Pasco Sanitary Landfill Site Cleanup Overview

Eastern Washington Chapter of the Academy of Certified Hazardous Material Managers (EWCACHMM)

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Site Managers

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Public Involvement

Toxics Cleanup Program, Eastern Region

DEPARTMENT OF ECOLOGY
State of Washington

How the public sometimes perceives the pace of environmental cleanup at complex sites

Department of Ecology
Regional and Field Offices

Topics for Today

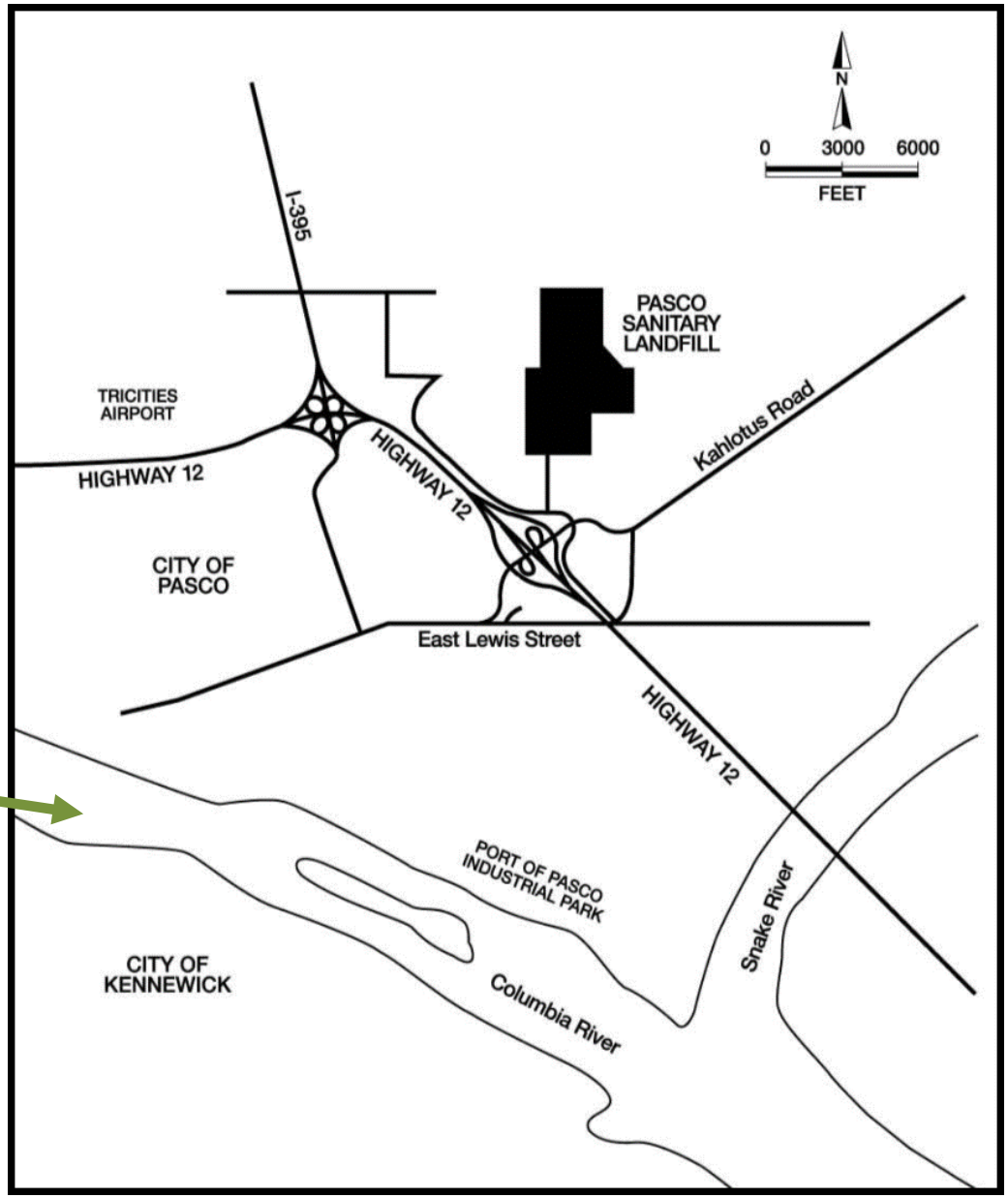
- Site history
- Model Toxics Control Act
- Cleanup actions – past and ongoing
- Remediation progress and challenges
- Balefill fire recap
- Next steps
- Public participation

Pasco Landfill Site History

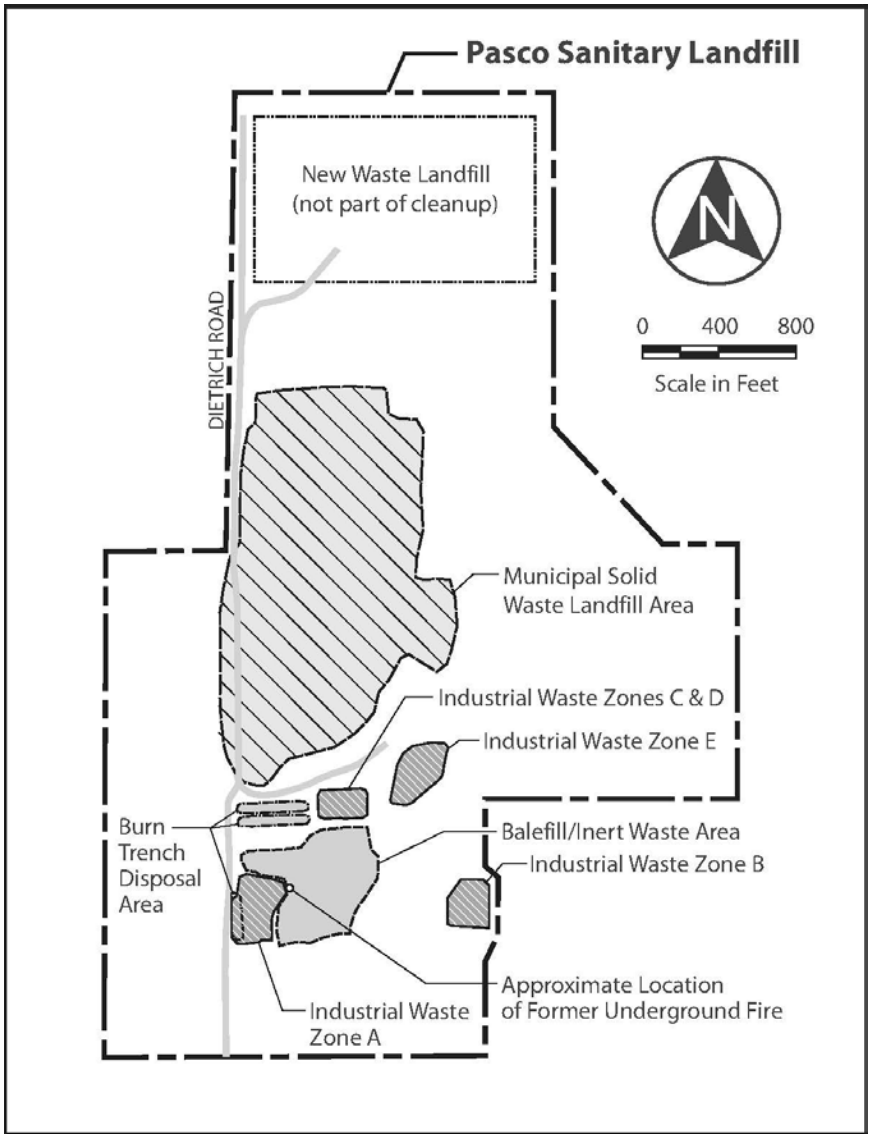
Site Location

Dietrich Road by intersections of Kahlotus Road and U.S. Highway 12

Columbia River



Site Map


Pasco Sanitary Landfill
New Waste Landfill
(not part of cleanup)
N
0
400
800
Scale in Feet
DIETRICH ROAD
Municipal Solid
Waste Landfill Area
Industrial Waste Zones C & D
Industrial Waste Zone E
Burn
Trench
Disposal
Area
Balefill/Inert Waste Area
Industrial Waste Zone B
Approximate Location
of Former Underground Fire
Industrial Waste
Zone A

Aerial View

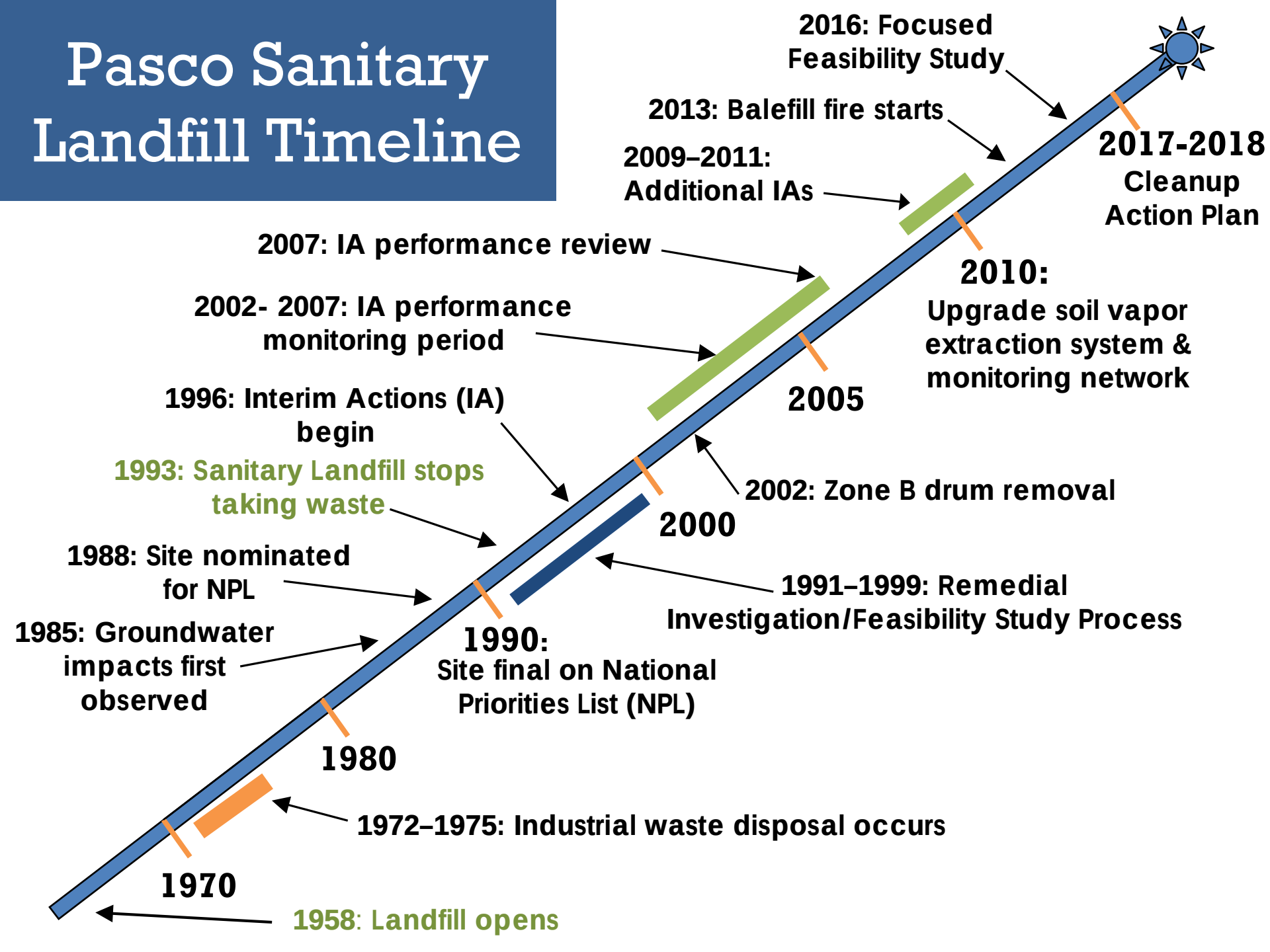
SVE = Soil vapor extraction

What's in the neighborhood?

