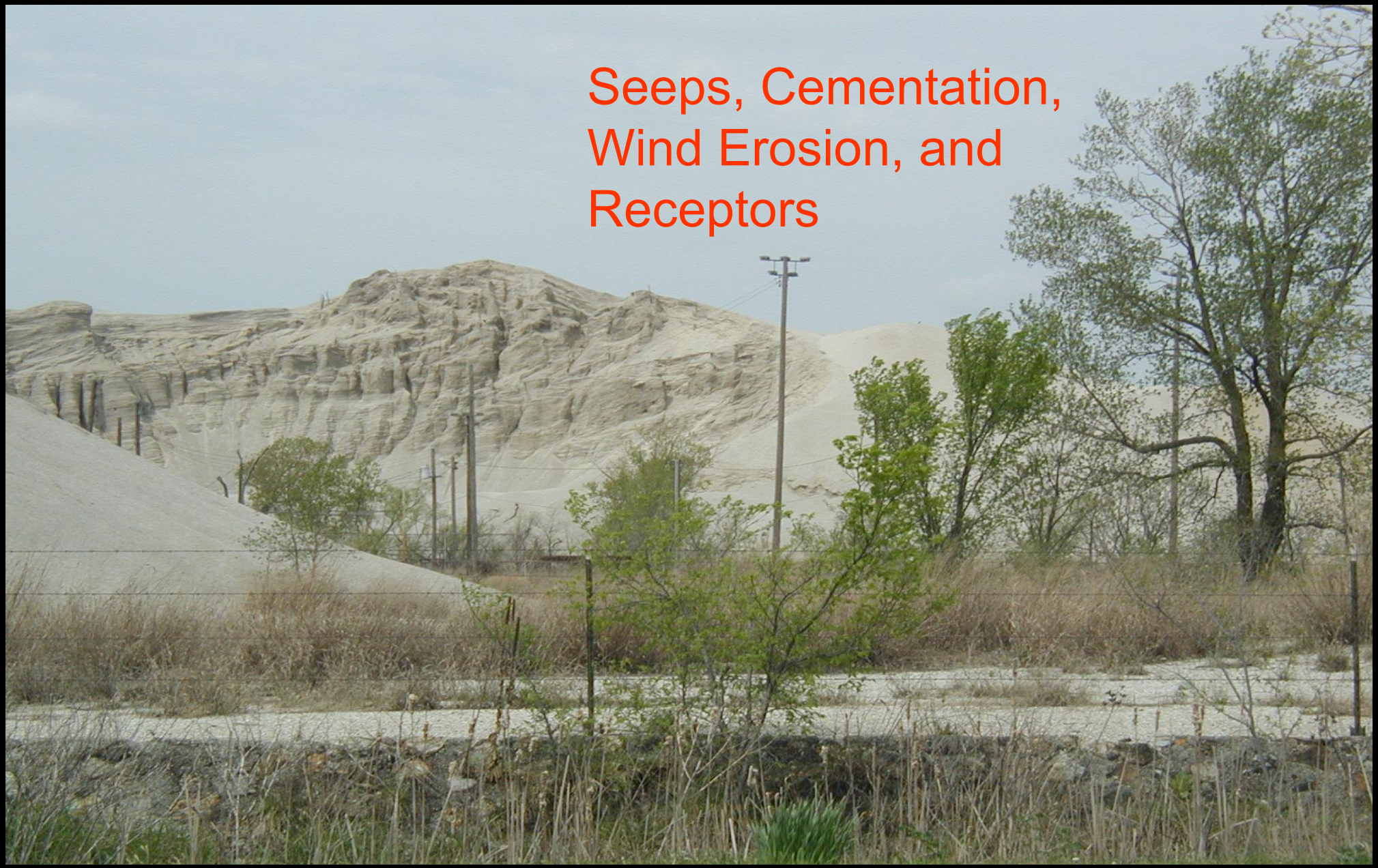
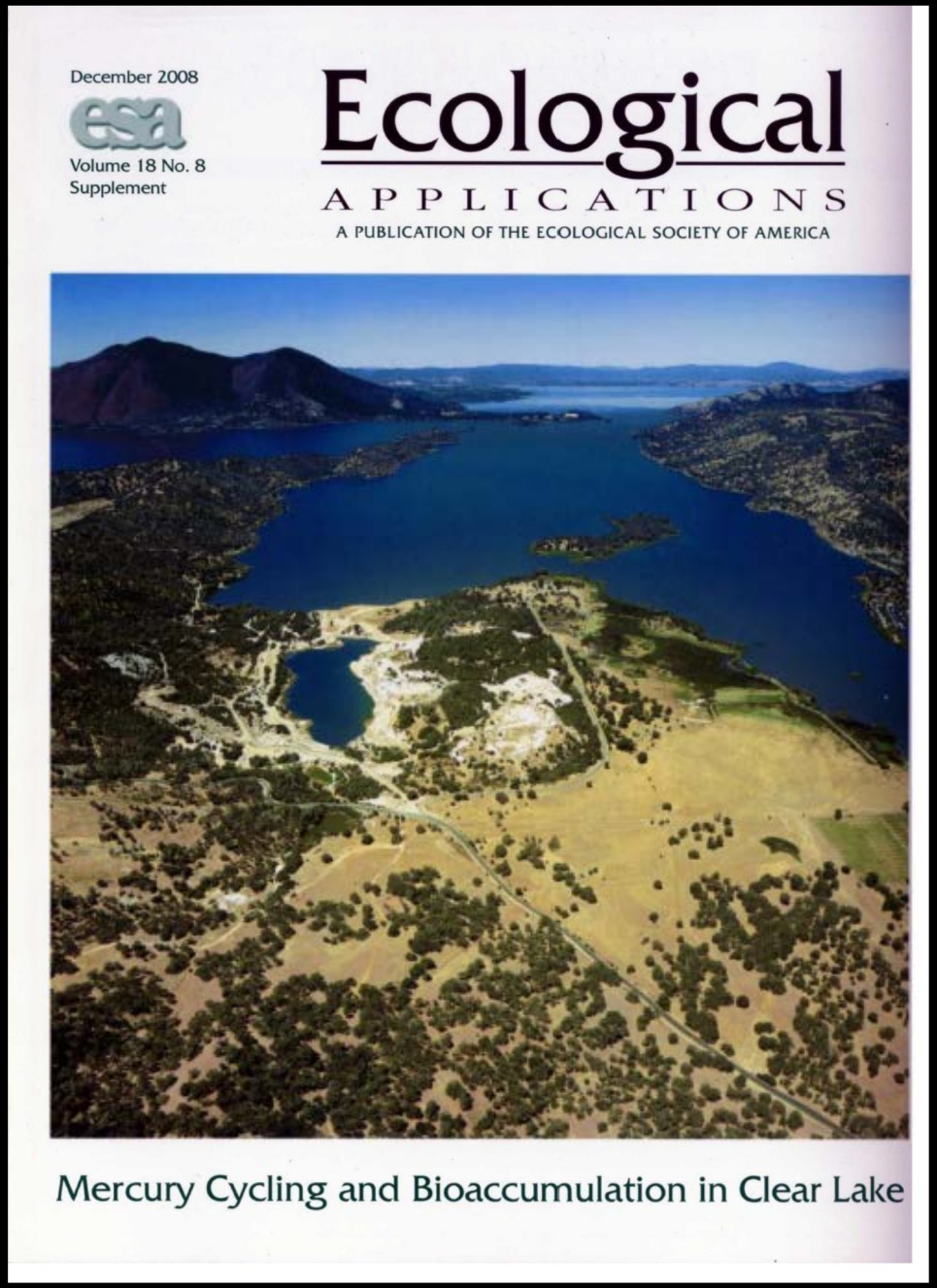
Sulphur Bank Rancheria

AESE, Inc.



AESE, Inc.



This compendium is a necessary resource for anyone living in, or using natural resources from, the Clearlake Watershed.

PLATE 1. A photograph from an early postcard showing the Sulphur Bank Mercury Mine site ca. 1890 (courtesy of Lakeport Historic Courthouse Museum). The large complex of buildings at center right indicates the location of one of many shafts, which were active from ca. 1875 to 1902.

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PLATE 2. Mercury-laden mine tailings and waste rock piles at the Sulphur Bank Mercury Mine ca. 1900, before more modern earthmoving equipment and bulldozing occurred (courtesy of Lakeport Historic Courthouse Museum).

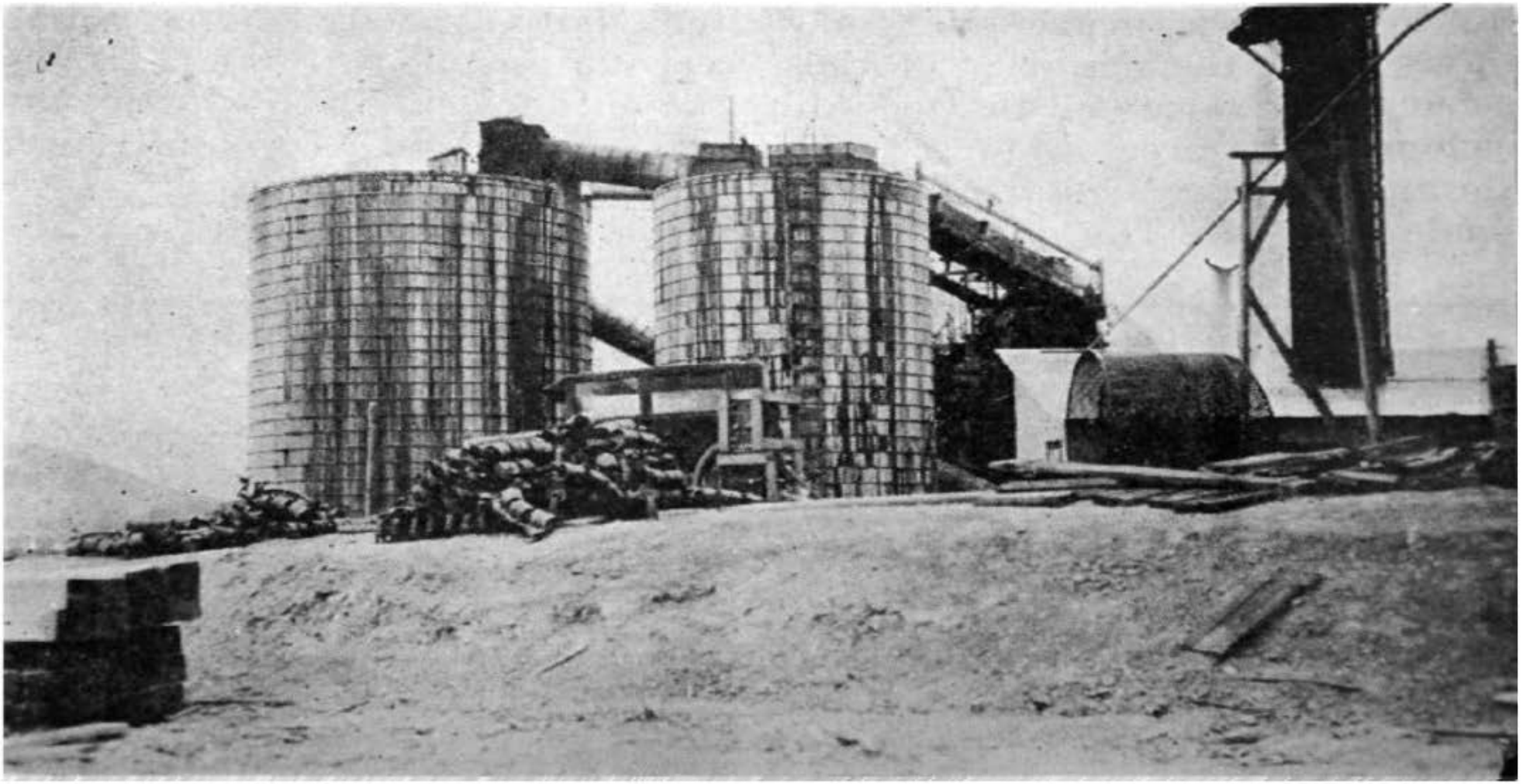


PLATE 3. Wooden condeners at the Sulphur Bank Mercury Mine that captured volatilized mercury from the roasting of cinnabar ore in retort furnaces, converting it into liquid quicksilver ca. 1929 (courtesy of California Geological Survey, Department of Conservation).