Site History & Features

- **Industrial Wastes (1972 – 1975)**
  - Zone A: 35,000 – 40,000 drums mixed industrial waste
  - Zone B: Herbicide wastes (~5,000 drums)
  - Zone C/D: Various sludges/resins (>3,000,000 gallons)
  - Zone E: Chlor-alkali wastes (~11,000 tons)
- **Municipal Landfill (1958 – 1993)**
  - Burn trenches (1958–1971)
  - Balefill and Inert Waste Area (1976–1993)
  - Septic tank wastes, sewage sludge (1976–1989)
- **Offsite Plume (1985 – present)**

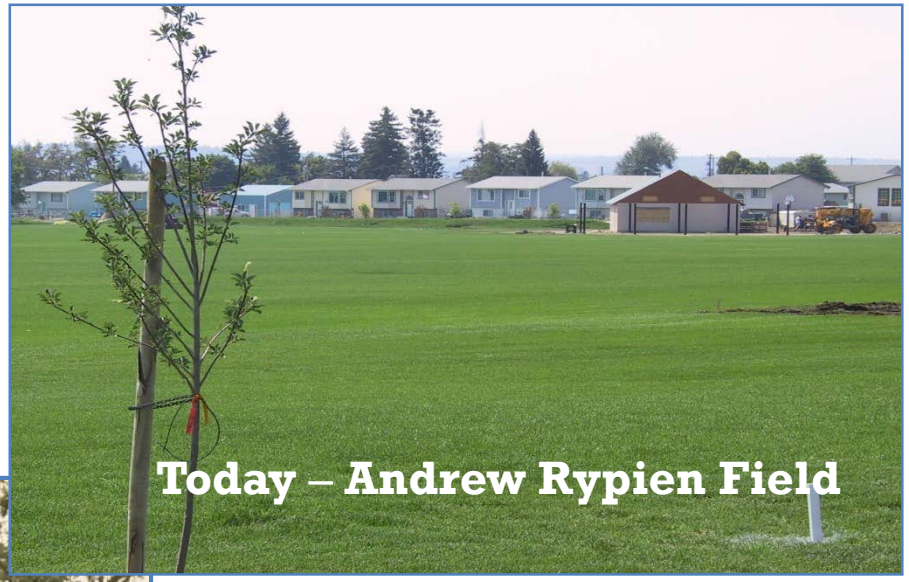
Pasco Sanitary Landfill Timeline



Model Toxics Control Act

Key Principles

- Polluter pays
- Permanent remedies
- Public participation



- Bias towards action
- Innovation

Regulatory Authority

Statute

- Passed as citizen's initiative in 1988
- Created a funding source generating **$150 million per year** for environmental protection & cleanups
- Chapter 70.105D RCW

Rules

- WAC 173-340 (Cleanup regulation)
- WAC 173-204 (Sediment management standards)

RCW = Revised Code of Washington
WAC = Washington Administrative Code

What's a hazardous substance?

- Any substance that is a hazardous substance under federal superfund law
- Dangerous or extremely dangerous hazardous waste under state hazardous waste law
- Petroleum and petroleum products
- Other substances determined by Ecology by rule

What's a facility?

- Physical structures:

Buildings	Pipelines
Landfills	Ponds
Wells	Vehicles

- Any site or area where a hazardous substance has been disposed of or otherwise come to be located

Who are Potentially Liable Persons?

- Current owner and operator with any ownership interest or exercises any control
- Owner and operator at the time of release
- Abandoned facilities: anyone who owned, operated or exercised control before its abandonment
- Persons who owned the hazardous substance and arranged for disposal, treatment or transport (generators)
- Persons who transported the hazardous substance (transporters)
- Manufacturers of hazardous substance that cause pollution when used according to their instructions

Pasco Landfill Potentially Liable Persons

- Advance Electroplating
- Basin Disposal Company
- Boeing Company
- Philip Environmental, Inc.
- Burlington Environmental, Inc.
- Chemical Processors, Inc.
- Resource Recovery, Inc.
- Burlington Northern, Inc.
- Carr Aviation
- Collier Carbon and Chemical
- Chempro of Oregon
- Crown Cork and Seal Company, Inc.
- E.I. du Pont de Nemours and Co., Inc.
- Franklin County
- Freightliner Corporation, a Subsidiary of Daimler-Benz of North America Holding Company
- Georgia-Pacific Corporation
- Glidden Corporation, a Subsidiary of ICI Americas, Inc.
- Harbor Oil, Inc.
- ICI Canada, Inc.
- Intalco Aluminum Corporation
- James River Paper Company, Inc.
- Kalama Chemical Company
- Leonard and Glenda Dietrich
- Minnesota Mining and Manufacturing Company
- Morton Chemical Company
- National Service Industries, Inc.
- Pasco Sanitary Landfill, Inc.
- Franklin Land Recovery, Inc.
- Puget Sound Naval Shipyards
- The O'Brien Corporation
- Oregon Cutting Systems Division of Blount, Inc.
- PACCAR, Inc.
- Precision Castparts Corporation
- Piute Energy & Transportation Company
- PPG Industries
- Rhone-Poulenc Company
- Sandvik Special Metals
- Simpson Timber Company
- UARCO Incorporated
- United States Air Force
- United States Department of Agriculture, Forest Service
- United States Department of Interior, Bureau of Reclamation
- Weyerhaeuser Corporation
- Wood Treatment Chemical Company

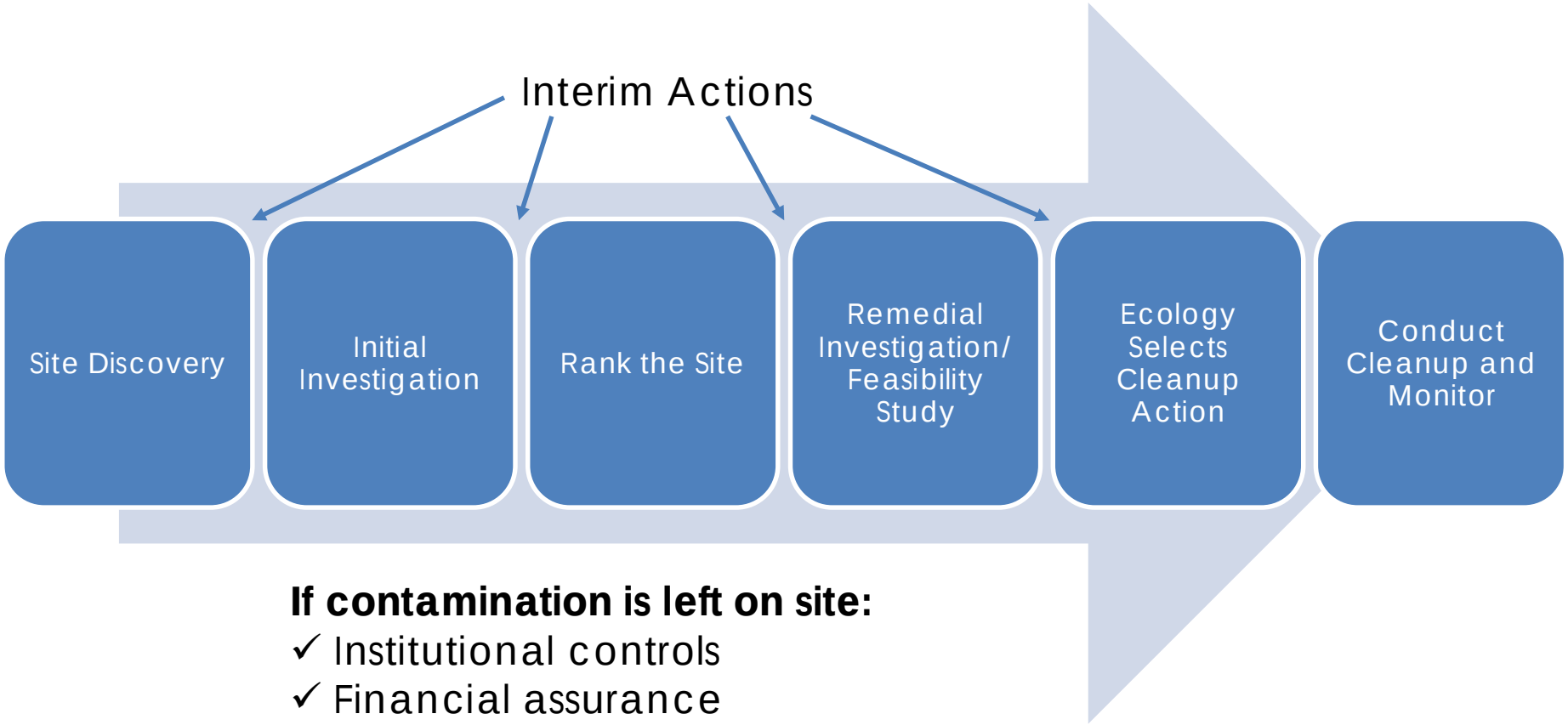
More than 30 PLPs!!

Nature of Liability

- **Joint and several:** One or all PLPs may be liable for entire cleanup
- **Strict liability:** PLPs are liable regardless of whose fault it was that pollution occurred

NOTE: Except in emergencies, Ecology must notify all PLPs and solicit comments on status before ordering action at a site

Steps in the Cleanup Process



If contamination is left on site:

- ✓ Institutional controls
- ✓ Financial assurance
- ✓ Monitoring
- ✓ Periodic reviews

Selecting a Cleanup Remedy

Threshold requirements

- Protect human health and the environment
- Comply with cleanup standards
- Comply with state and federal laws
- Provide for compliance monitoring

Other significant requirements

- Use permanent solutions to fullest extent practicable
- Provide reasonable restoration time frame
- Consider public concerns

Cleanup Actions: Past & Ongoing

RI/FS Findings & Recommendations

- Volatile organic compounds (VOCs) released from Zone A, the Municipal Solid Waste Landfill, and potentially other sources
- Groundwater plume ~1.5 miles long
- Elevated VOCs in soil gas beneath Zone A
- No significant areas of soil contamination exist outside the waste zones
- Feasibility Study (2000) identifies a 5-yr Interim Action period to evaluate remedy performance

RI/FS = Remedial Investigation/Feasibility Study

Contaminants

Broad suite, including:

- Volatile organic compounds
- Metals
- Herbicides
- Dioxins/Furans
- Semi-volatile organic compounds

Preliminary Groundwater Cleanup Levels Adjusted for Risk[1]

INDICATOR[2]	MTCA METHOD B FORMULA, ug/L		Preliminary Method B CUL, ug/L	Adjusted Method B CUL, ug/L[1]	Cancer Risk	nephrotoxicity	hepatotoxicity	neurotoxicity	hematotoxicity	Liver cell polymorphism	Other
VOCs	Carcinogen	Noncarcinogen		**SEE KEY**							
Benzene	0.795	32	0.795	**0.79**	9.93E-07						0.025
1,2-Dichloroethane	0.48	160	0.38	**0.38**	7.92E-07						0.002
1,1-Dichloroethene	NR	400	0.057	**0.057**			0.000				
cis-1,2-Dichloroether	NR	16	16	**16**					1.000		
Methylene chloride	5.83	480	5	**5**	8.57E-07		0.010				
Tetrachloroethene	20.8	48	0.69	**0.69**	3.32E-08		0.014				
Toluene	NR	640	640	**615**		0.961	0.961	0.961			
1,1,1-Trichloroethane	NR	16000	200	**200**			0.013				
Trichloroethene[3]	0.54	4	0.54	**2.5**	4.63E-06						0.625
Vinyl chloride	0.029	24	0.029	**0.079**	2.72E-06					0.003	
METALS											
Chromium III	NR	24000	100	**100**							0.004
			Total Cancer Risk =		**1.00E-05**						
			Total Hazard Index =			**0.961**	**0.998**	**0.961**	**1.000**	**0.003**	**0.656**

Note 1: These cleanup levels have been adjusted for ingestion risk only. Cleanup levels may need to be further reduced to account for overall site risk.

Note 2: This list of indicators is subject to addition based on the outcome of a fate and transport analysis that is yet to be completed.

Note 3: The Adjusted CUL for Trichloroethene was increased to the limit of 2.5 ug/L dictated by surface water (CWA) regulations.

KEY
Adjustable for cancer risk
Adjustable for non cancer risk
Surface Water regs applicable
Can't go higher (SW kicks in)
Can't go higher (MCL kicks in)

Reasonable Maximum Exposure Scenarios

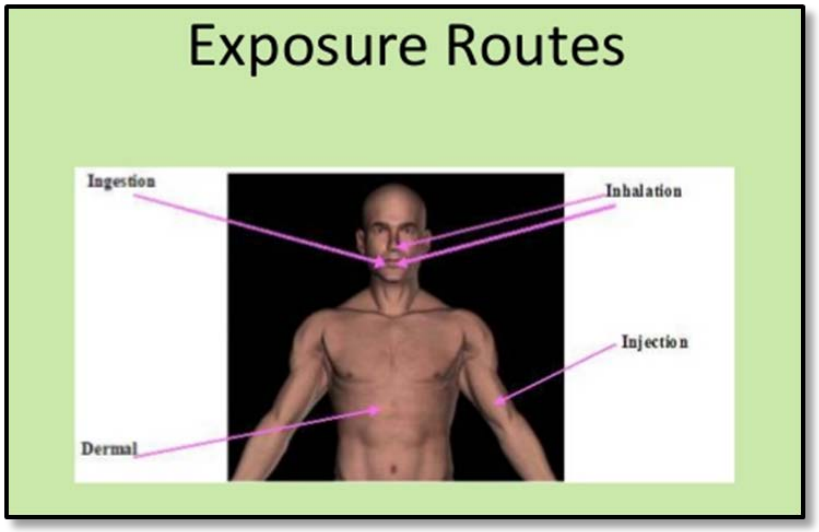
Groundwater

- Residential ingestion
- Domestic consumptive use

Soil

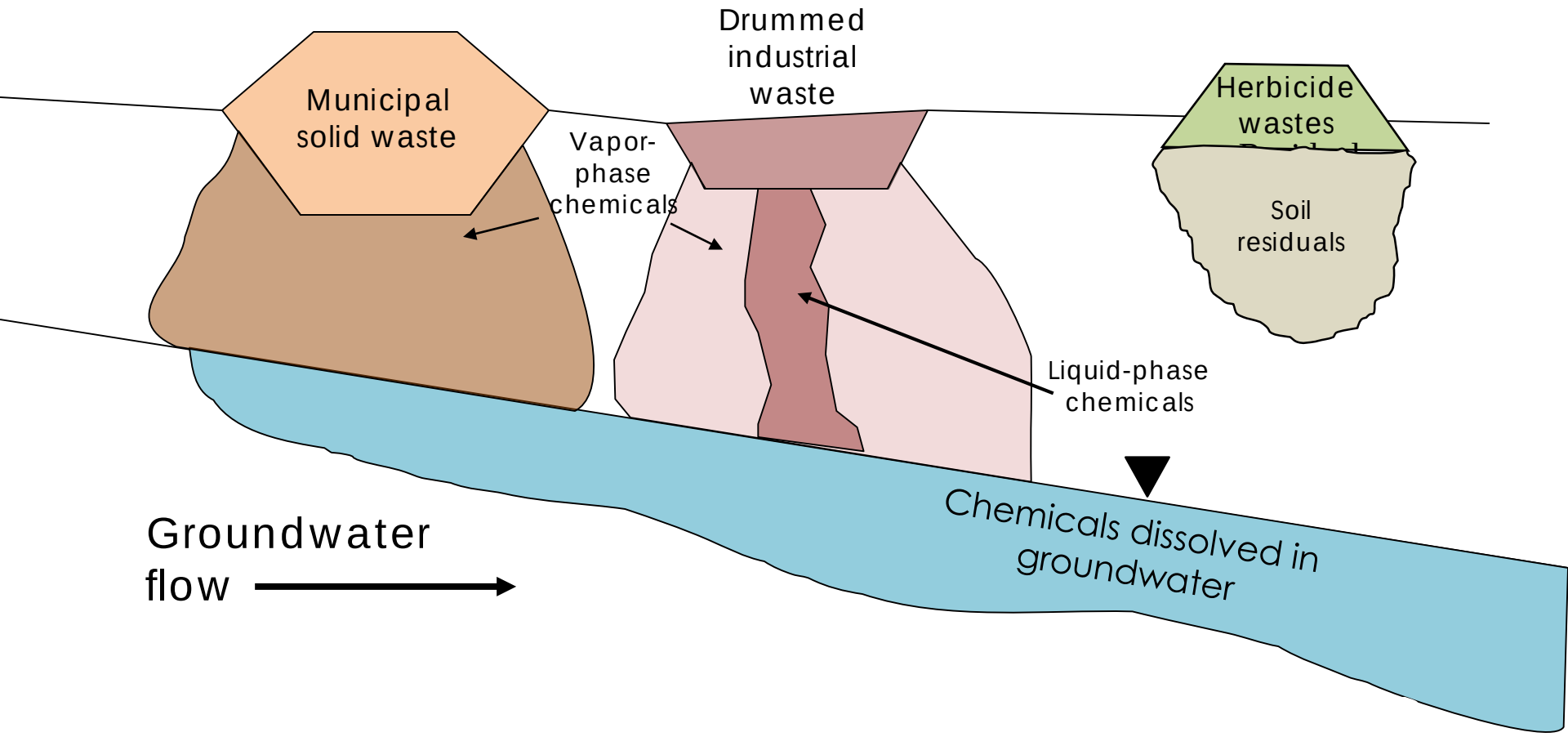
- Industrial worker
- Incidental ingestion, dermal contact, vapor inhalation

These exposure routes were used for remedial alternative selection and cleanup level development

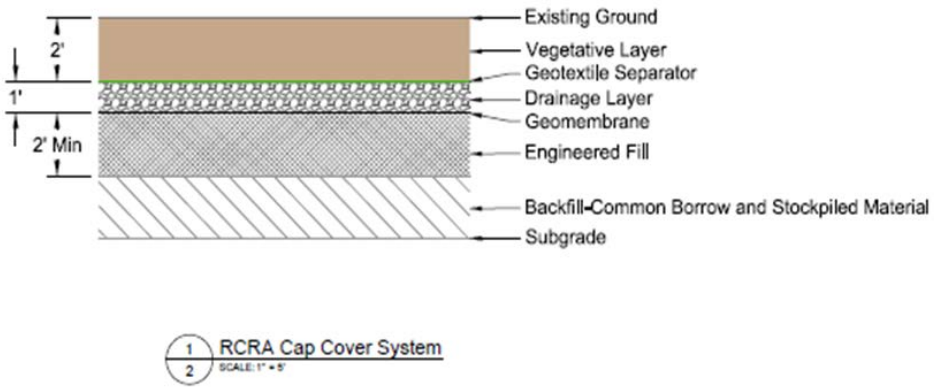


What's happened here?

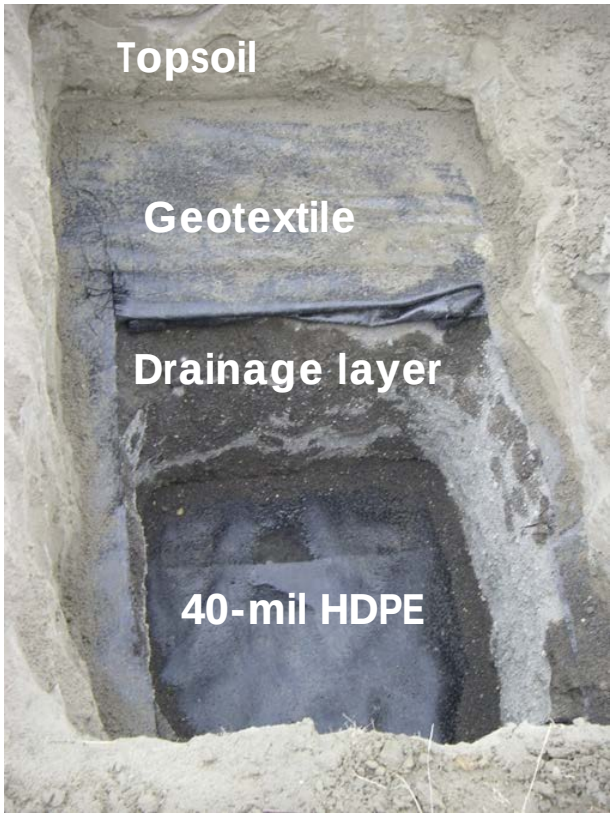
Simplified Conceptual Site Model



Interim Action Installation
RCRA C Cover Systems



1 2 RCRA Cap Cover System
SCALE: 1" = 5'



Zone A Cover System Test Pit

Protective multi-layer covers installed at all industrial waste disposal areas and the Municipal Solid Waste Landfill

RCRA = Resource Conservation & Recovery Act

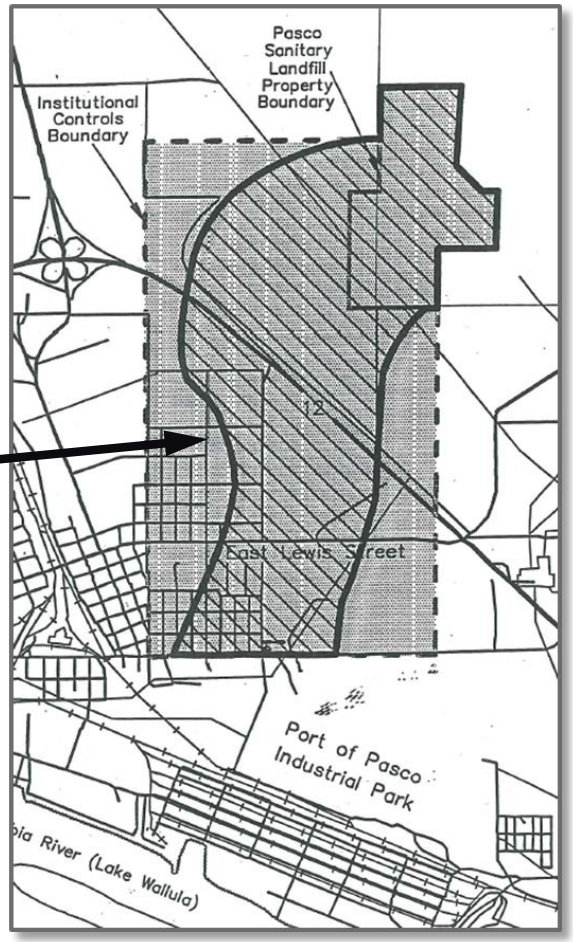
Site-wide Institutional Controls

- Fencing, gating and signage
- Deed restrictions on landfill-related parcels
- Groundwater protection area (City of Pasco ordinance) to restrict groundwater use
- City water provided to some residential well users

Institution Controls: Restricted Groundwater Use

City of Pasco
Ordinance (2001)