1920’s Mechanization

Open Pit Mining at Sulphur Bank Mercury Mine Begins in 1927

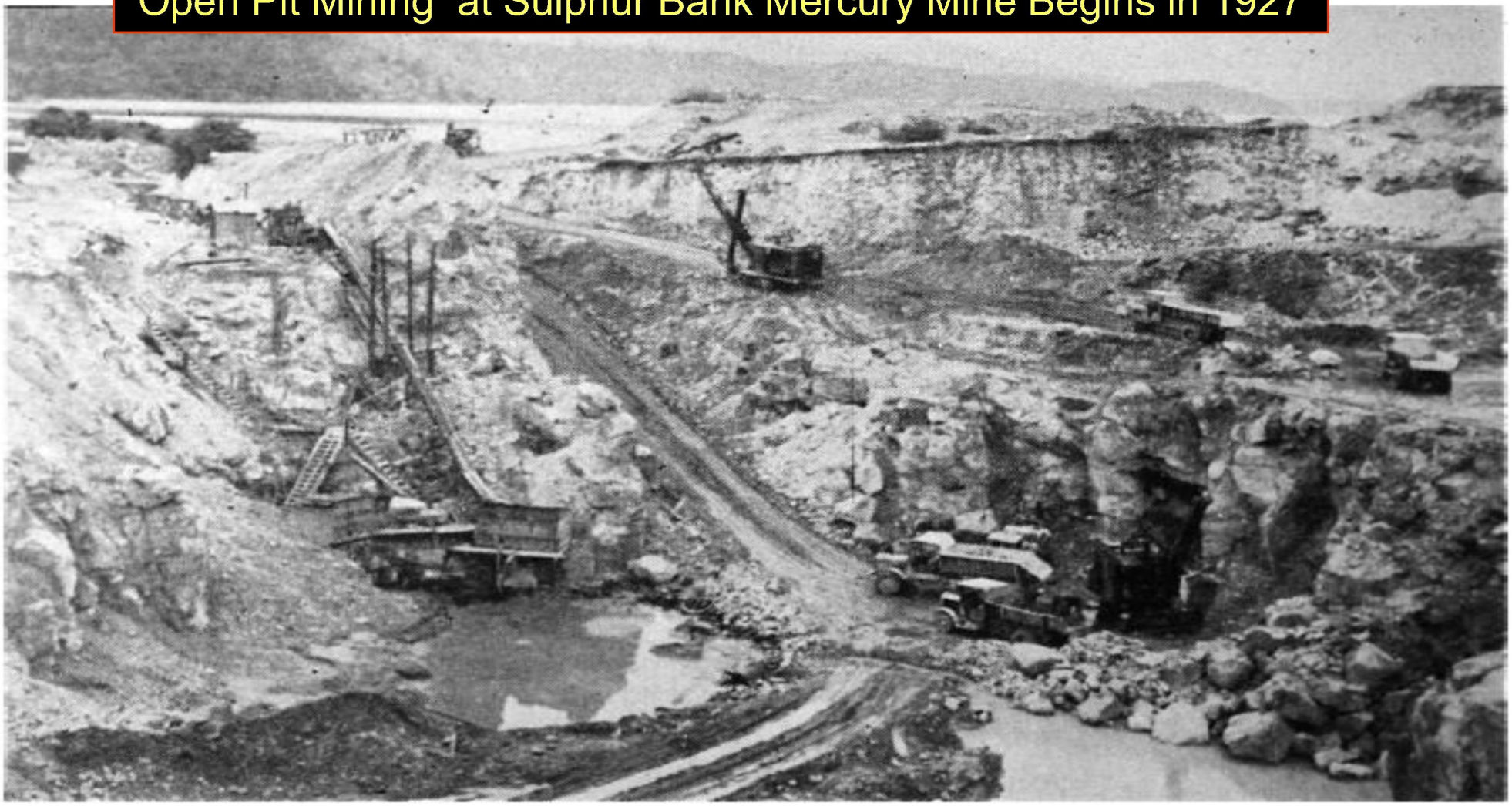
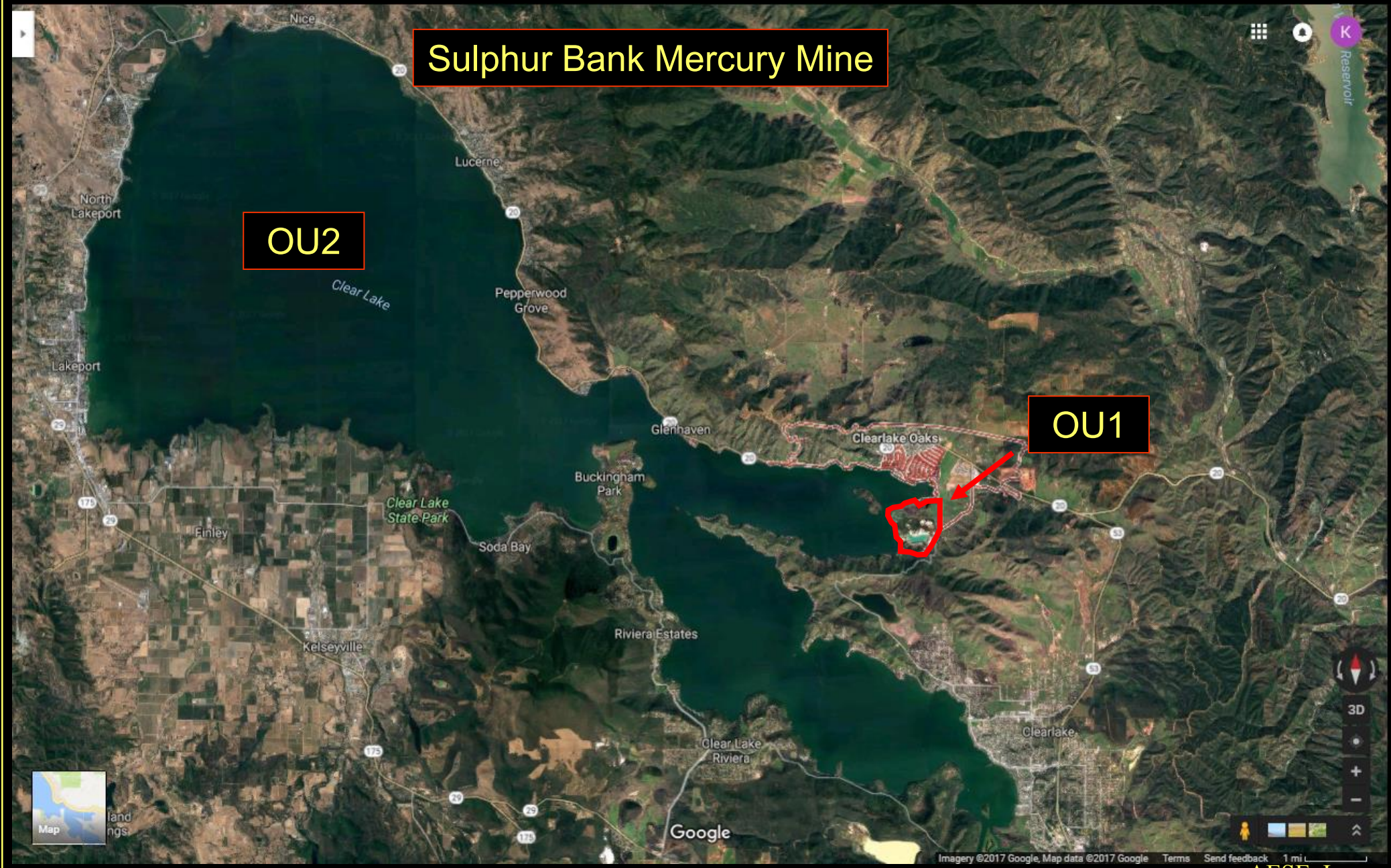


PLATE 4. Parrot Pit at Sulphur Bank Mercury Mine during the era of open pit mining showing steam shovel and dump trucks, ca. 1939 (courtesy of California Geological Survey, Department of Conservation).


Sulphur Bank Mercury Mine
OU2
OU1
Nice
Lucerne
North Lakeport
Clear Lake
Pepperwood Grove
Lakeport
Glenhaven
Clearlake Oaks
Buckingham Park
Clear Lake State Park
Finley
Soda Bay
Riviera Estates
Kelseyville
Clear Lake Riviera
Clearlake
Reservoir
Map
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Imagery ©2017 Google, Map data ©2017 Google
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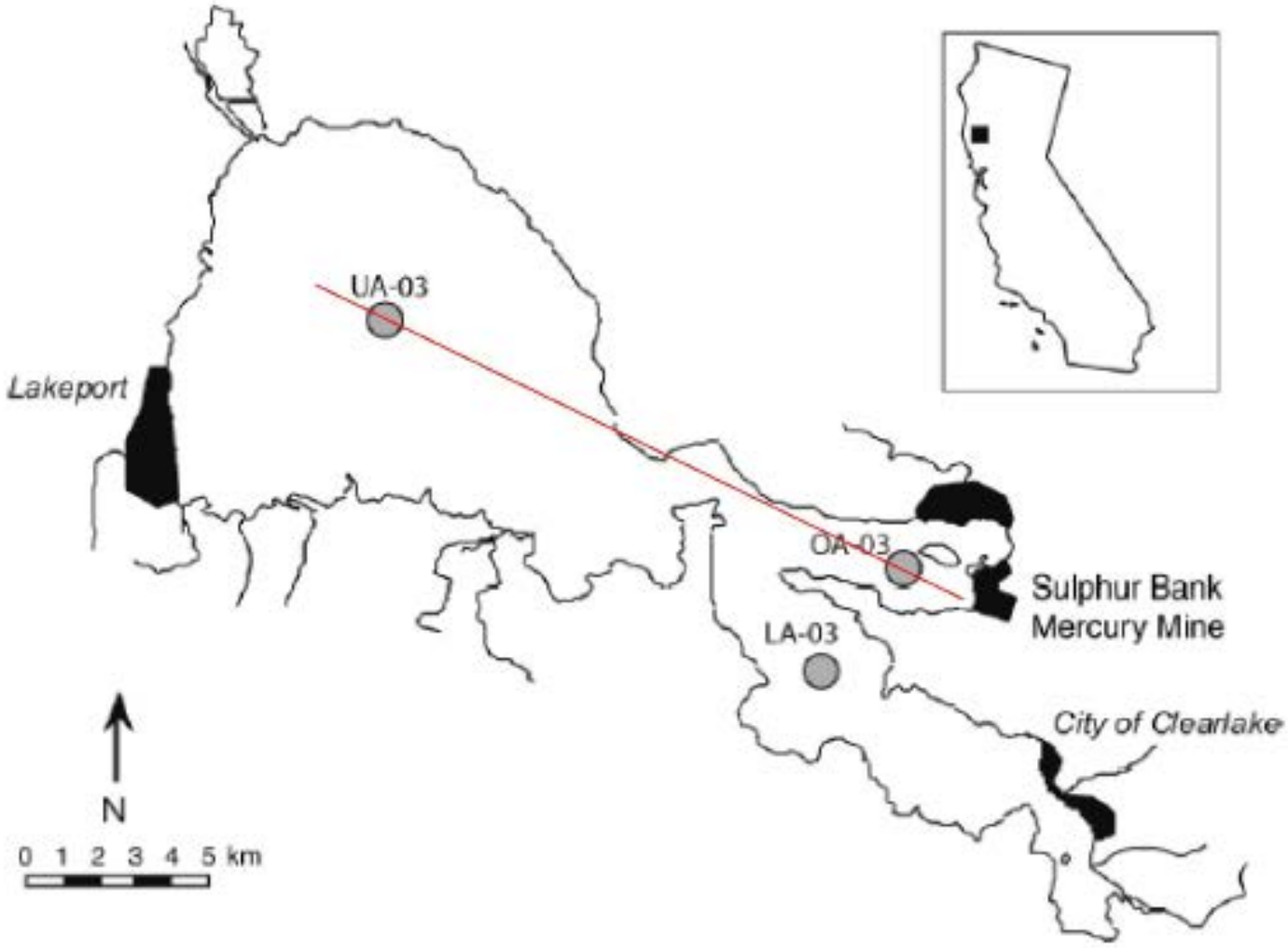
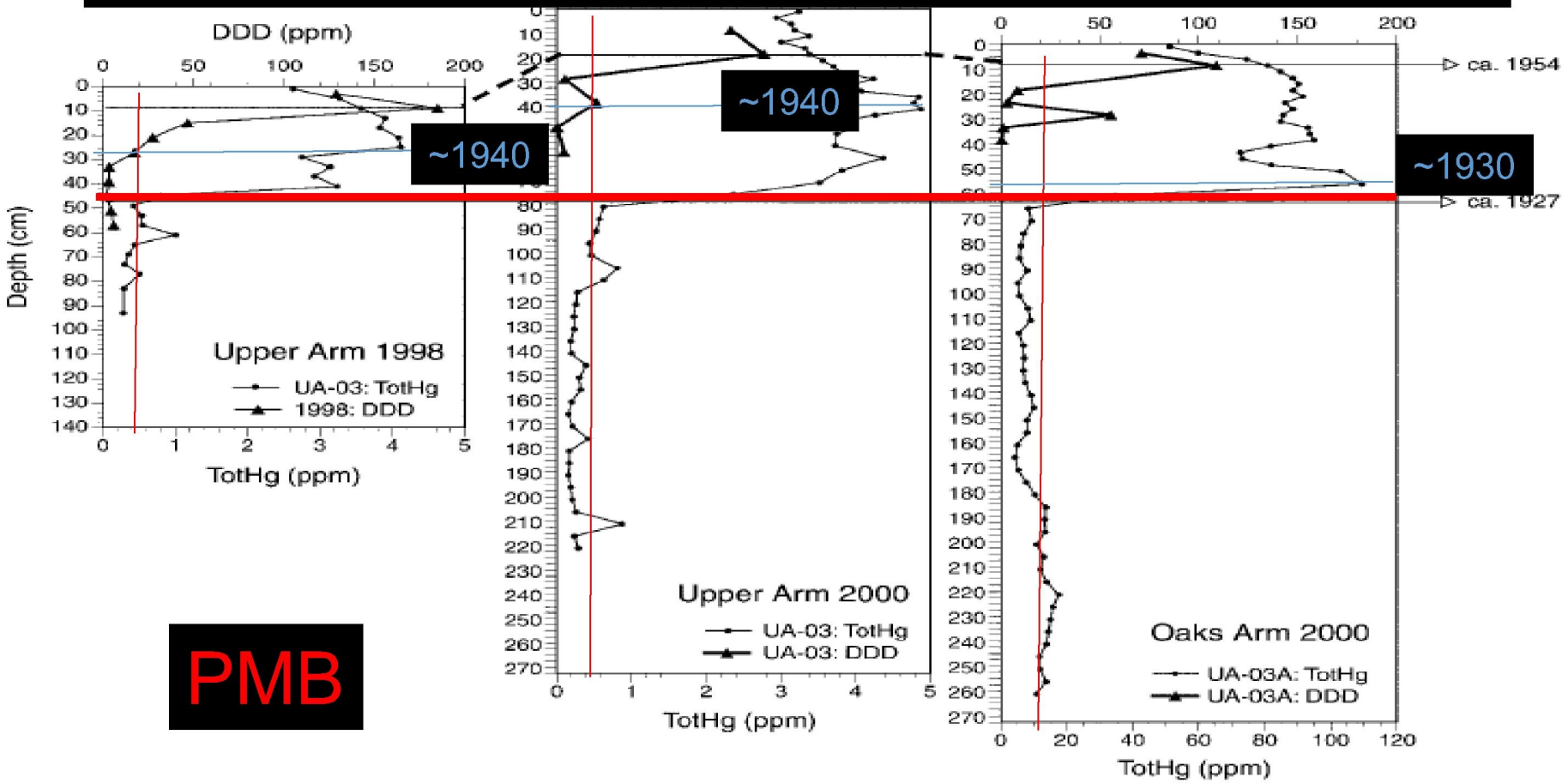


FIG. 2. Locations of coring sites in Clear Lake. See Suchanek et al. (2008*d*) for a more detailed map of the lake and watershed.

Based on OA 2000 Core, Post mining Deposition rates appear similar in upper and oaks, but slightly lower in Lower Lake



PMB

FIG. 3. Dichlorodiphenyldichloroethane (DDD) (triangles) plotted as a function of depth in representative Upper Arm cores (in 1998 and 2000) and an Oaks Arm core (in 2000). The DDD peak should correspond to the year of maximum application to the lake, ca. 1954. Total mercury (TotHg; small dots) is also plotted, along with a horizon line that represents the beginning of open-pit mining ca. 1927.

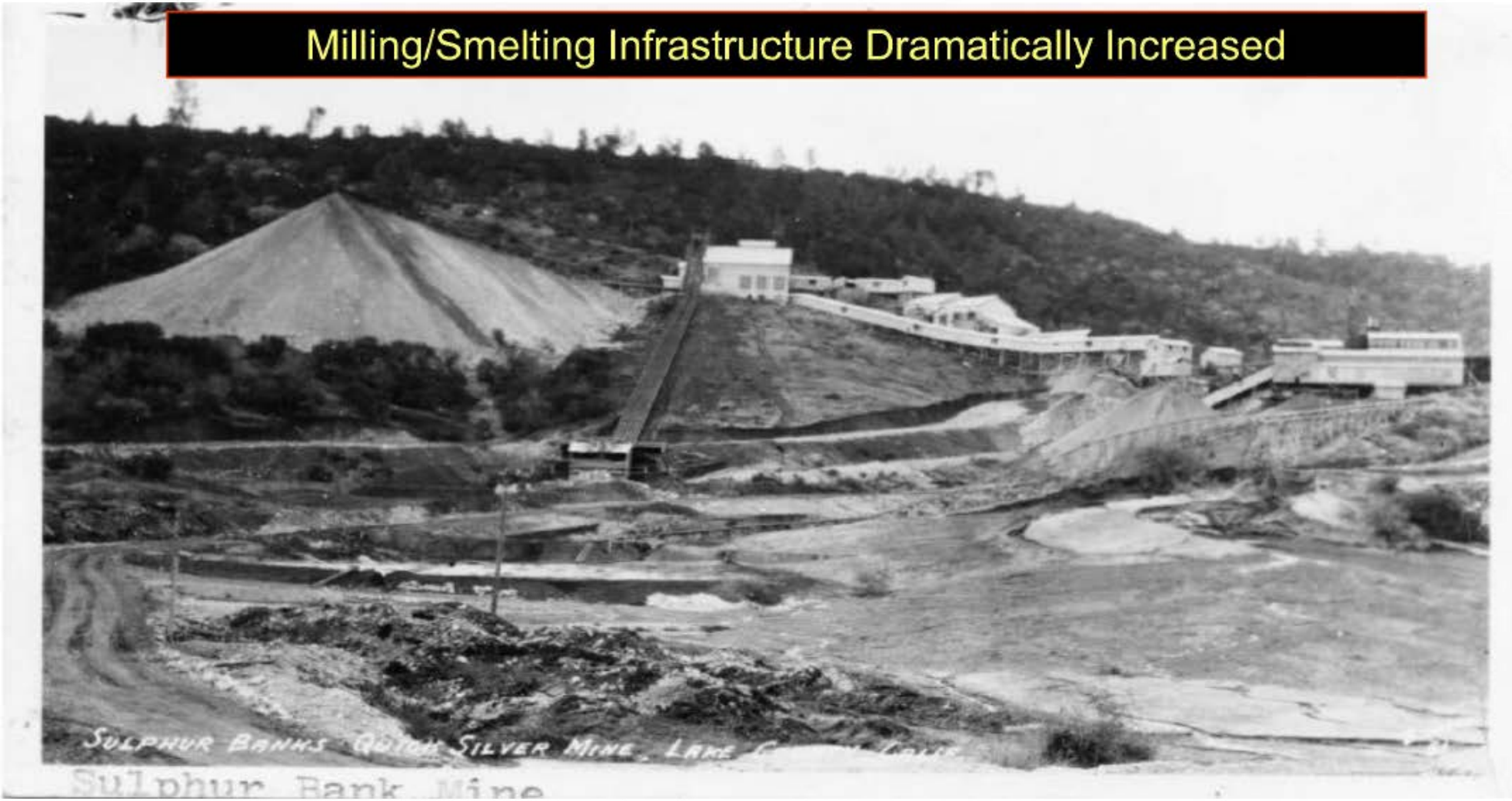


PLATE 5. Sulphur Bank Mercury Mine operations during large-scale production, with massive tailings pile on left, shortly before the end of the mining era ca. 1946 (courtesy of Lakeport Historic Courthouse Museum).

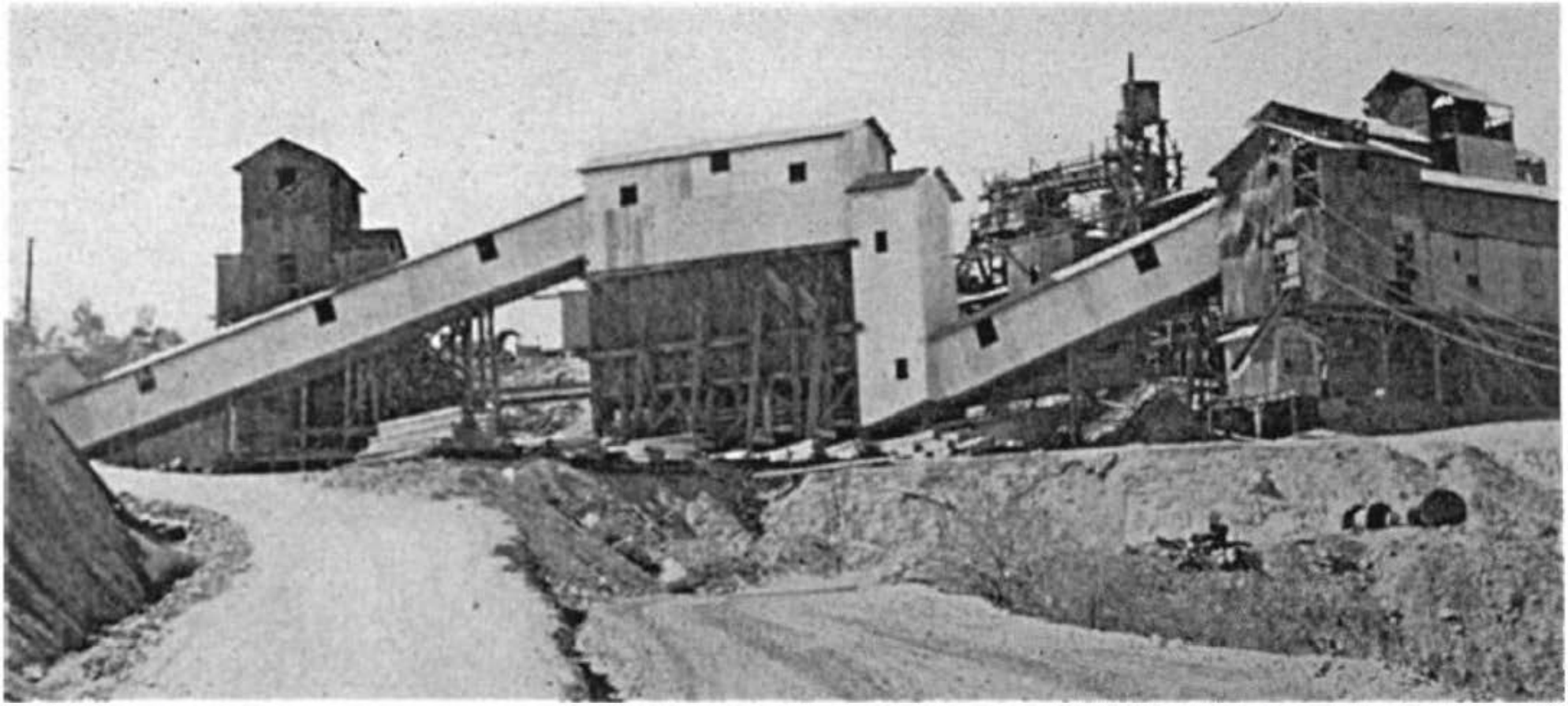
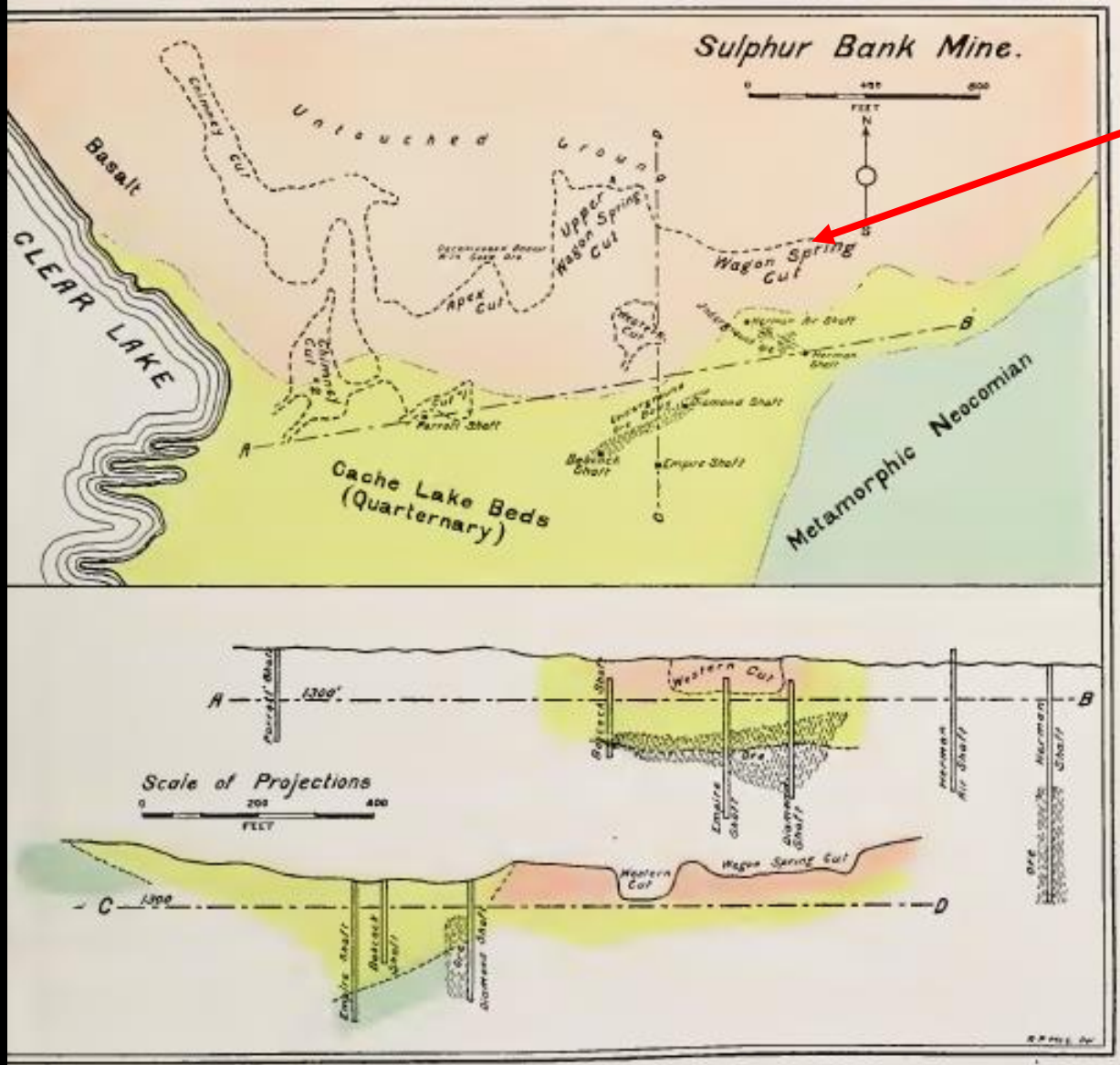