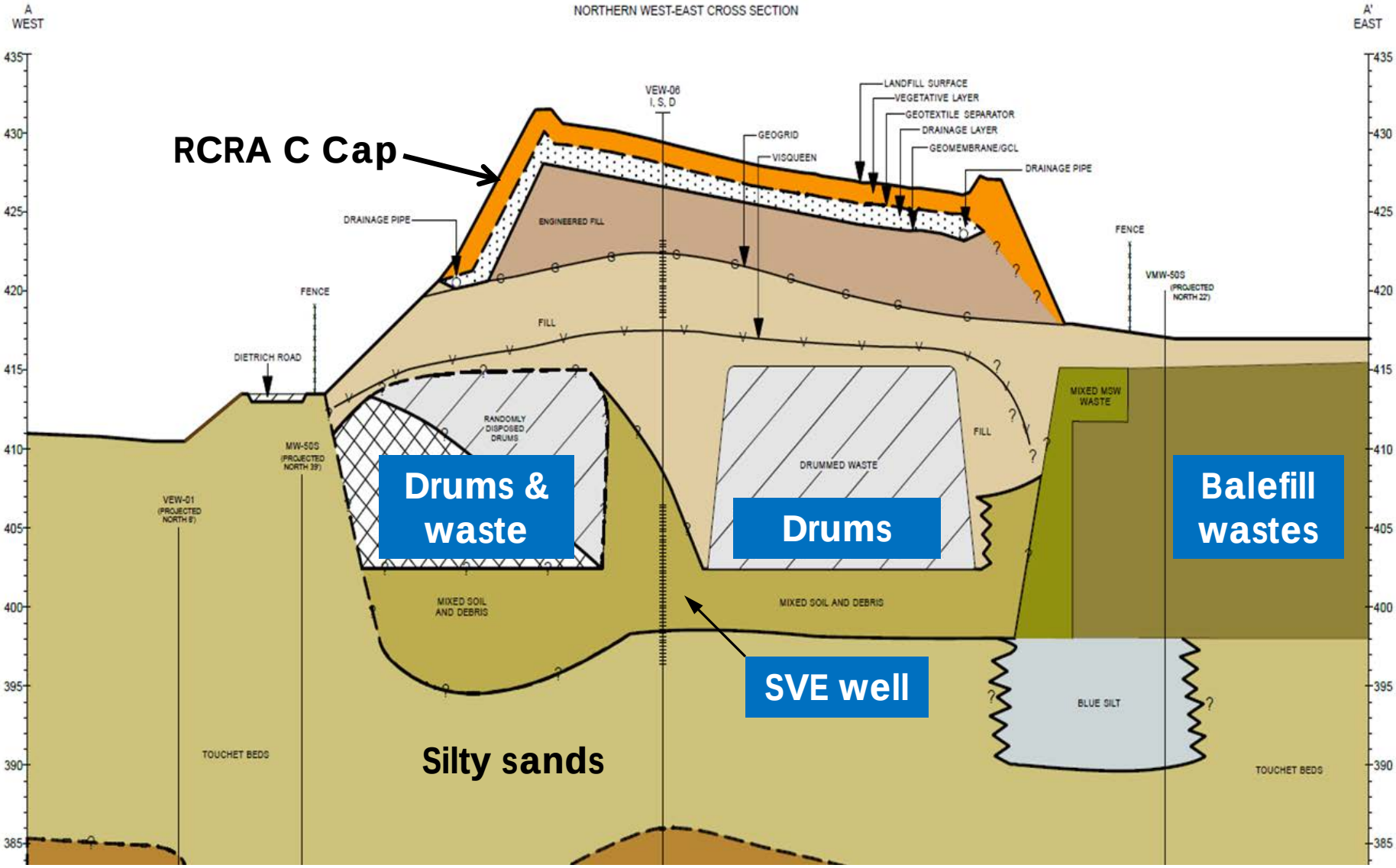
Groundwater
Protection Area



Zone A Industrial Waste Repository Area

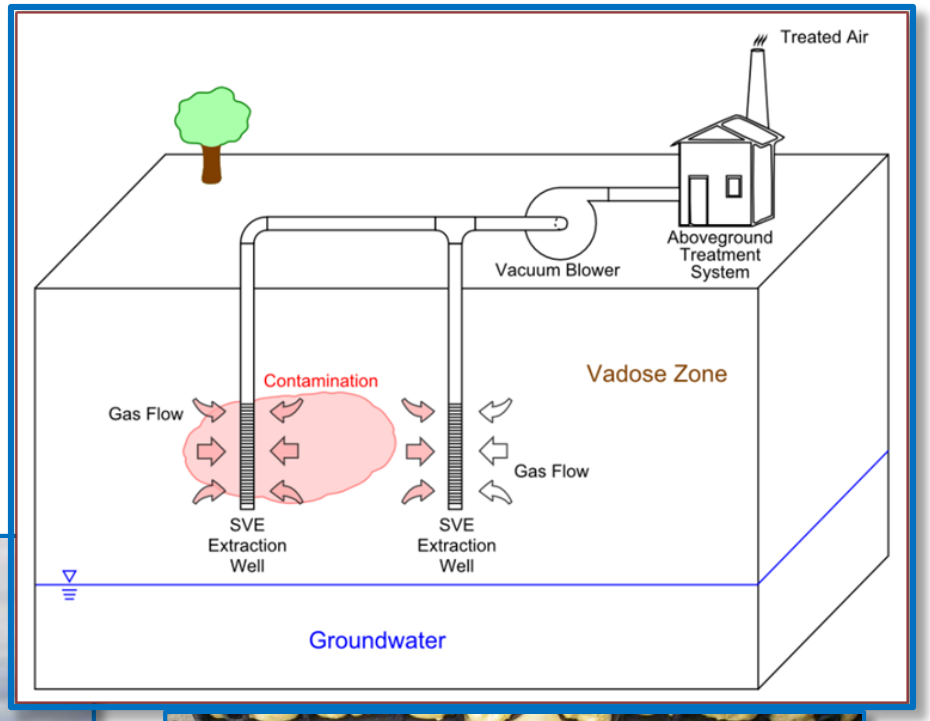
SVE = Soil vapor extraction

Zone A



RCRA = Resource Conservation & Recovery Act
SVE = Soil vapor extraction

Zone A
Soil Vapor Extraction System

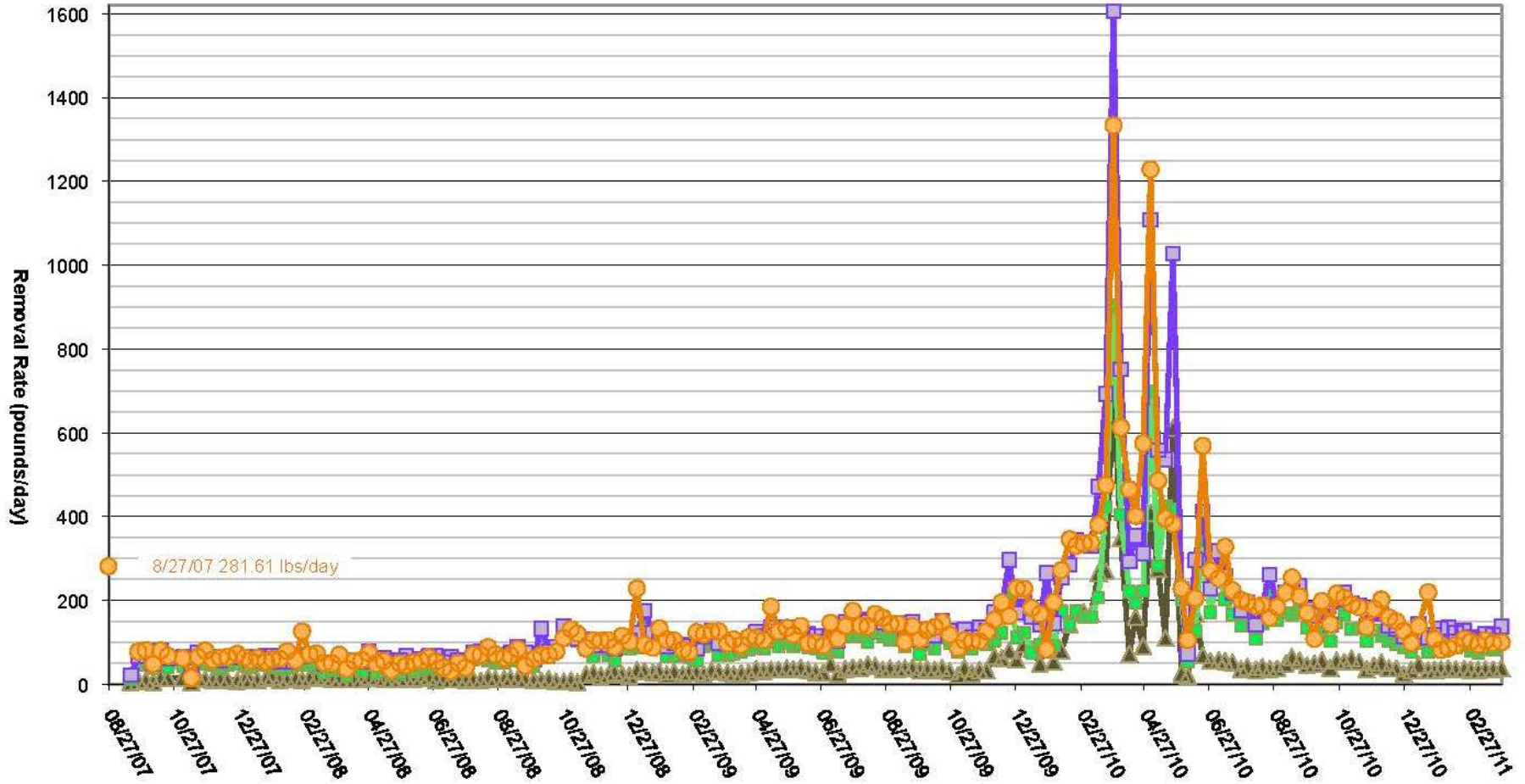


SVE wells

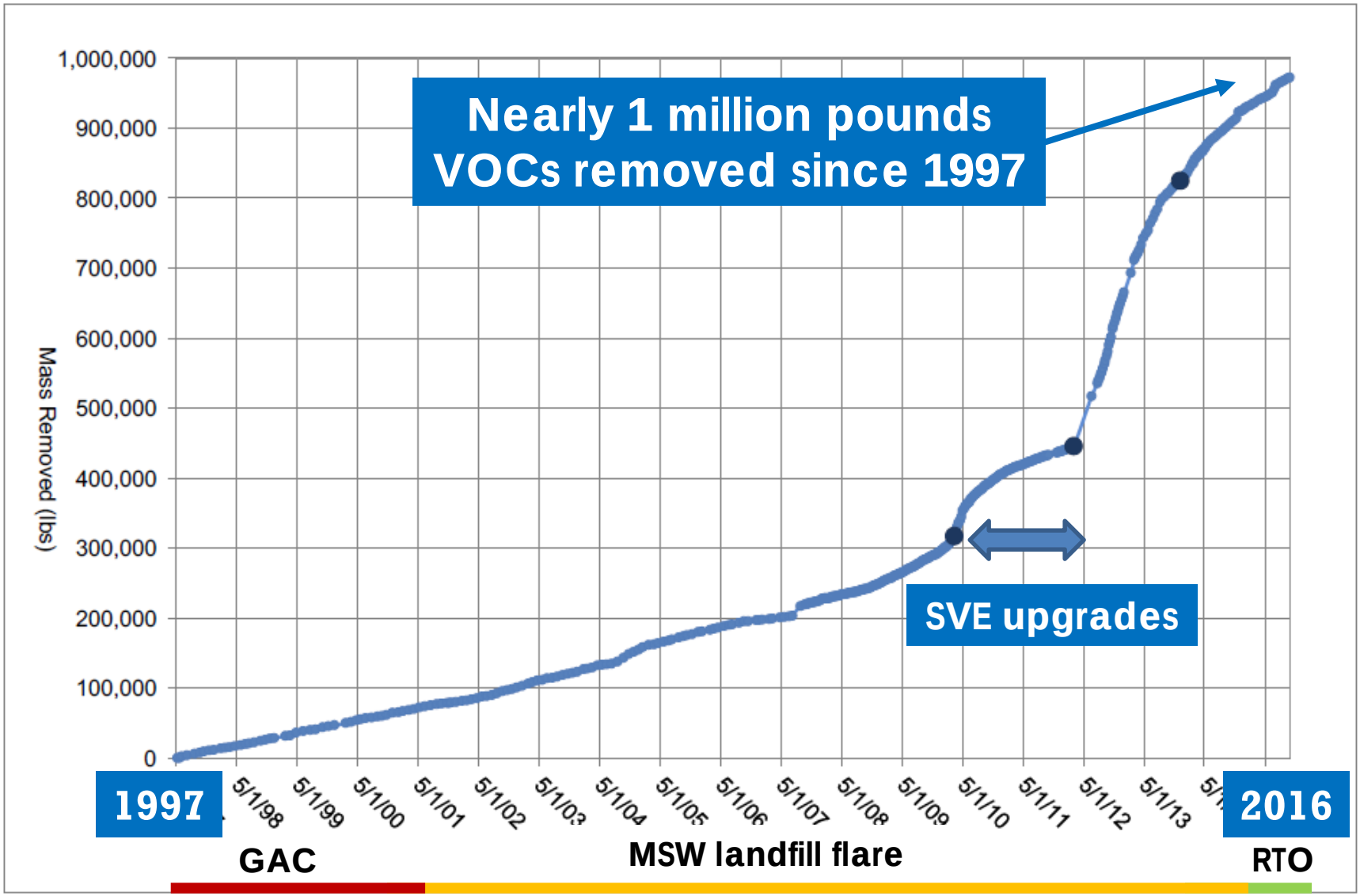
Condensate collection

Zone A Soil Vapor Extraction Rates 2007–2011

Volatile organic compound capture in current system as high as 1,600 pounds/day, currently near 200 pounds/day

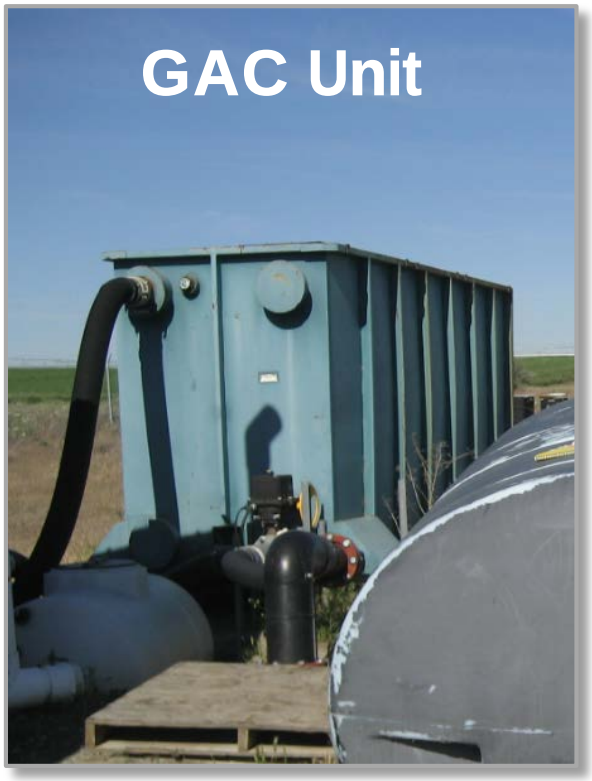


Zone A VOC Removal by SVE



GAC = Granular activated carbon
MSW = Municipal solid waste
RTO = Regenerative thermal oxidizer
VOC = Volatile organic compounds
SVE = Soil vapor extraction

Zone A Soil Vapor Treatment Methods



GAC = Granular activated carbon

MSW = Municipal solid waste

RTO = Regenerative thermal oxidizer

Zone B Industrial Waste Repository Area

SVE = Soil vapor extraction

Zone B Timeline

- **1972-1975**: Herbicide manufacturing waste disposed; other wastes also present
- **2000**: Interim Action Agreement requires drum removal
- **2002**: Drums removed - some residual soil contamination left behind
- **2013**: Highly protective, multi-layer Resource Conservation & Recovery Act C Cover installed
- **Present**: Ongoing cover inspection and groundwater monitoring