PLATE 7. Mercury retort furnace and processing facility at the Sulphur Bank Mercury Mine ca. 1947 (photo credit: Worthen Bradley; courtesy of California Geological Survey, Department of Conservation).

PLATE IX.



Geological Map of Sulphur Bank Mine, Lake County.

Reprinted from Bulletin No. 27.

Western Cut Spring

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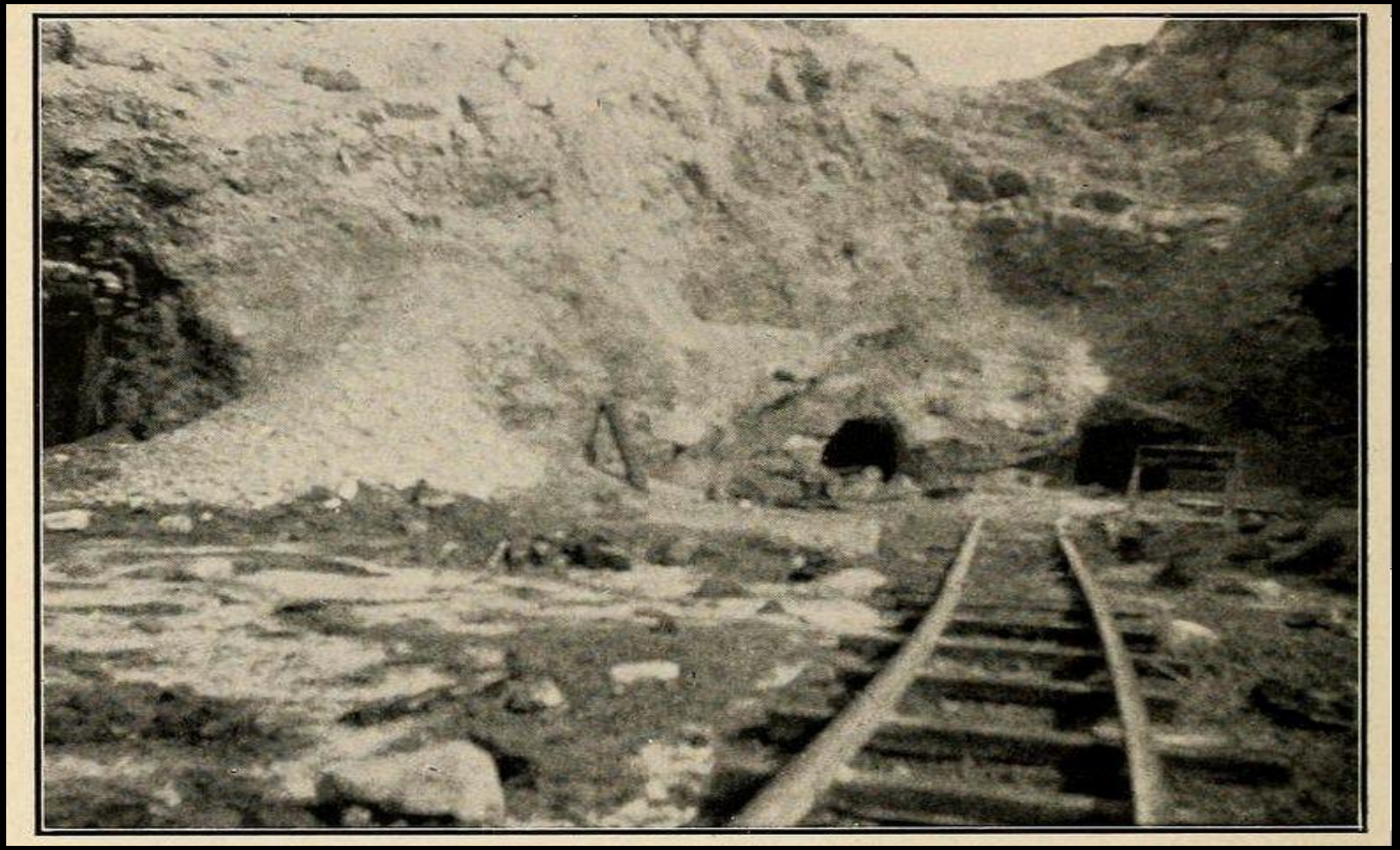
Photo No. 12. Hot springs in bottom of "Western Cut," Sulphur Bank Mine.



A. SULPHUR BANK MINE, LAKE COUNTY, CALIFORNIA

Open pit.

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PLATE 8. Sulphur Bank Mercury Mine showing steeply sloped waste rock piles that comprise the waste rock dam with overflow channel into Clear Lake (on right side of dam) before the 1992 slope remediation by U.S. EPA. Note 30 m deep Herman Pit (pH~3) in background. Clear Lake is in the foreground. (Courtesy of Charles Chamberlin, Humboldt State University; photo taken in 1987, before waste rock pile remediation in 1992).

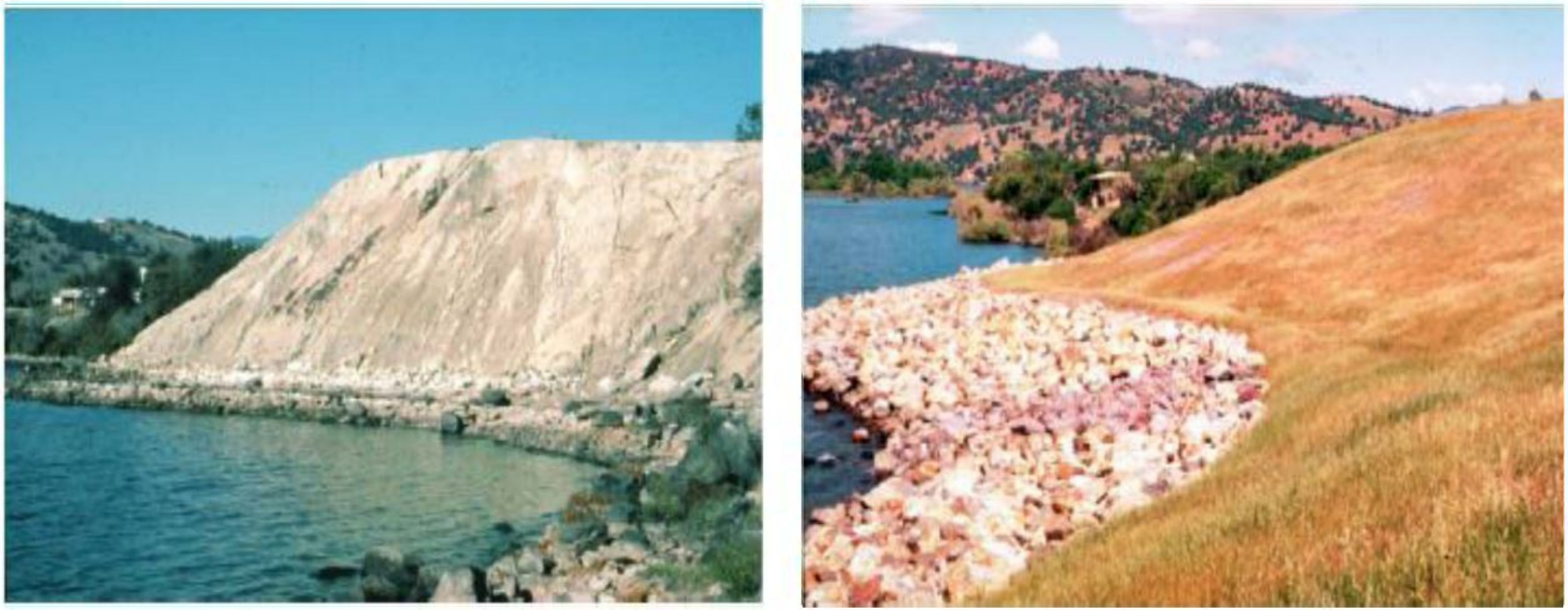


PLATE 9. Waste rock piles from the Sulphur Bank Mercury Mine along the Clear Lake shoreline. (Left) Before the 1992 U.S. EPA shoreline remediation. Note the steeply sloped waste rock pile that eroded mercury-laden soils into Clear Lake during heavy rains. (Right) After the 1992 remediation. Note the vegetated slope, reduced angle of the piles and rip rap along the shoreline to reduce erosion.

Indian Reservations are lands set aside or reserved by the U.S. for the benefit of the a Tribe and are designed to provide all the necessary sustenance for the subject Tribe at the time the lands were reserved and in perpetuity.

This means that the Tribe has the right to resources that are safe for traditional uses even though these lands cannot support these uses today, due to past inappropriate management practices.

Since human health risk for those living close to the land are driven by traditional consumption rates occurring during traditional activities, Traditional, pre-contamination consumptions rates are employed to calculate how clean the resources must be.

It is our experience working with tribes on superfund issues throughout the U.S., that because tribes rely heavily on natural resources, in many instances, their sole source of sustenance, these resources have to be free of site contamination.

Since CERCLA cannot require a PRP to cleanup to conditions that are cleaner than pre-contaminated conditions, this means that Cleanups must focus on pre-contaminated conditions and not excess risk.

In Summary, drawing this conclusion early in the process enables the focus of work to shift from estimating risk and back-calculating PRG/RAOs, to determining pre-contamination baseline and mapping the nature and extent of contamination. This early realization will result in saving large sums of time and money, makes EPA to appear more credible to the public, speeds the cleanup process while not costing the responsible parties additional sums, and more rapidly brings closure to the RI/FS and NRDA processes.

The National Contingency Plan (NCP) prescribes the approach for selecting a CERCLA remedy. 40 CFR § 300.430. All alternatives considered by EPA, except the no action alternative, must meet the two threshold criteria of protecting human health and the environment and of complying with applicable or relevant and appropriate requirements (ARARs).