Zone B Removal Action
February 5, 2002

Zone B Removal Action
February 4, 2002

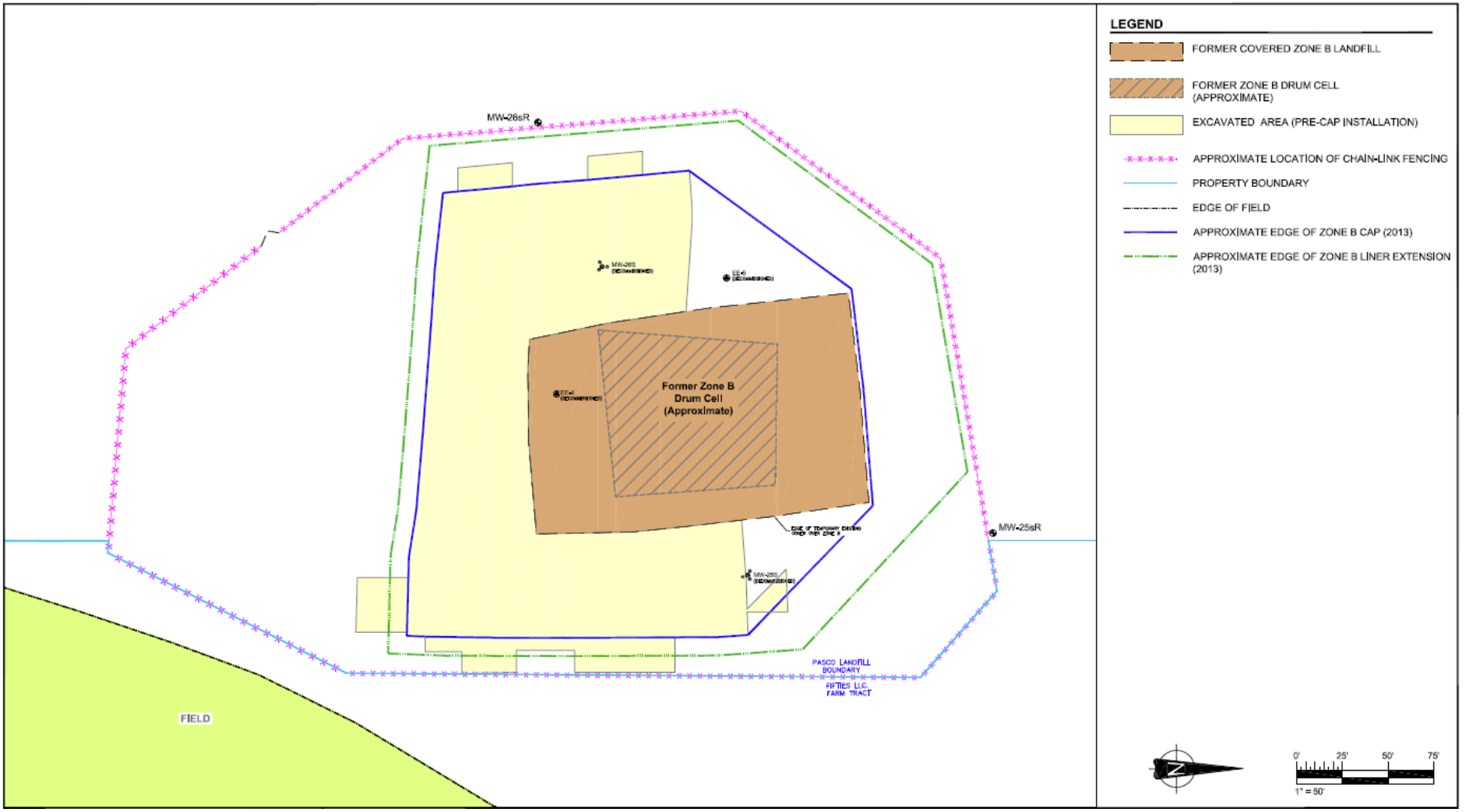
Zone B Removal Action
February 21, 2002

Zone B Removal Action
February 28, 2002

Zone B Removal Action
March 19, 2002

Zone B Interim Cover System after Drum Removal

Zone B: New Cover Footprint



Courtesy of AMEC

Zone B Multi-Layer Cover System
May 2013

Zone B Cover System
June 2013

Zone C/D & E Industrial Waste Repository Areas

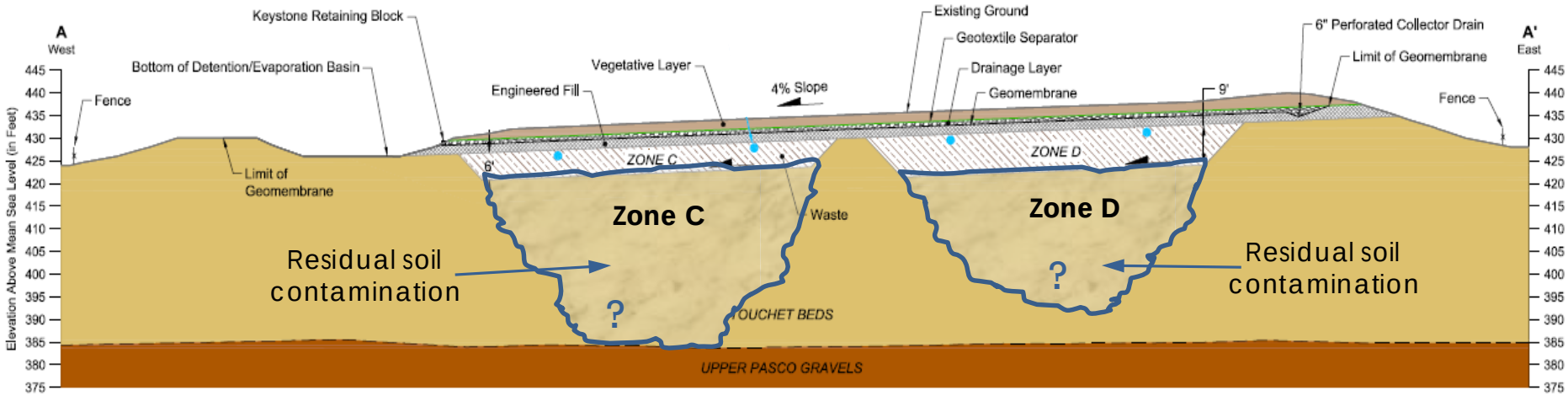
SVE = Soil vapor extraction

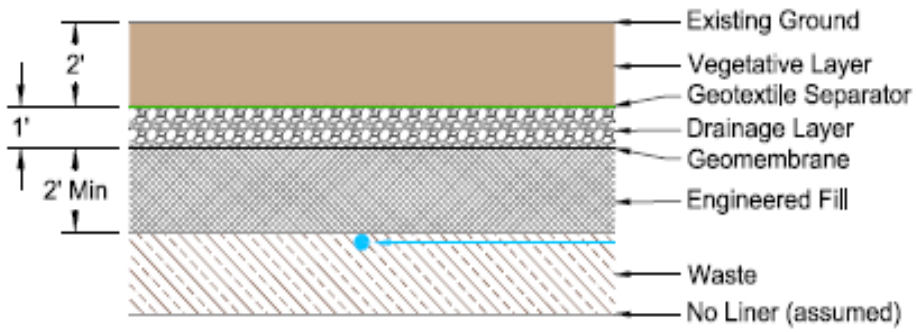
Zone C/D & E Repository Areas

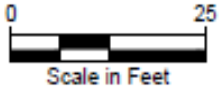
- Interim Action Resource Conservation & Recovery Act C Covers in place
- Waste materials relatively stable
- Limited contaminant migration from source zone
- Localized groundwater impacts from volatile organic compounds

Zone C/D Vapor Monitoring

Zones C/D Cross Section

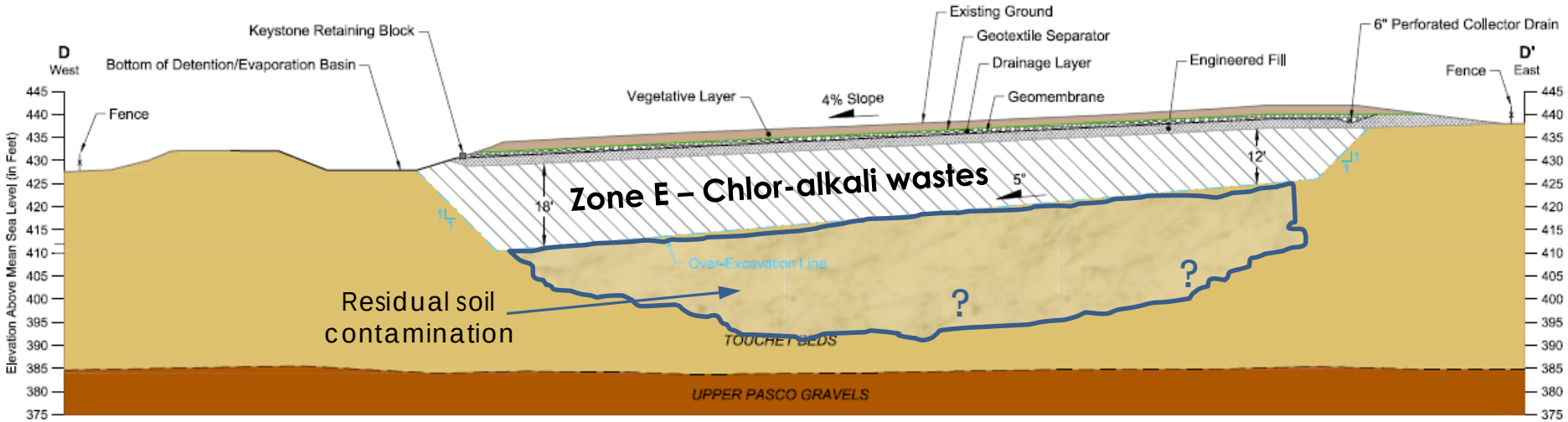


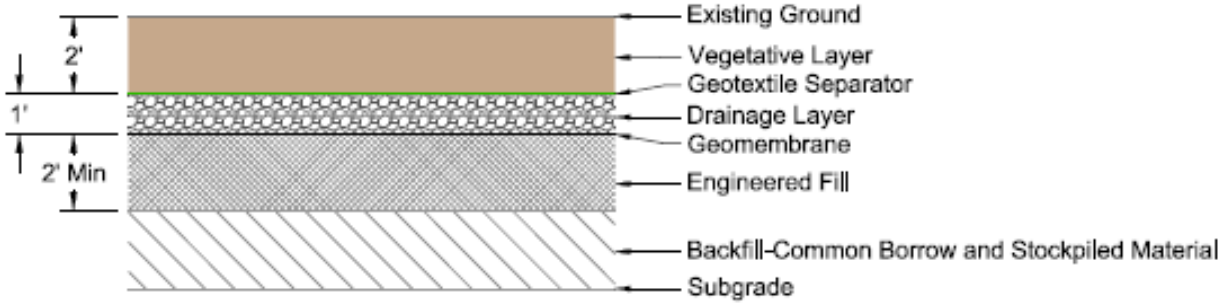


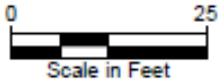


Courtesy Anchor QEA

Zone E Cross Section







Courtesy Anchor QEA

Municipal Solid Waste Landfill

SVE = Soil vapor extraction

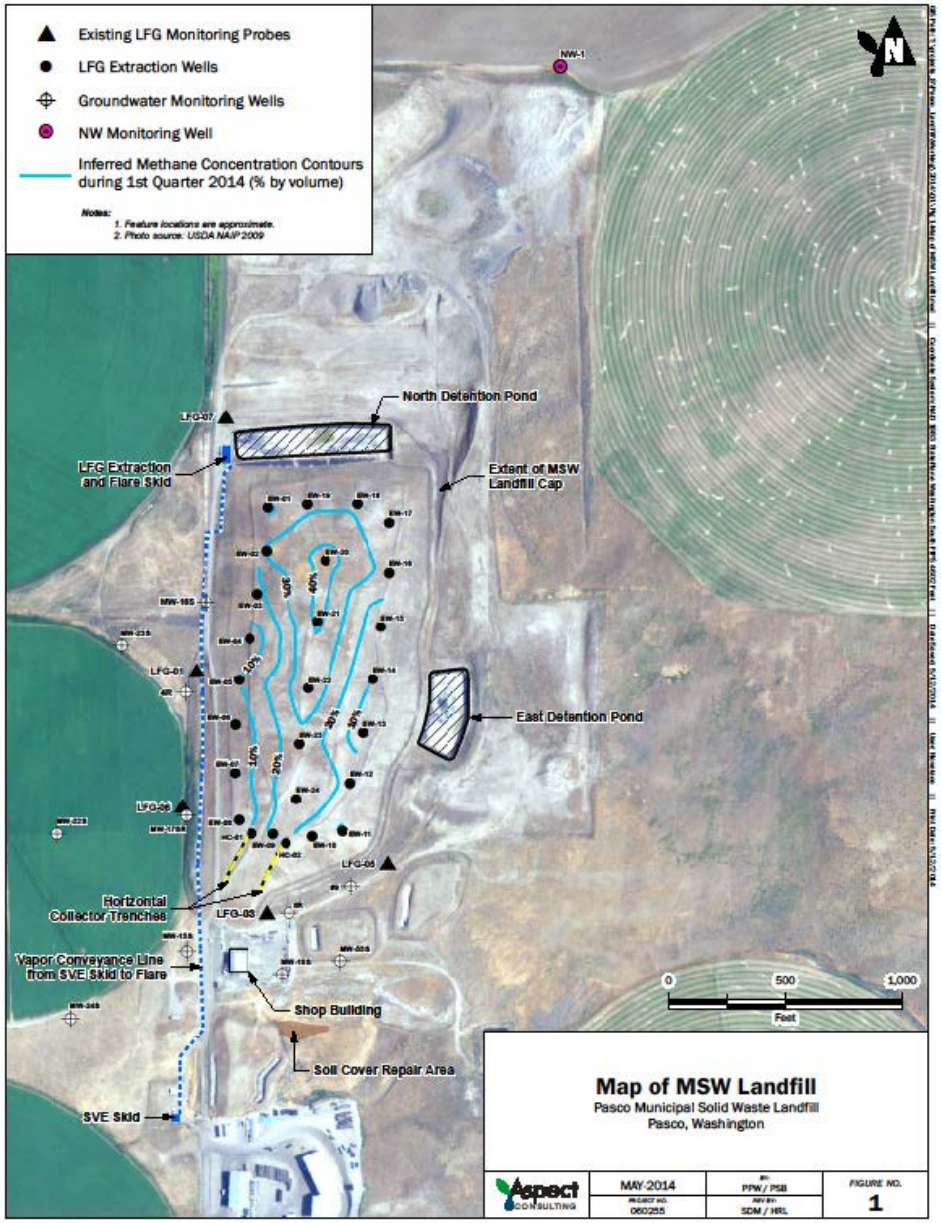
Municipal Solid Waste Landfill & Flare Unit Cleanup Actions