RFFLU OSWER Directive No. 9355.7-04

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAY 25 1995

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

OSWER Directive No. 9355.7-04

MEMORANDUM

SUBJECT: Land Use in the CERCLA Remedy Selection Process

FROM: Elliott P. Laws
Assistant Administrator

TO: Director, Waste Management Division
Regions I, IV, V, VII
Director, Emergency and Remedial Response Division
Region II
Director, Hazardous Waste Management Division
Regions III, VI, VIII, IX
Director, Hazardous Waste Division,
Region X
Director, Environmental Services Division
Regions I, VI, VII

Purpose:

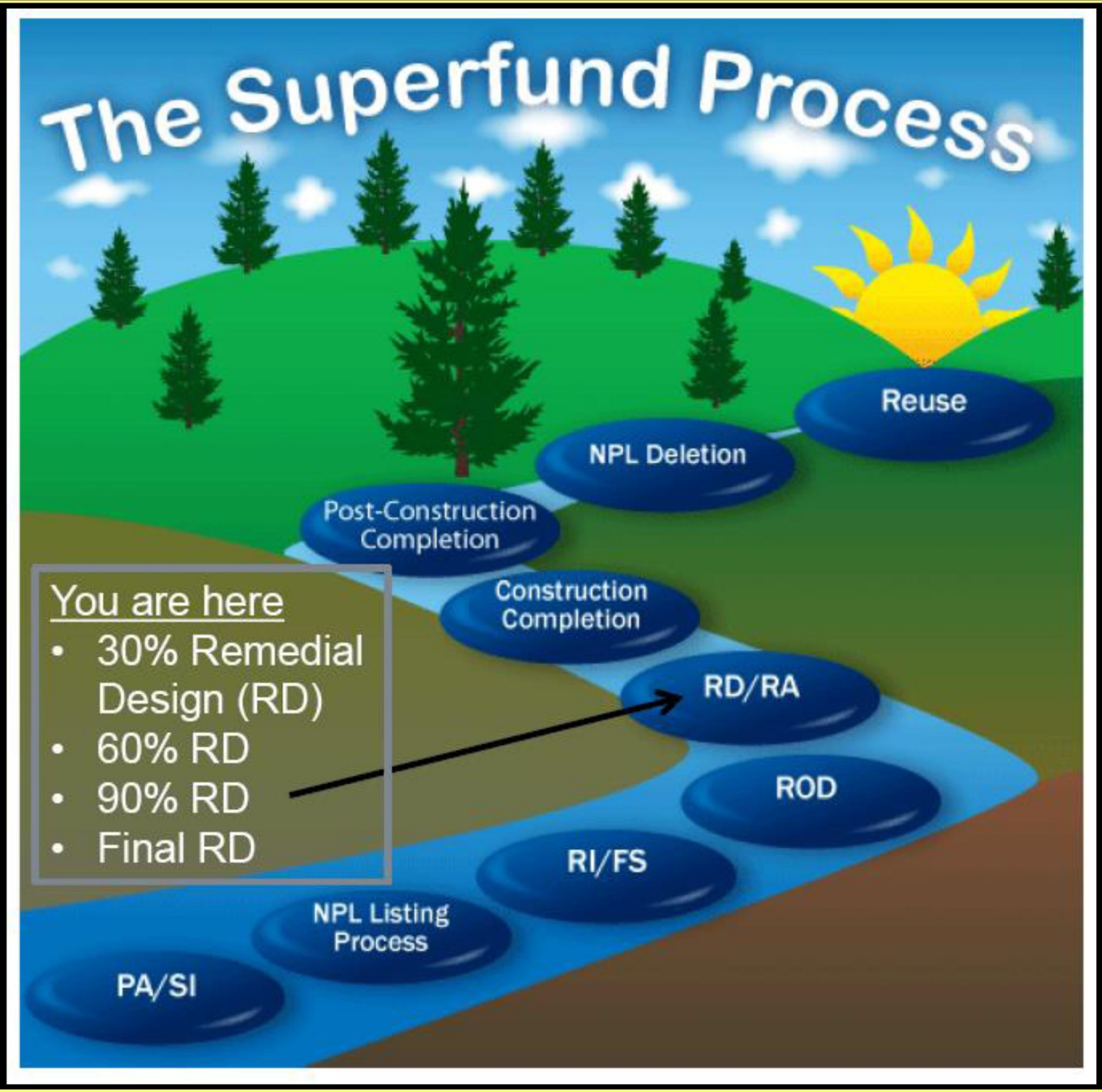
This directive presents additional information for considering land use in making remedy selection decisions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at National Priorities List (NPL) sites. The U.S. Environmental Protection Agency (EPA) believes that early community involvement, with a particular focus on the community's desired future uses of property associated with the CERCLA site, should result in a more democratic decisionmaking process; greater community support for remedies selected as a result of this process; and more expedited, cost-effective cleanups.

EPA's REMEDIAL ACTION TOOL BOX:

1. REMOVE
2. CONTAIN/CONTROL
3. INSTITUTIONAL CONTROLS (HANG A SIGN ON IT)

EPA's RELIANCE ON PERPETUAL OR LONG-TERM INSTITUTIONAL CONTROLS IN REMEDIES ON TRIBAL LANDS IS TANTAMOUNT TO EXPROPRIATION

expropriation…the action of the state in taking of modifying the property rights of an *individual* in the exercise of its sovereignty (*Webster*).


The Superfund Process
Reuse
NPL Deletion
Post-Construction Completion
Construction Completion
RD/RA
ROD
RI/FS
NPL Listing Process
PA/SI
You are here
• 30% Remedial Design (RD)
• 60% RD
• 90% RD
• Final RD

2006 Comments on RI/FS

2007 to ~2010 Elem/EPA/Bradley Litigation

2011 State Ads New Alternative and EPA responds with Focused Feasibility Study (FFS)

2016/2017 Tribe provides Comments on Draft FFS

2018 (NOW) Tribe Comments on FFS

The Focused FS Contains a Greatly Shortened List of Alternatives, based on the Incorrect Boundary Conditions. None of the Alternatives address the HI and none of the alternatives protect Human Health of the Tribe

Elem Requested that EPA Evaluate/Revaluate All Alternatives Using Consistent Boundary Conditions (i.e. protection of the Elem Tribe—not the general Public)

Elem's Comments and Position during a 2018 F2F meeting w/EPA Provided the Rationale for EPA to Evaluate/Revaluate All Alternatives Using Consistent Boundary Conditions

Three Alternatives/General Response Actions (GRAs)

Tribal Alternative No. 7: Convert HI into an Embayment (HI GRA first proposed in 2005)

Tribal Alternative No. 8: Backfill HI with Materials (Waste and HI GRA)

Tribal Alternative No. 9: Partial Offsite Disposal on Backhaul (Waste GRA)

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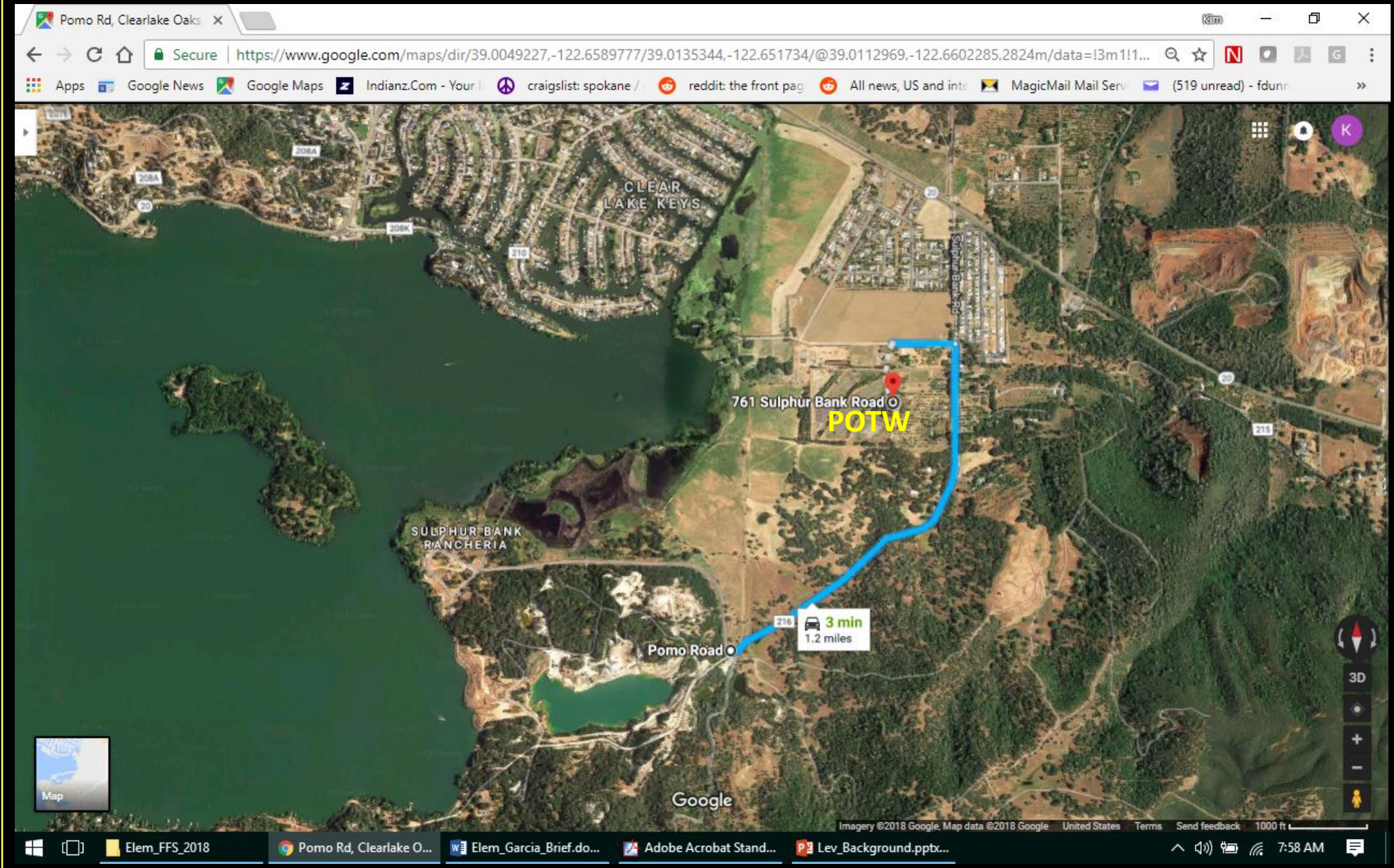
Three Alternatives/General Response Actions (GRAs)

Tribal Alternative No. 8: Backfill HI with Materials (Waste and HI GRA)

Tribal Alternative No. 7: Convert HI into an Embayment (HI GRA)

Tribal Alternative No. 9: Partial Offsite Disposal on Backhaul (Waste GRA)


Pomo Rd, Clearlake Oaks
Secure
https://www.google.com/maps/dir/39.0049227,-122.6589777/39.0135344,-122.651734/@39.0112969,-122.6602285,2824m/data=!3m1!1...
Apps
Google News
Google Maps
Indianz.Com - Your
craigslist: spokane /
reddit: the front pag
All news, US and inte
MagicMail Mail Serv
(519 unread) - fdunn
CLEAR LAKE KEYS
SULPHUR BANK RANCHERIA
761 Sulphur Bank Road
POTW
Pomo Road
3 min
1.2 miles
Map
Google
3D
Imagery ©2018 Google, Map data ©2018 Google
United States
Terms
Send feedback
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Elem_FFS_2018
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Tribal Alt. No. 8