- Protective cover system in place
- Landfill gas extraction wells active
- Recent flare upgrades to enhance performance
- Flare no longer treats Zone A SVE vapors
- Management of declining methane levels
- Routine groundwater monitoring

SVE = Soil vapor extraction

Municipal Solid Waste Landfill Gas Control System

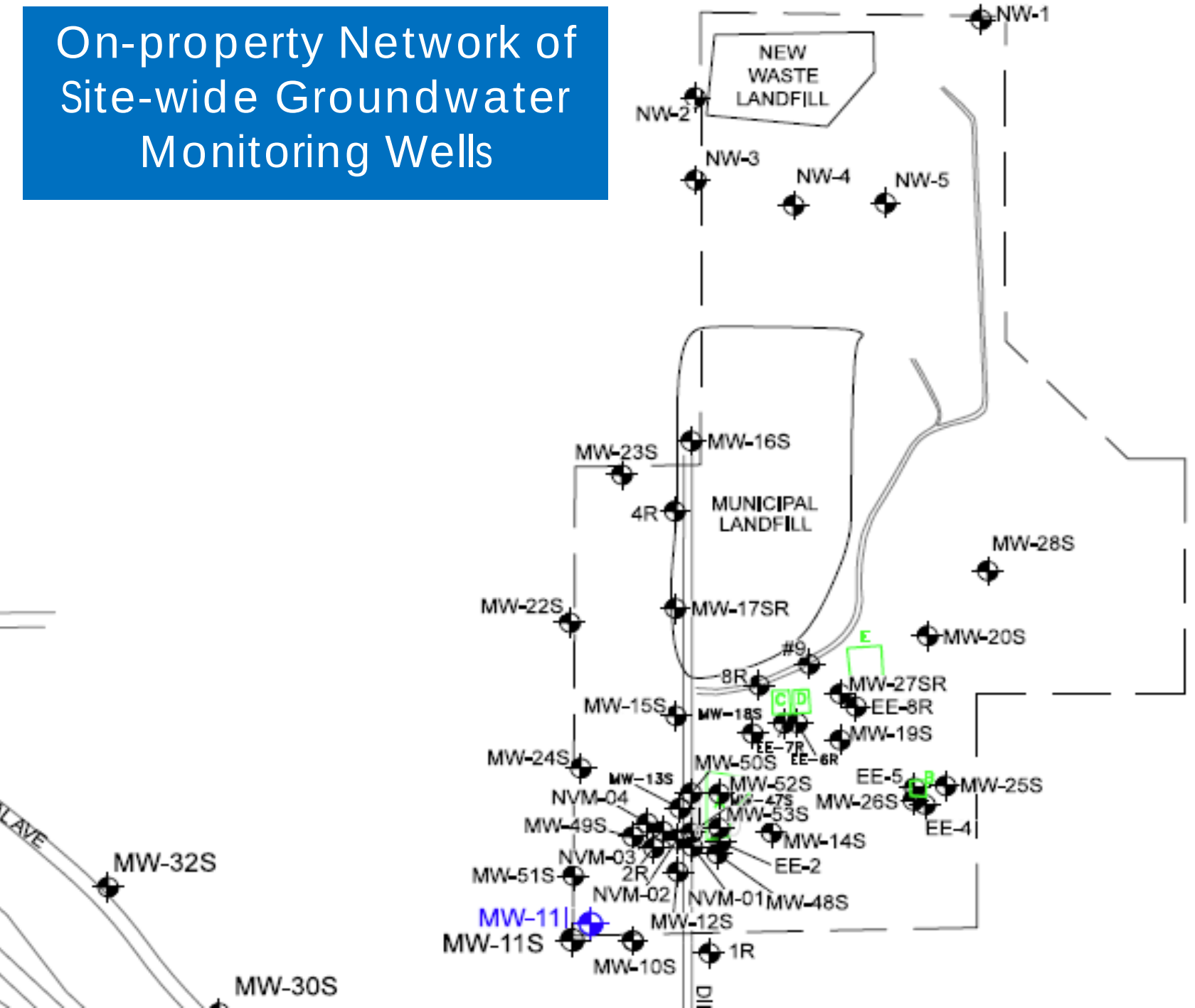
Gas extraction well



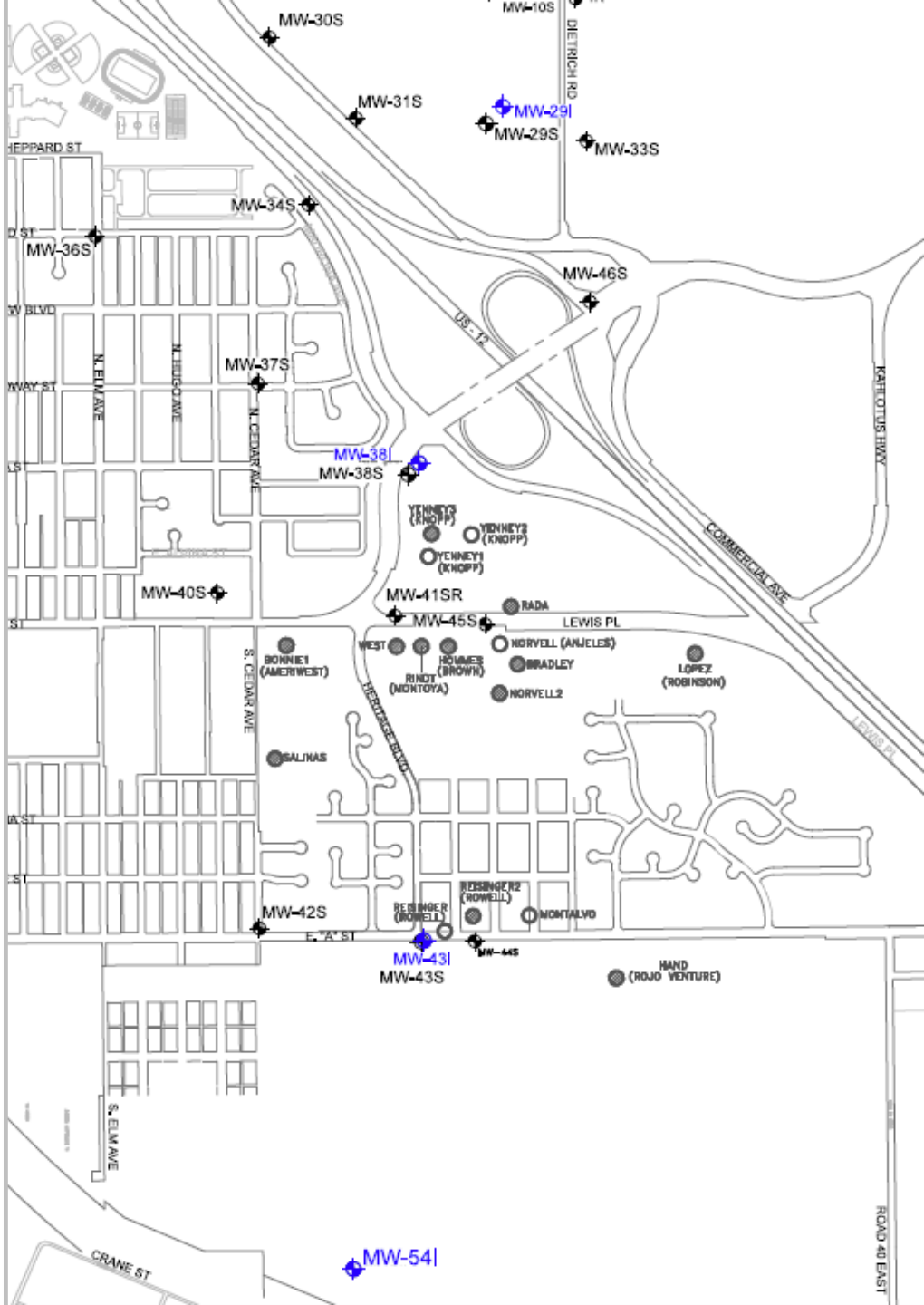
Municipal Solid Waste Landfill Flare Unit

Flare unit currently treats landfill gas

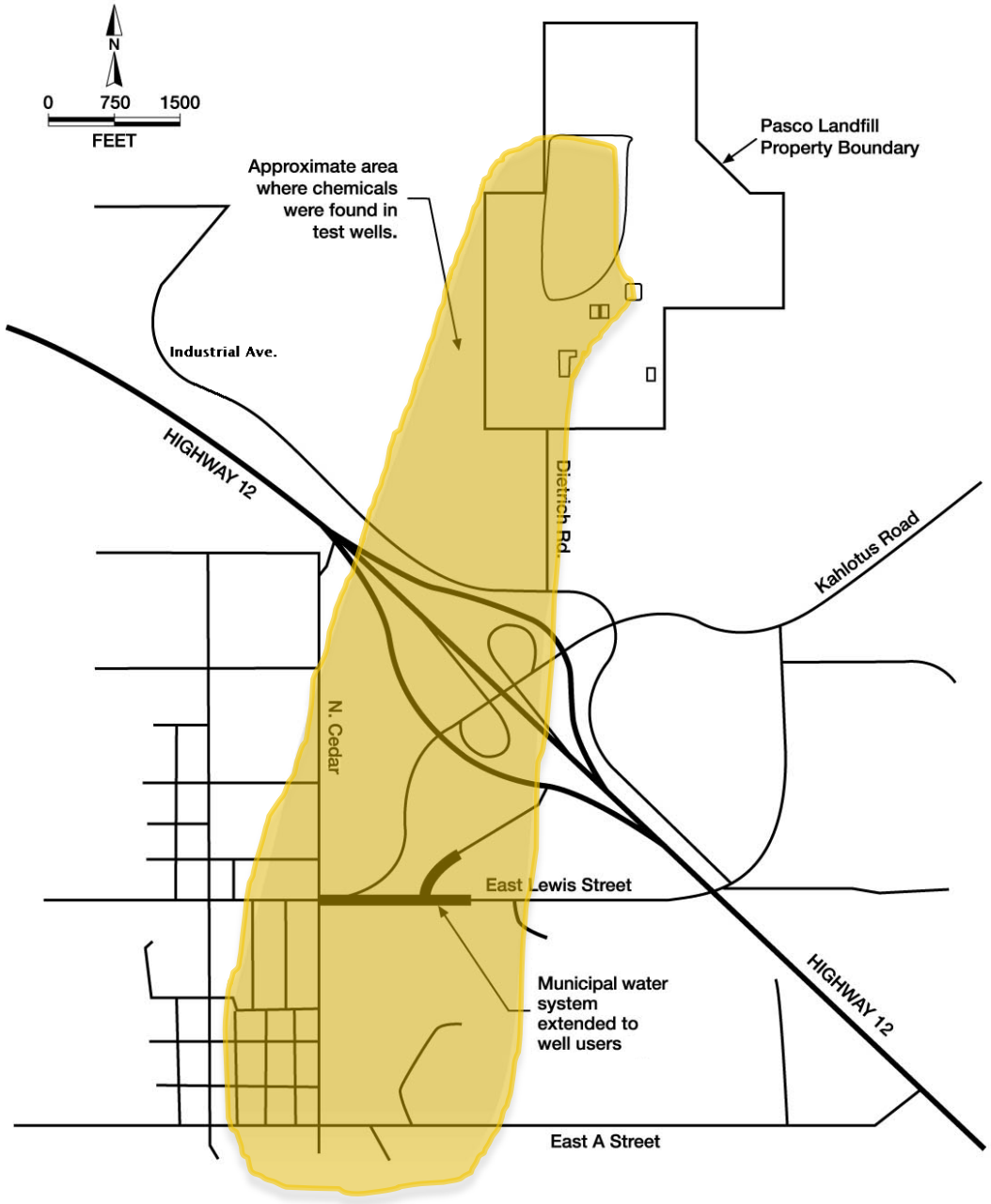
On-property Network of Site-wide Groundwater Monitoring Wells