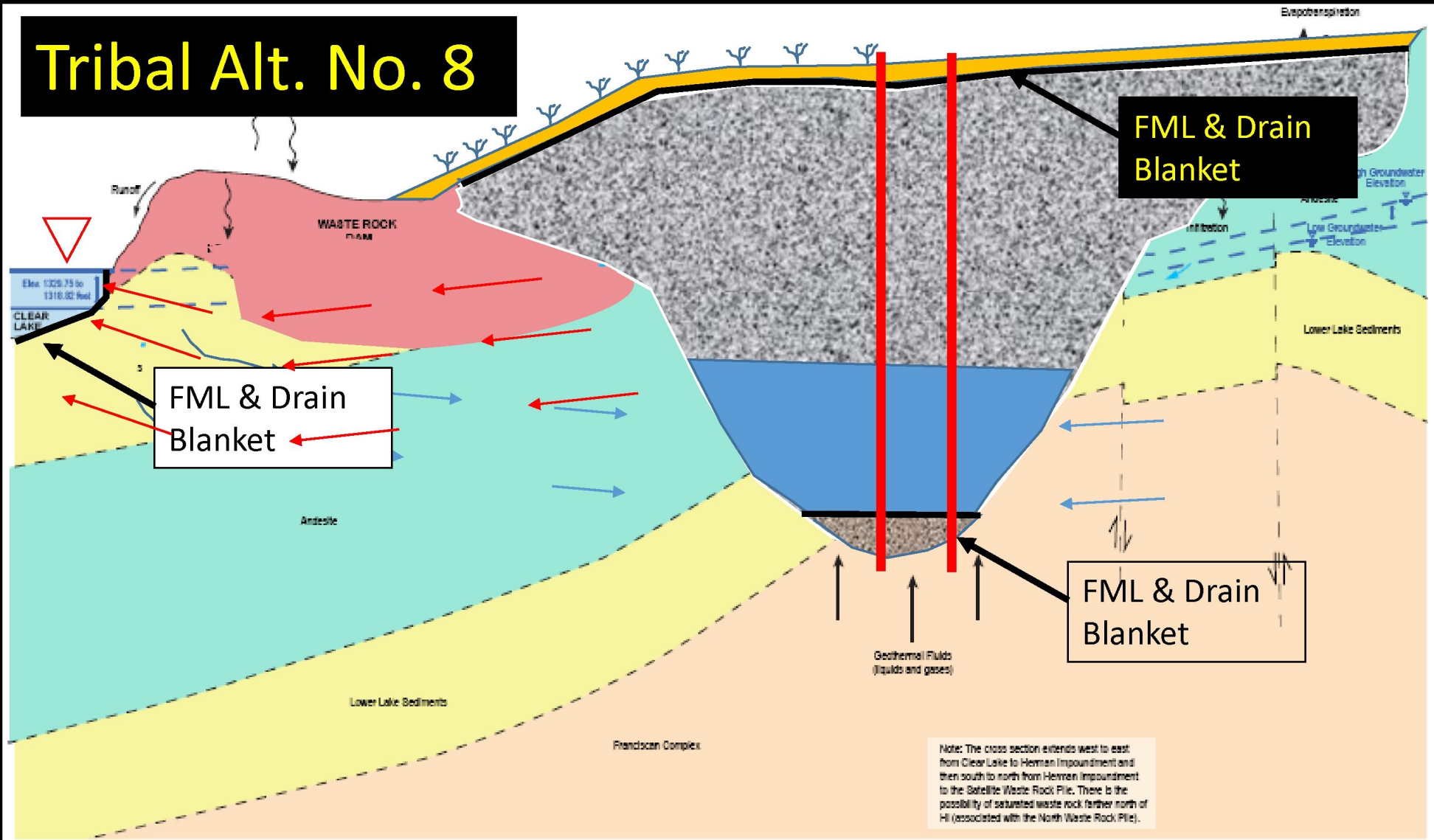

Figure 3-6
Conceptual Site Model of Water Flow between Herman Impoundment and Clear Lake
OU1 Focused Feasibility Study
Sulphur Bank Mercury Mine

Tribal Alt. No. 8

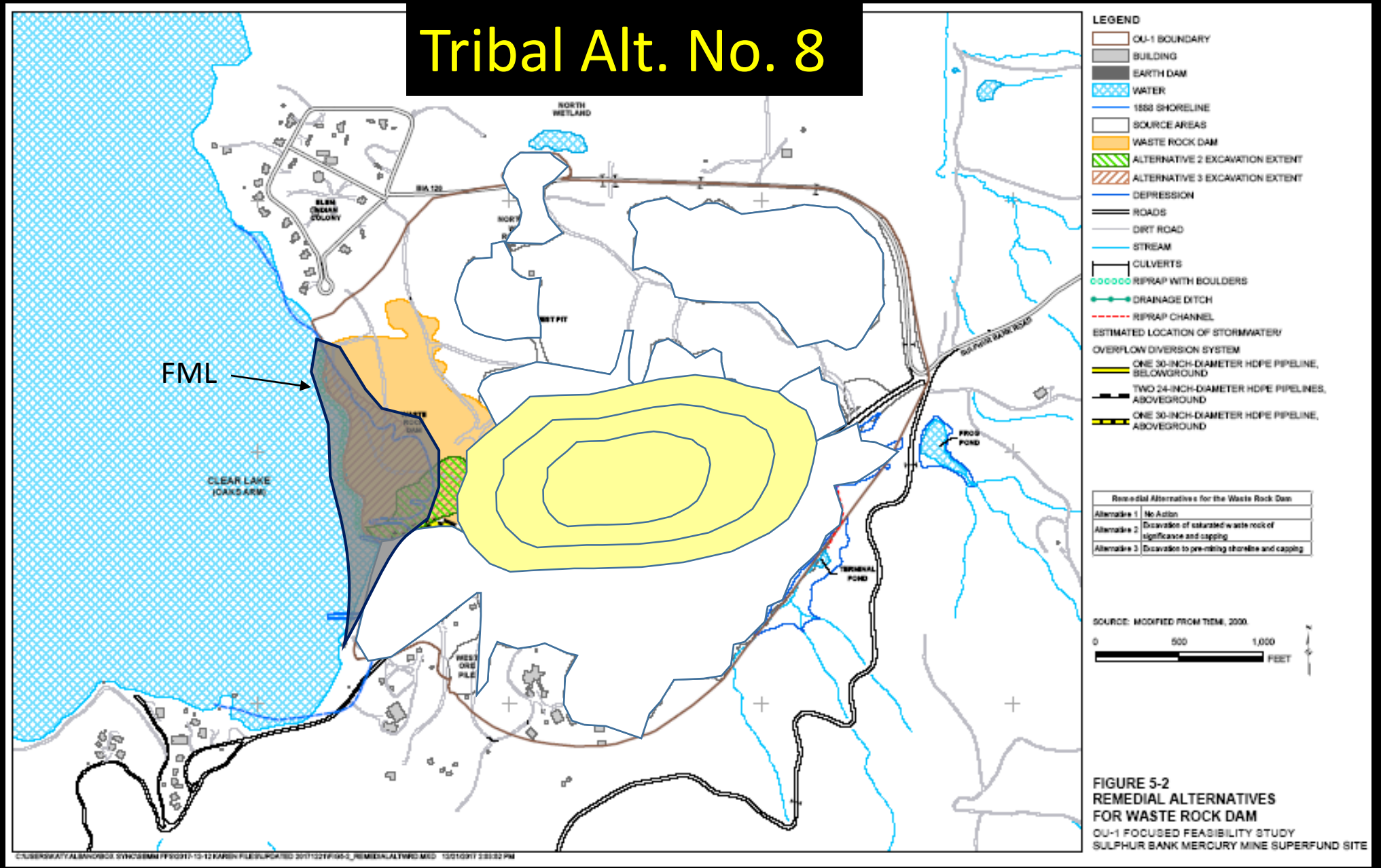

FIGURE 5-2
REMEDIAL ALTERNATIVES
FOR WASTE ROCK DAM
OU-1 FOCUSED FEASIBILITY STUDY
SULPHUR BANK MERCURY MINE SUPERFUND SITE

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Various Water Balances

A Geochemical Evaluation and Water Balance of Herman Pit, Sulphur Bank Mercury Mine, Clearlake Oaks, California, a USEPA Superfund Site

BY

JENNIFER ELAINE PHILLIPPE
B.A. (DePauw University) 2002

THESIS

Submitted in partial satisfaction of the requirements for the degree of

MASTER OF SCIENCE

in

Geology

in the

OFFICE OF GRADUATE STUDIES

of the

UNIVERSITY OF CALIFORNIA

DAVIS

Table 11
Summary of Herman Pit Leakage Rate Estimates

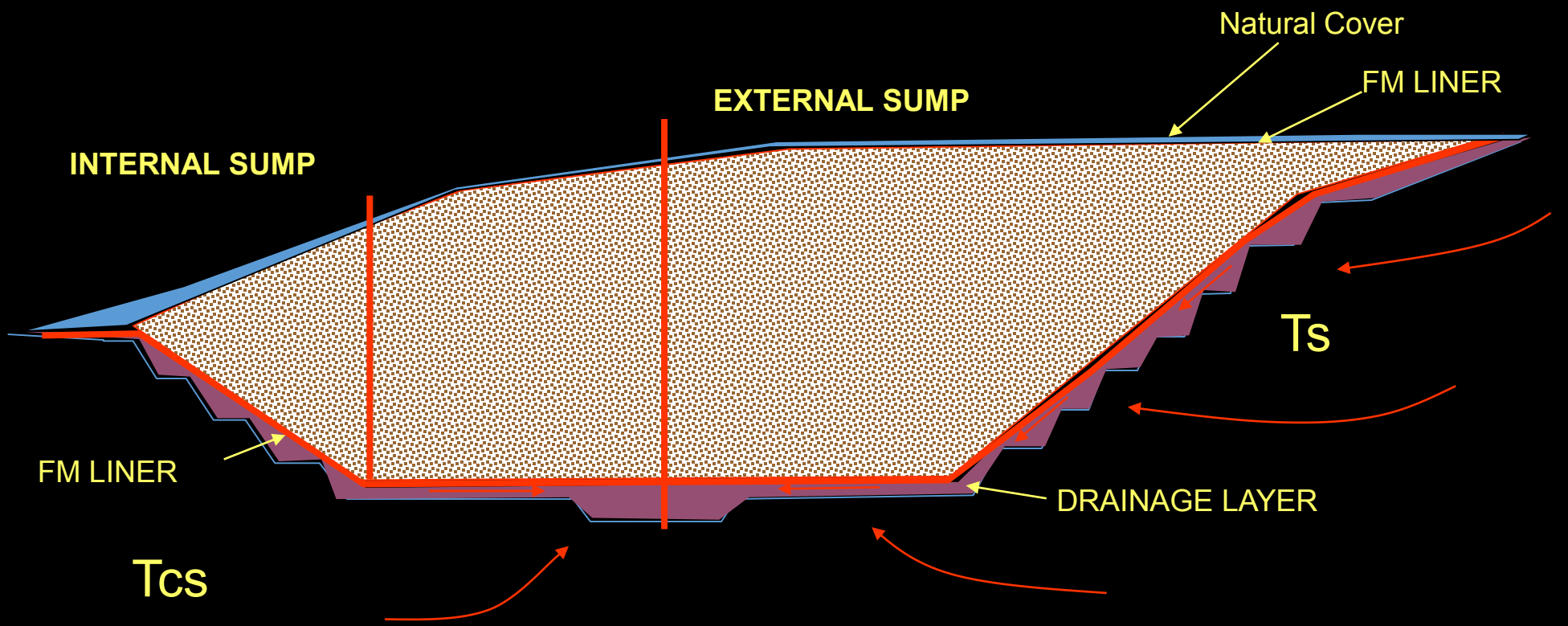
Method	Leakage Rate		Source
	L/min	gpm	
Impoundment dewatering	526	139	Trumbull (1956)
Impoundment filling	360	95	Trumbull (1956)
Darcy's Law	10.6 - 76	2.8 - 20	Columbia Geosciences (1988)
Darcy's Law	0.38	0.1	Chamberlain (1990)
Soil laboratory test	19	5	EPA (1994)
Water chemistry and mass balance	378 (<2,271)	100 (<600)	Goff and Bergfeld (1997)
Rhodamine WT tracer injection	26,498 - 34,069	7,000 - 9,000	Schladow and Massoudi (1997)
Water level change minus evaporation	413	109	Suchanek et al., 1997
Darcy's Law	57	15	ICF Kaiser (1999)
SF_6/^{22}Ne tracer injections	37,854 - 60,567	10,000 - 16,000	Oton (1999)
Water mass balance and Darcy's Law	129	34.1	TetraTech (2002)
Water mass balance	410	108	Phillippe (this study)

Midnite Uranium Mine Goal: reduce water treatment via reduction of footprint and promotion of runoff

Draft AESE, Inc.