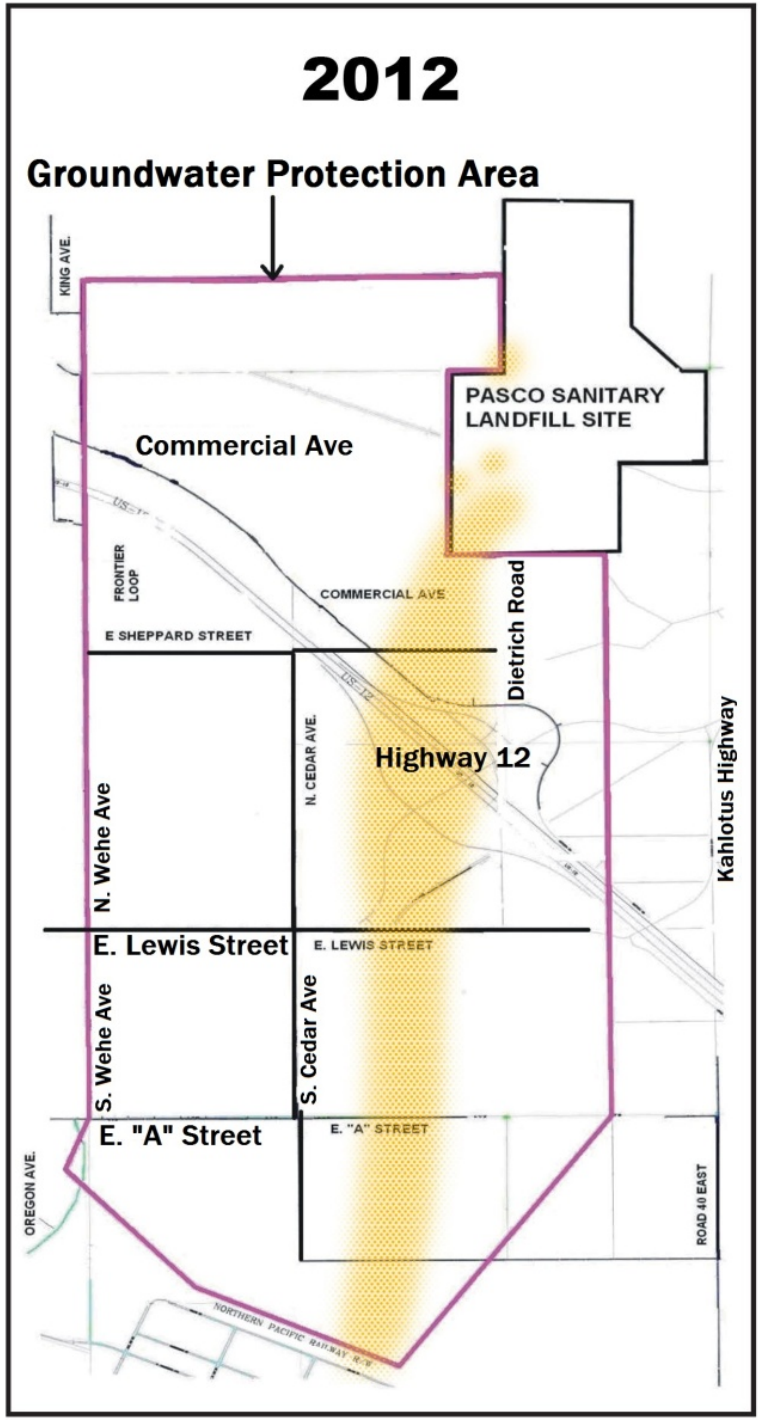
Off-property Network of Groundwater Monitoring & Residential Wells



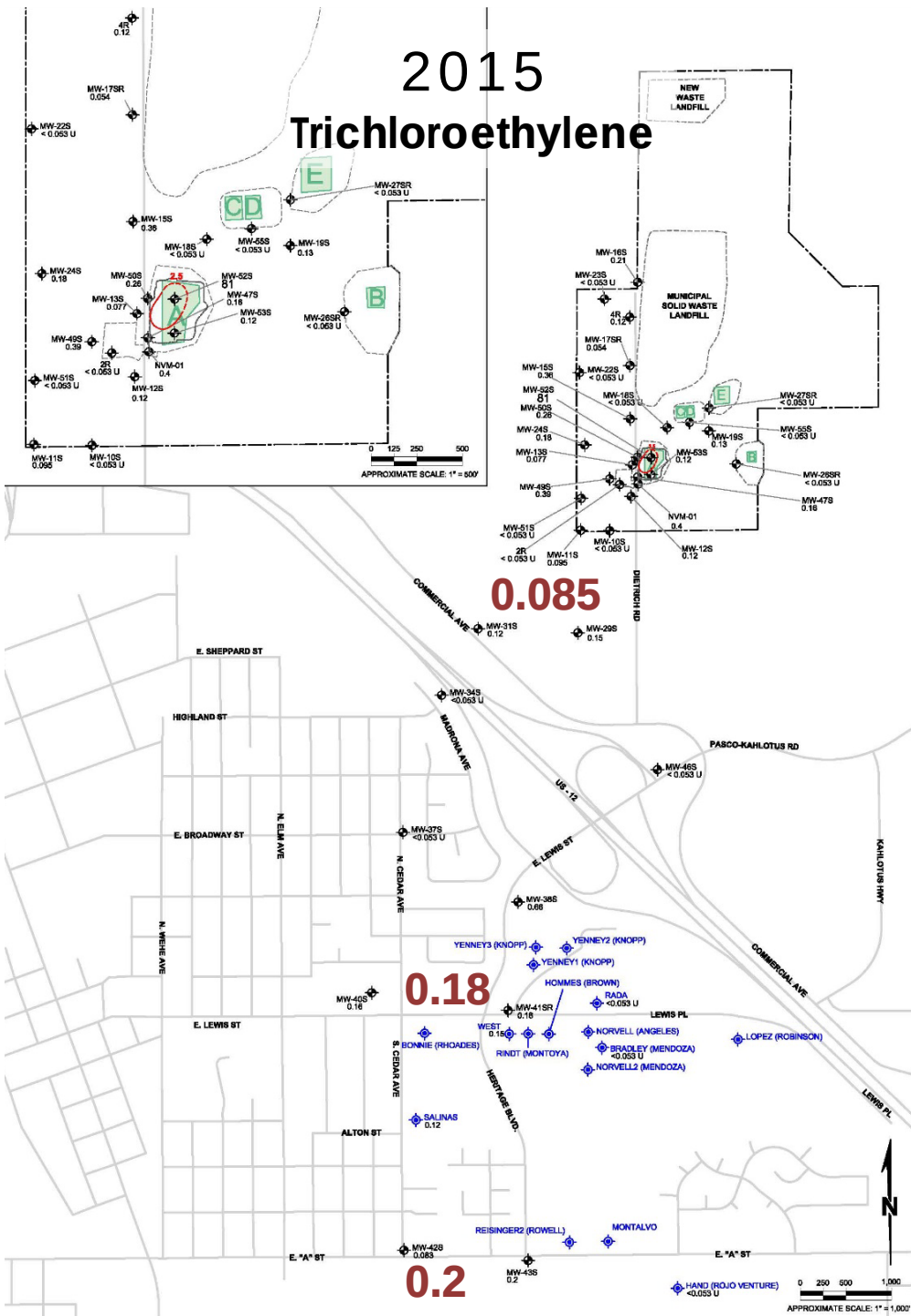
1997


N
0 750 1500
FEET
Approximate area where chemicals were found in test wells.
Pasco Landfill Property Boundary
Industrial Ave.
HIGHWAY 12
Dietrich Rd.
Kahlotus Road
N. Cedar
East Lewis Street
Municipal water system extended to well users
HIGHWAY 12
East A Street

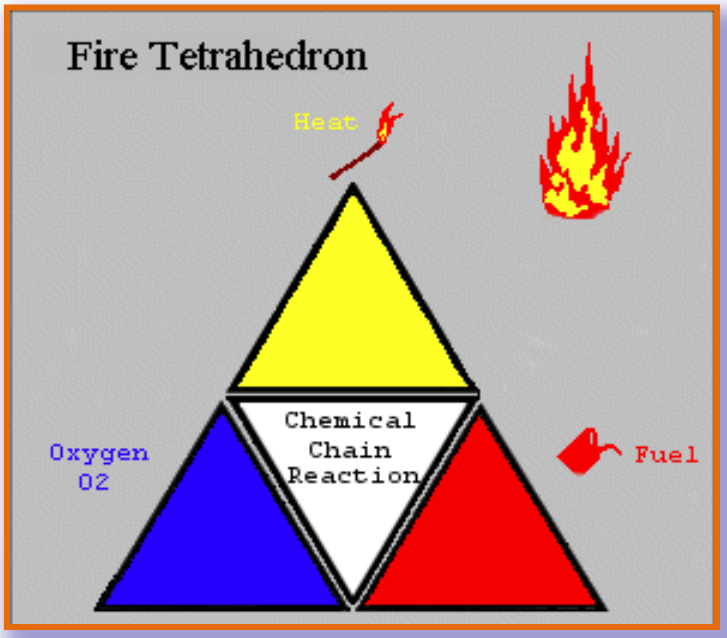
2012


Groundwater Protection Area
KING AVE.
PASCO SANITARY LANDFILL SITE
Commercial Ave
FRONTIER LOOP
COMMERCIAL AVE
E SHEPPARD STREET
Dietrich Road
Highway 12
N. CEDAR AVE.
N. Wehe Ave
Kahlotus Highway
E. Lewis Street
E. LEWIS STREET
S. Wehe Ave
S. Cedar Ave
E. "A" Street
E. "A" STREET
OREGON AVE.
ROAD 40 EAST
NORTHERN PACIFIC RAILWAY R/W


Groundwater Protection Area
2012
PASCO SANITARY LANDFILL SITE
Commercial Ave
Dietrich Road
Highway 12
Kahlotus Highway
E. Lewis Street
E. "A" Street
N. Wehe Ave
S. Wehe Ave
S. Cedar Ave
E SHEPPARD STREET
COMMERCIAL AVE
E. LEWIS STREET
E. "A" STREET
Ellen Ochoa Middle School
Pasco Kahlotus Rd
Lakeview Mobile Home Park
AINSWORTH JUNCTION
Google