Launch Midnite Uranium Mine Flyover

MUM CONCEPTUAL REMEDY FOR PIT 3
(S to N Cross Section)



Midnite Uranium Mine: Pit 4

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Midnite Uranium Mine: Pit 4

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MUM Pre-Backfill and Capping

MUM Pre-Backfill and Capping

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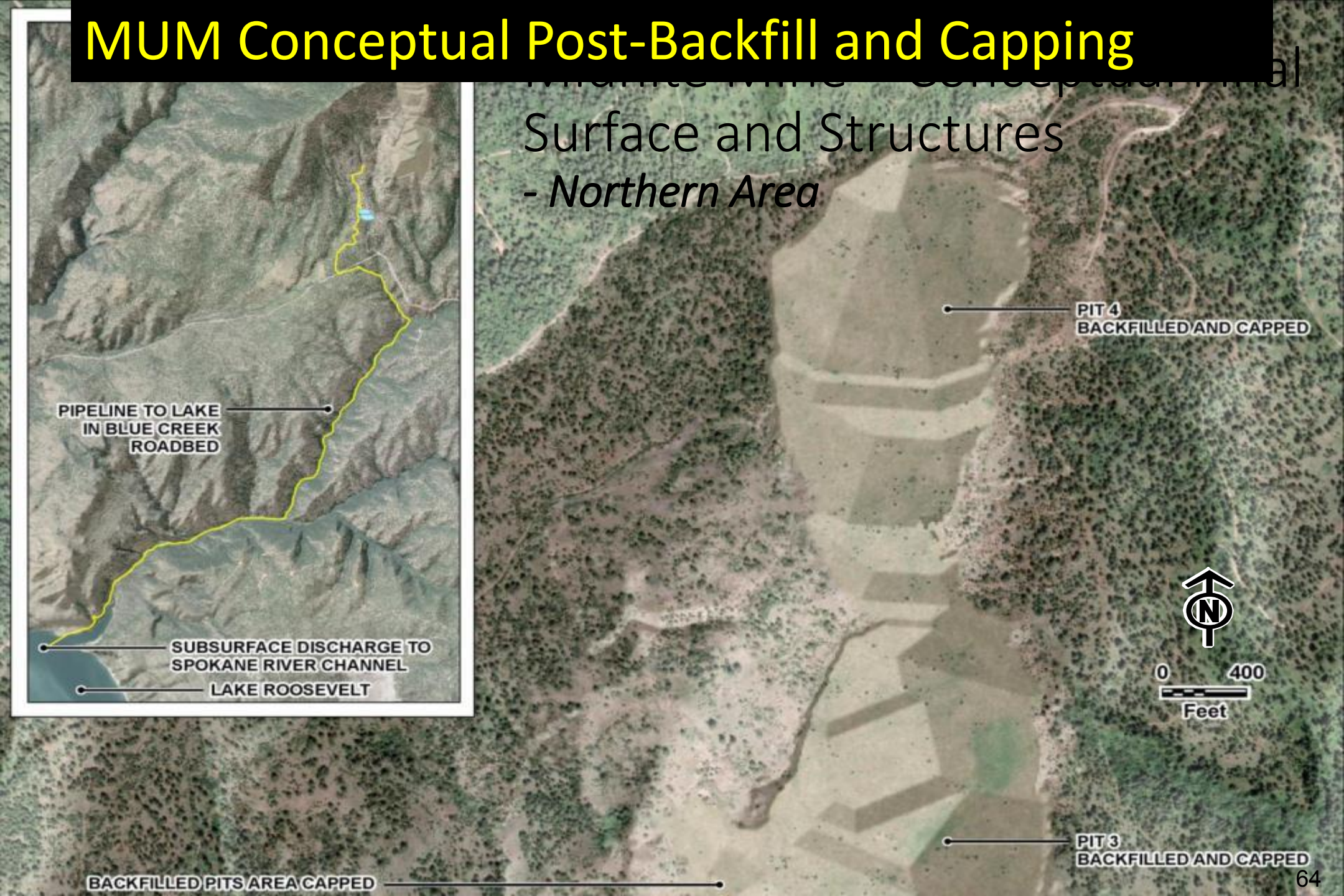
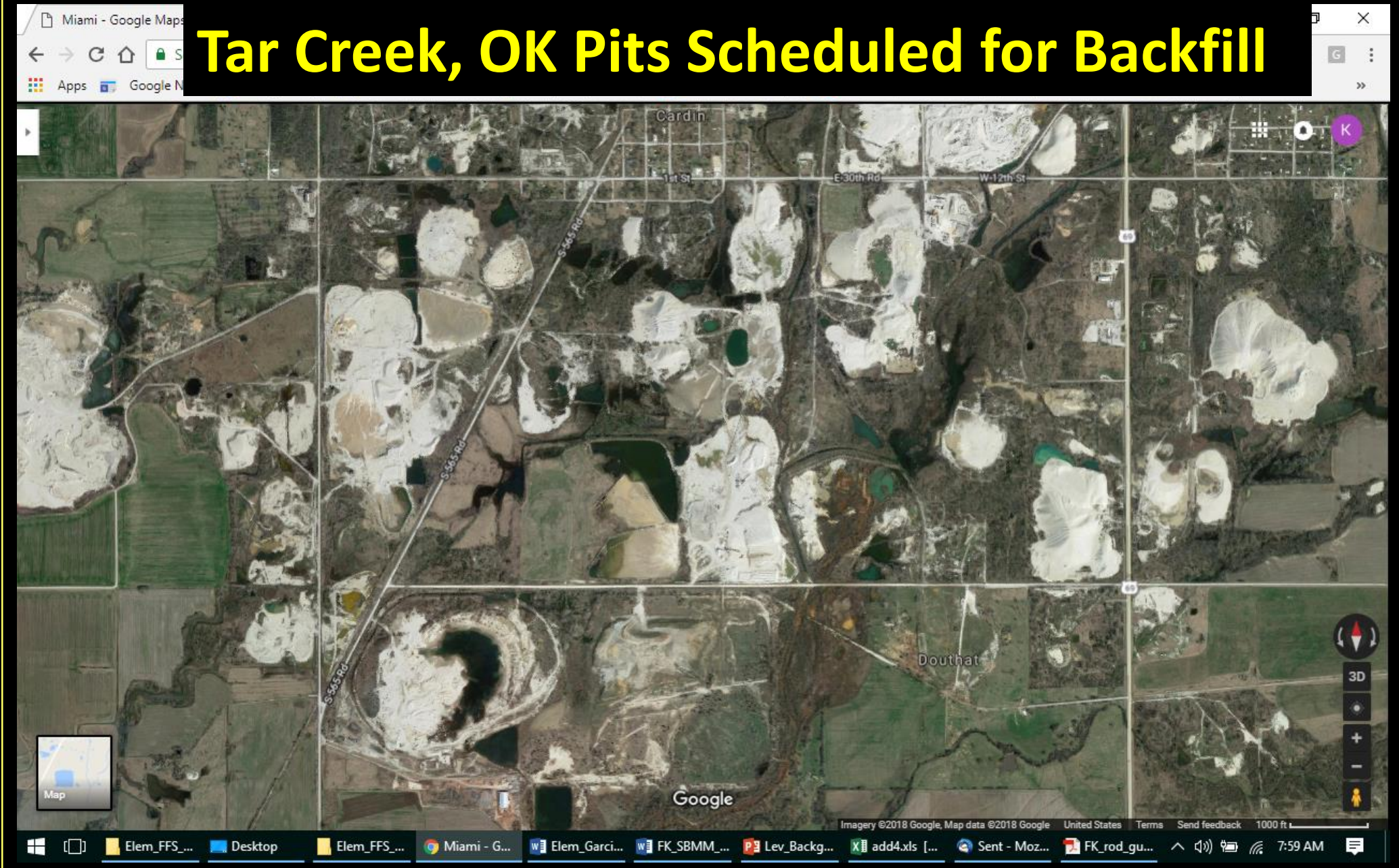
MUM Conceptual Post-Backfill and Capping

Surface and Structures

- Northern Area



Tar Creek, OK Pits Scheduled for Backfill



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Tar Creek, OK Pits Scheduled for Backfill

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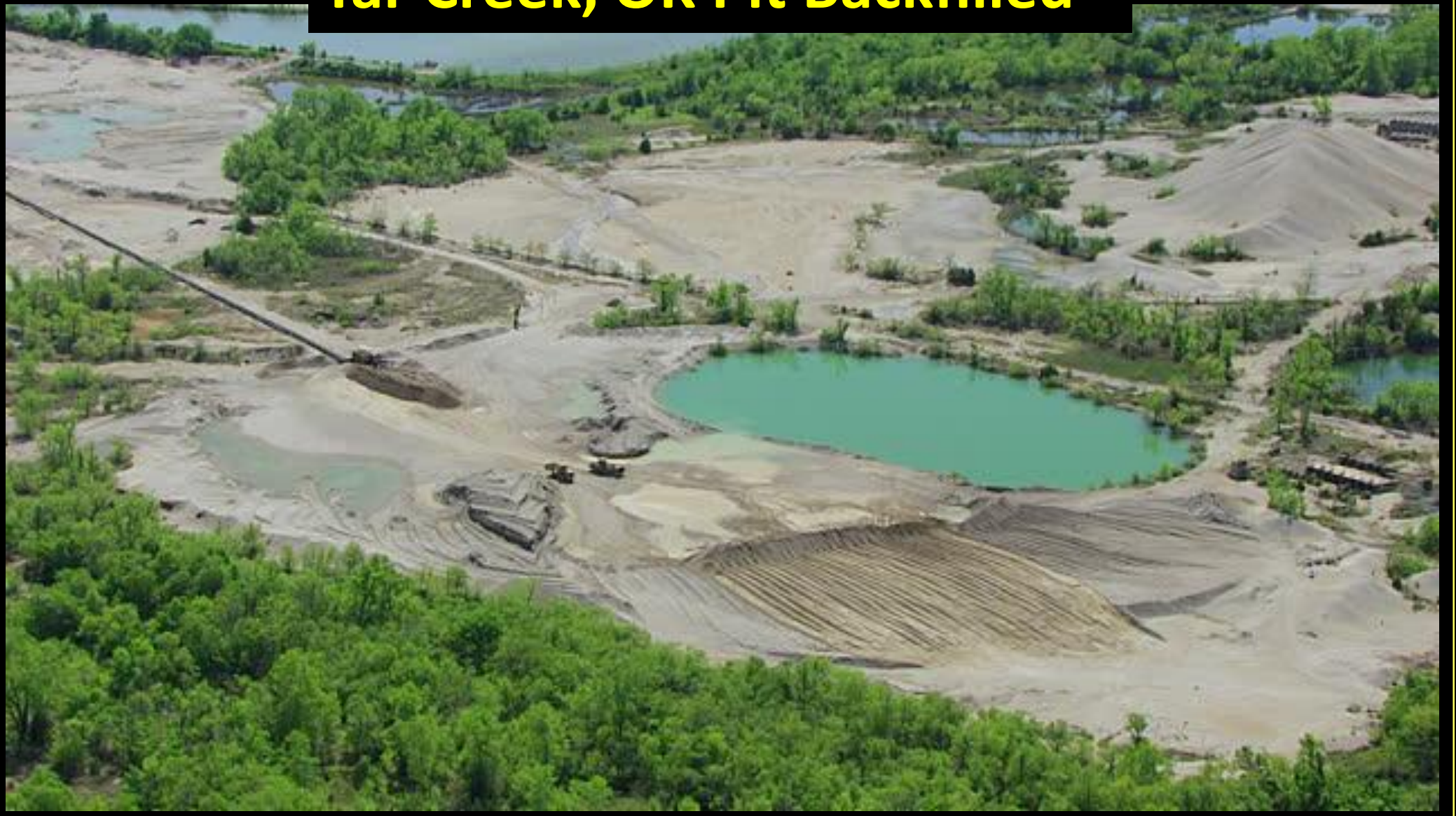
Tar Creek, OK Pits Scheduled for Backfill

Tar Creek, OK Pit Backfilled



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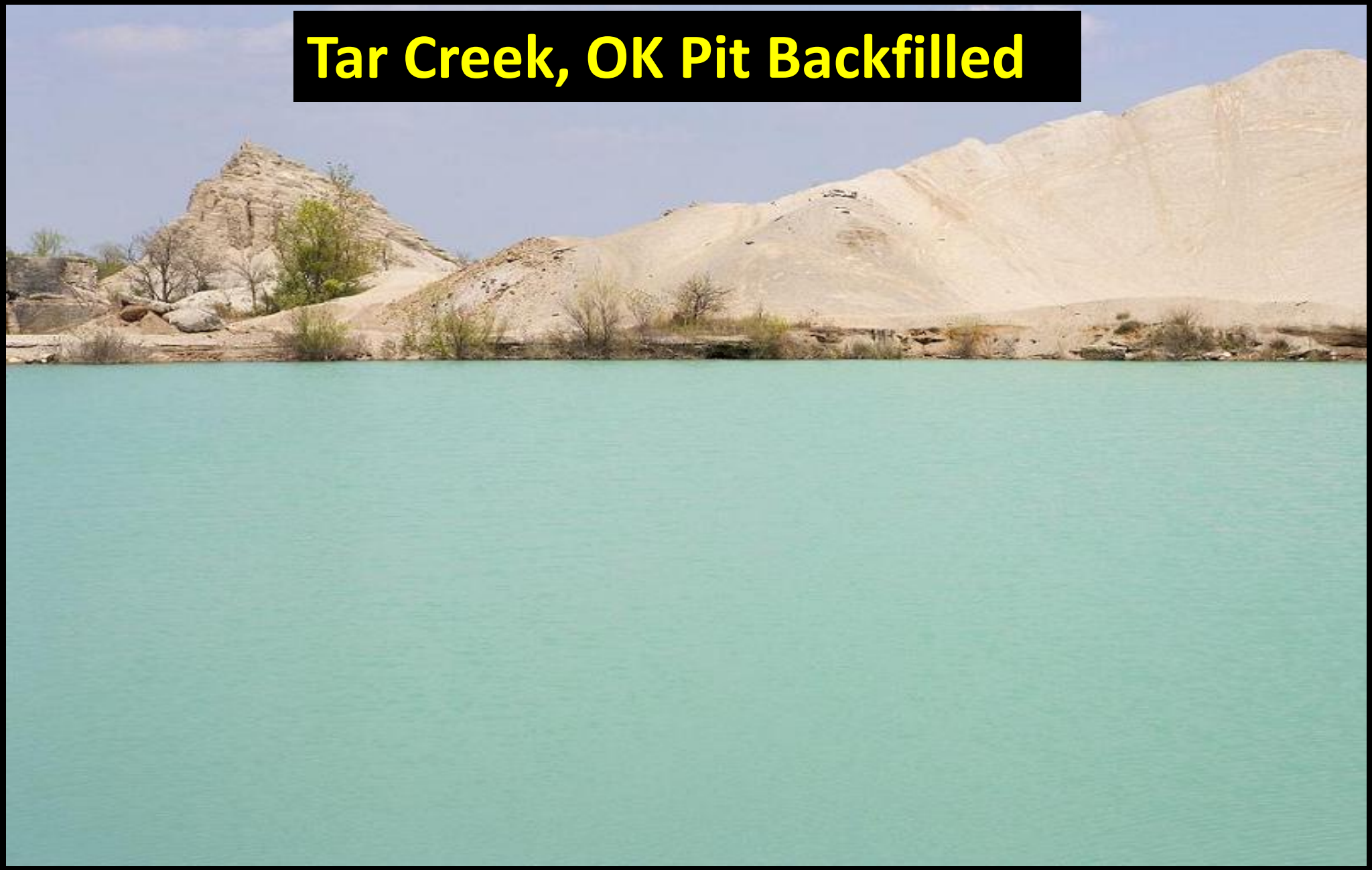
Tar Creek, OK Pit Backfilled



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Rules to the Game

40CFR 300.430 (f) Selection of remedy - (1) Remedies selected shall reflect the scope and purpose of the actions being undertaken and how the action relates to long-term, comprehensive response at the site.

(i) The criteria noted in paragraph (e)(9)(iii) of this section are used to select a remedy. These criteria are categorized into three groups.

(A) Threshold criteria. Overall protection of human health and the environment and compliance with ARARs (unless a specific ARAR is waived) are threshold requirements that each alternative must meet in order to be eligible for selection.

(B) Primary balancing criteria. The five primary balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost.

(C) Modifying criteria. State and community acceptance are modifying criteria that shall be considered in remedy selection.

Rules to the Game (con't)

(ii) The selection of a remedial action is a two-step process and shall proceed in accordance with § 300.515(e). First, the lead agency, in conjunction with the support agency, identifies a preferred alternative and presents it to the public in a proposed plan, for review and comment. Second, the lead agency shall review the public comments and consult with the state (or support agency) in order to determine if the alternative remains the most appropriate remedial action for the site or site problem. The lead agency, as specified in § 300.515(e), makes the final remedy selection decision, which shall be documented in the ROD. Each remedial alternative selected as a Superfund remedy will employ the criteria as indicated in paragraph (f)(1)(i) of this section to make the following determination:

(A) Each remedial action selected shall be protective of human health and the environment.

(B) On-site remedial actions selected in a ROD must attain those ARARs that are identified at the time of ROD signature or provide grounds for invoking a waiver under § 300.430(f)(1)(ii)(C).

(1) Requirements that are promulgated or modified after ROD signature must be attained (or waived) only when determined to be applicable or relevant and appropriate and necessary to ensure that the remedy is protective of human health and the environment.

(2) Components of the remedy not described in the ROD must attain (or waive) requirements that are identified as applicable or relevant and appropriate at the time the amendment to the ROD or the explanation of significant difference describing the component is signed.

History of the Water Boards

The Early Years

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Through a ballot initiative in the early 20th Century, law-makers passed a Constitutional amendment declaring that our water resources “shall put water to the highest beneficial use possible and shall not waste water or use it unreasonably.”

History of the Water Boards (Cont)

This new regulatory board merged the functions of two previous Boards: the State Water Quality Control Board and the State Water Rights Board. The former had its roots in the late 1940s, when legislators created a streamlined regulatory agency to address rising water quality problems with the state's explosive industrial and population growth. A water rights commission, which preceded the water rights board, was created in the early 1900s to arbitrate and resolve the state's water battles, which began during the 1849 Gold Rush. Back then, prospectors from throughout the world raced to the Sierra Nevada Mountains to stake their claims, using the cold mountain streams as a tool to unearth gold.

https://www.waterboards.ca.gov/about_us/water_boards_structure/history.html

Leviathan

AESE, Inc.

Insert Leviathan Flyover

State ARARs

Fact: Elem has Federally Reserved Rights, that are not under the Jurisidiction of The State

Fact: State Water Quality Control Boards Rules and Regulations are Not Protective of Tribal Members Currently Using Resources.

Fact: Elem Is developing Tribal Surface Water Quality Standards that are protective of Traditional uses. Since our uses focus on Lake resources, these standards will be protective of ALL users.

State Beneficial Uses Of Clear Lake

Table 2- 1 Beneficial uses of Clear Lake and whether they are impaired by nutrients and/or mercury.

Beneficial Use	Status	Impaired by nutrients	Impaired by mercury
Municipal and Domestic Supply	Existing	√	
Agriculture (Irrigation and Stock Watering)	Existing		
Recreation (Contact and Non-contact)	Existing	√	√
Freshwater Habitat (Warm)	Existing	√	
Spawning (Warm)	Existing		
Freshwater Habitat (Cold)	Potential	√	
Wildlife Habitat	Existing	√	√
Commercial and/or Sport Fishing	Existing	√	√

Fact: State Water Quality Control Boards Rules and Regulations are Not Protective of Traditional Tribal Uses of the Lake. Tribal Traditional Uses are NOT considered a Beneficial Use

State ARARs

Fact: Clear Lake is the Major Source of Natural Resources Required to fulfill the “purposes of the reservation”

Fact: Clear Lake is the Commons Relied Upon by all Neighboring Tribes as Well Other Non-White Subsistence Users

Fact: These Non-White Subsistence Users consume resources from the lake at higher rates than those protected by State Standards

Fact: State Water Quality Control Boards Rules and Regulations (ARARs) are Not Protective of Tribal Members or other users Currently Using Lake Resources.

Rules to the Game

40CFR 300.430 (f) Selection of remedy - (1) Remedies selected shall reflect the scope and purpose of the actions being undertaken and how the action relates to long-term, comprehensive response at the site.

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System	Site Element	Waste Rock Dam Regrading to Promote Runoff (Alternative No. 1 and 5)	Backfill HI with Wasterock and Soils, Hydraulic Head Control Via Waste Water Treatment (Tribal Alternative No. 8)
Description		Grade Waste Rock Dam as necessary to lay membrane liner and Cap in place.[5] No water treatment. Install a hydraulic cutoff wall near edge of Herman Impoundment on east side of Waste Rock Dam.[2, 3, 20]	**Install FML on lakeside of WRD.** Wash-down Pitwalls as Dewatering HI. Install drain blanket and basal FML and Well Risers. Backfill HI in the dry, employing upward fining. Flood pore space with lake water. Cap HI with RCRA-like cap. Maintain water level in HI at a level that is always lower than the lake[4, 21]
NCP Threshold Criteria	**Probability of Meeting RAFLU**	**0.0**	**1.0**
	Probability that Alt is Intrinsically Protective of Human Health (without relying on ICs)	**0.0**	**1.0**
	Probability of Protecting the Environment	**0.0**	**1.0**
	Probability of Complying with ARARs	**0.0**	**1.0**
NCP Balancing Criteria	**Reduction in Toxicity, mobility, or volume through treatment**	**0.5**	**1.0**
	Long-term Effectiveness and Permanence	**0.5**	**1.0**
	Overall Effectiveness	**Does not protect human health or the environment**	**1.0**
	Implementability	**Readily implemented**	**Readily implemented**
	Cost	**Low**	**Moderate**
NCP Modifying Criteria	**State Acceptance**	**Yes**	**No**
	Elem Acceptance	**No**	**Yes**
	Public Acceptance	**?**	**?**

State's Prefered Alternative

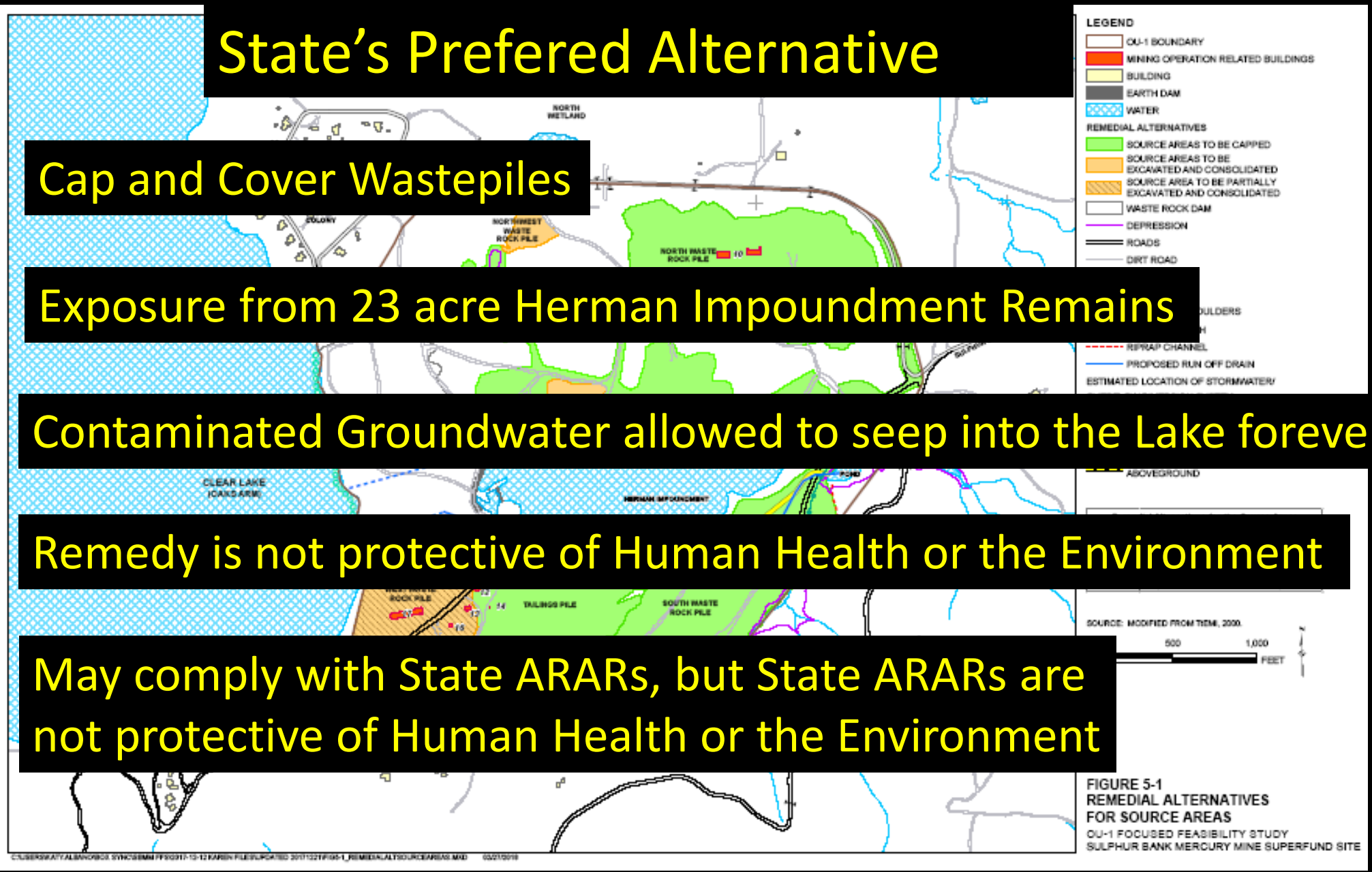
Cap and Cover Wastepiles

Exposure from 23 acre Herman Impoundment Remains

Contaminated Groundwater allowed to seep into the Lake forever

Remedy is not protective of Human Health or the Environment

May comply with State ARARs, but State ARARs are not protective of Human Health or the Environment



AESE, Inc.

Tribal Alt. No. 8

Eliminates Exposure from 23 acre HI

Fully Breaks the Ground Water flowpath to the Lake

Greatly Reduce the Volume of OU-1 Cover

Except for final cover material all transportation occurs on-site Greatly reducing Costs and Transportation Hazard

Longterm OU-1 O&M Costs Driven by Water treatment Options: Onsite WTP vs Discharge to POTW (General Public Benefits by utilization of POTW)