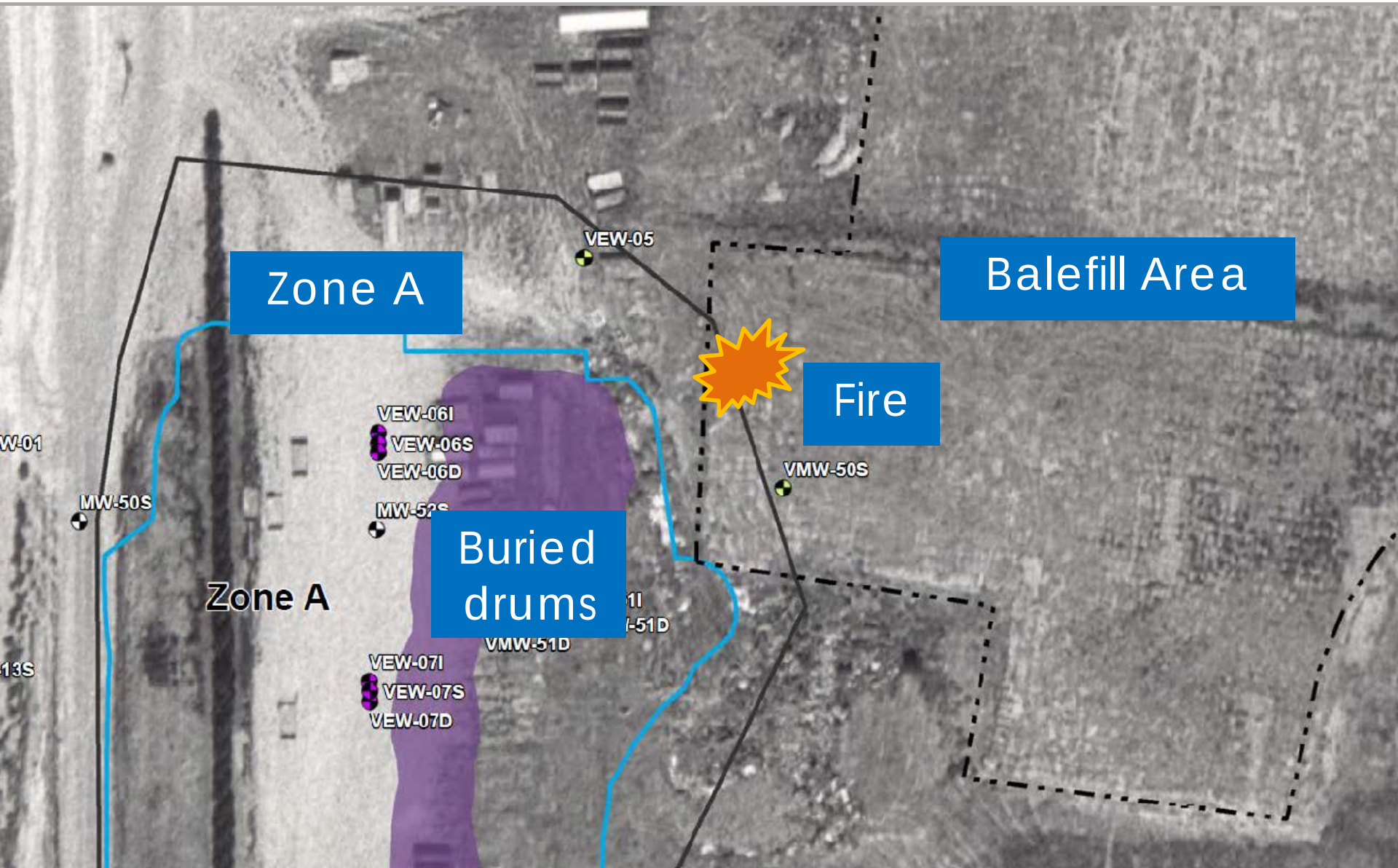

2015
Trichloroethylene
0.085
0.18
0.2
APPROXIMATE SCALE: 1" = 500'
APPROXIMATE SCALE: 1" = 1,000'
E. SHEPPARD ST
HIGHLAND ST
E. BROADWAY ST
E. LEWIS ST
E. "A" ST
PASCO-KAHLOTUS RD
COMMERCIAL AVE
DIETRICH RD
KAHLOTUS HWY
LEWIS PL
ALTON ST
HERITAGE BLVD
N. WEHE AVE
N. CEDAR AVE
N. ELM AVE
S. CEDAR AVE
MADRONA AVE
US - 12
NEW WASTE LANDFILL
MUNICIPAL SOLID WASTE LANDFILL
YENNEY3 (KNOPP)
YENNEY2 (KNOPP)
YENNEY1 (KNOPP)
HOMMES (BROWN)
RADA
WEST
NORVELL (ANGELES)
BONNIE (RHOADES)
RINDT (MONTOYA)
BRADLEY (MENDOZA)
NORVELL2 (MENDOZA)
LOPEZ (ROBINSON)
SALINAS
REISINGER2 (ROWELL)
MONTALVO
HAND (ROJO VENTURE)
N

But how does MTCA handle a landfill *fire*?

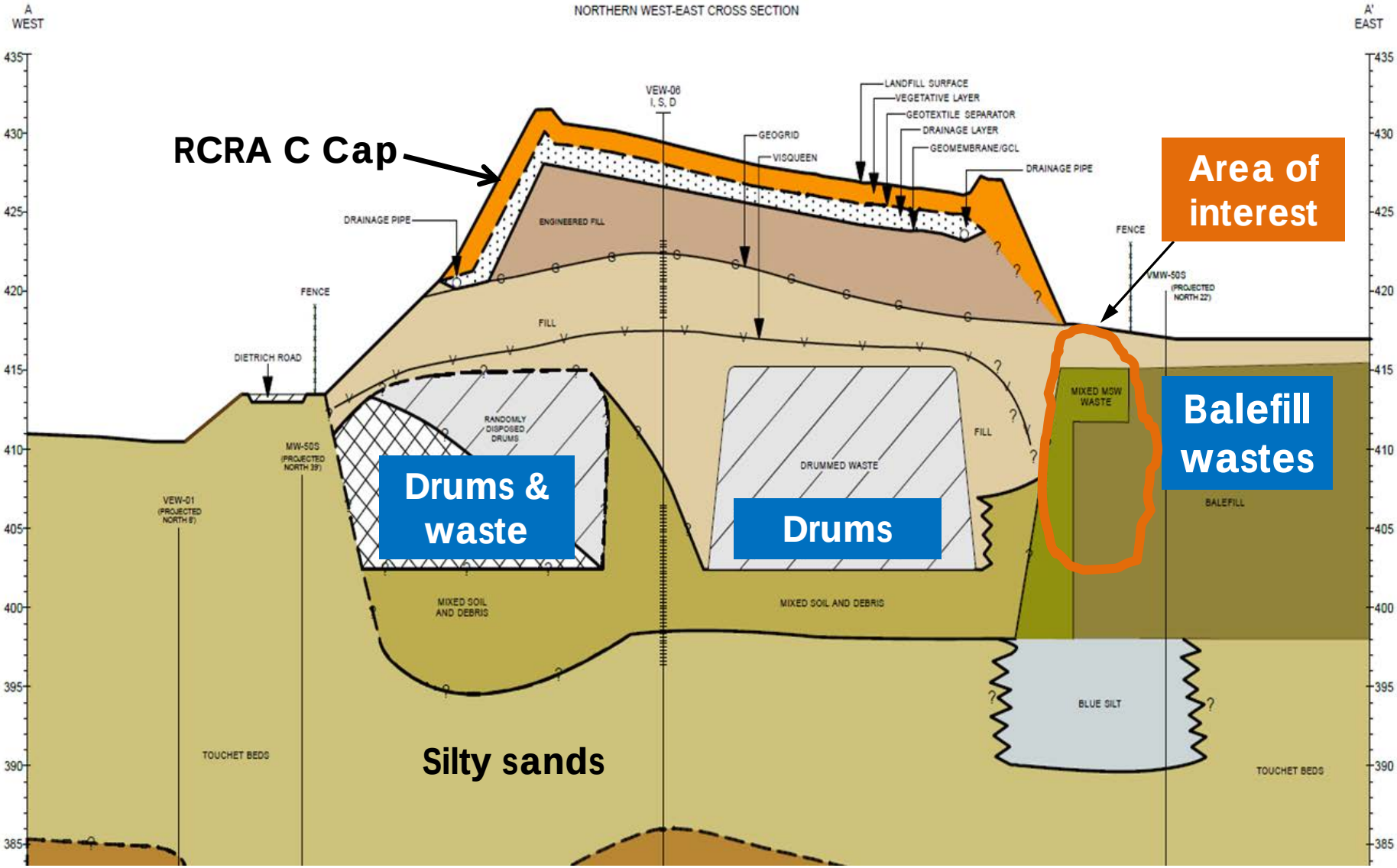


MTCA = Model Toxics Control Act

Balefill Area Underground Fire
November 2013



Zone A


NORTHERN WEST-EAST CROSS SECTION
A
WEST
A'
EAST
RCRA C Cap
Area of interest
Balefill wastes
Drums & waste
Drums
Silty sands
LANDFILL SURFACE
VEGETATIVE LAYER
GEOTEXTILE SEPARATOR
DRAINAGE LAYER
GEOMEMBRANE/GCL
DRAINAGE PIPE
GEOGRID
VISQUEEN
VEW-06
I, S, D
ENGINEERED FILL
FILL
FENCE
DIETRICH ROAD
VMW-50S
(PROJECTED NORTH 22')
MW-50S
(PROJECTED NORTH 39')
VEW-01
(PROJECTED NORTH 8')
RANDOMLY DISPOSED DRUMS
DRUMMED WASTE
MIXED MSW WASTE
BALEFILL
MIXED SOIL AND DEBRIS
BLUE SILT
TOUCHET BEDS
435
430
425
420
415
410
405
400
395
390
385

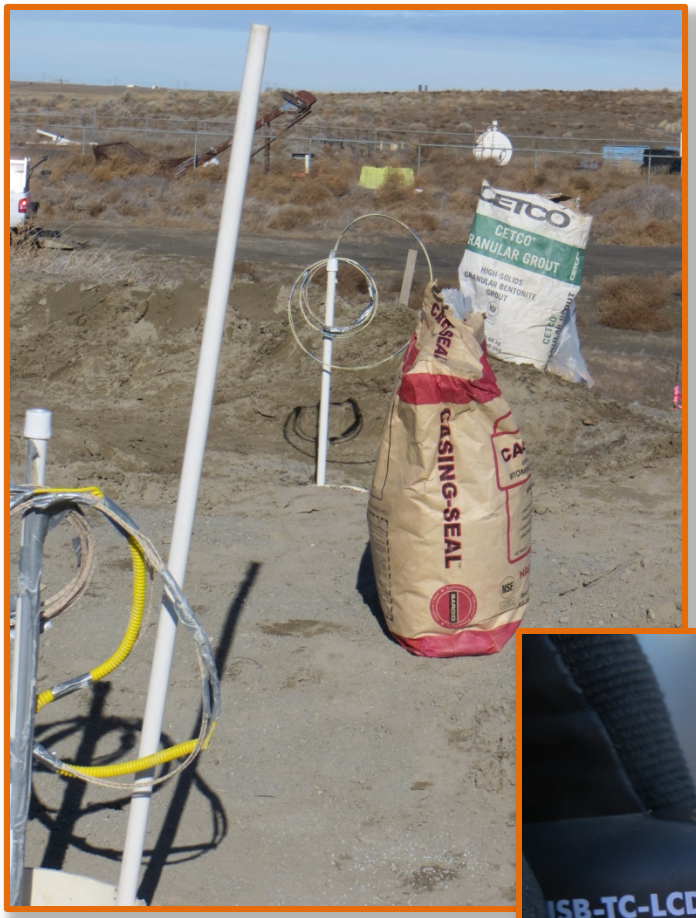
Balefill Area Underground Fire
Looking east from Zone A

Geoprobe Temperature Evaluation

How **BIG**?

How **HOT**?

Installing Dedicated Thermocouples



Phase 1: Cover & Smother

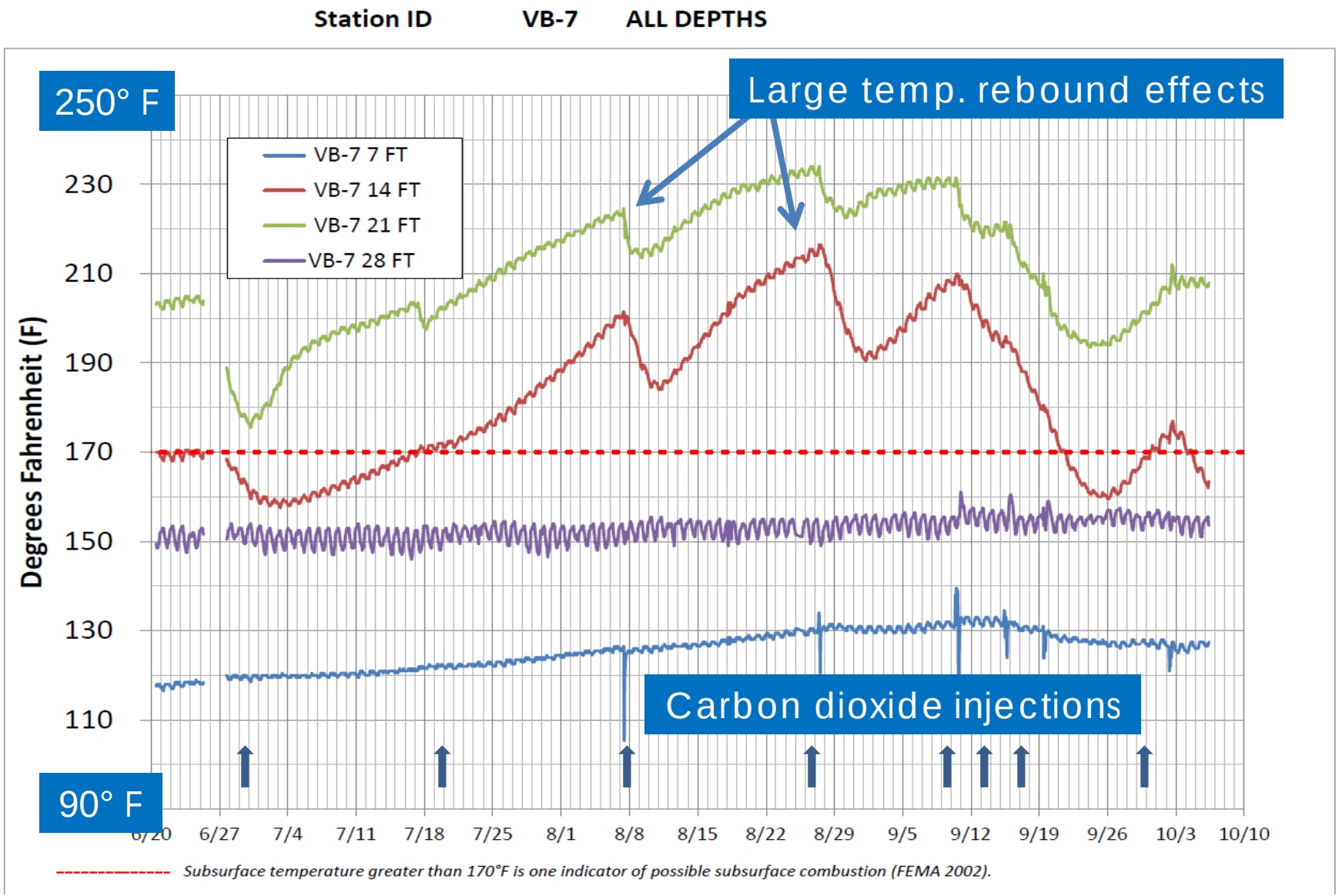
Phase 2: Liquid Carbon Dioxide Injection

June 26 & 27, 2014

Carbon Dioxide Refusal & Short-Circuiting

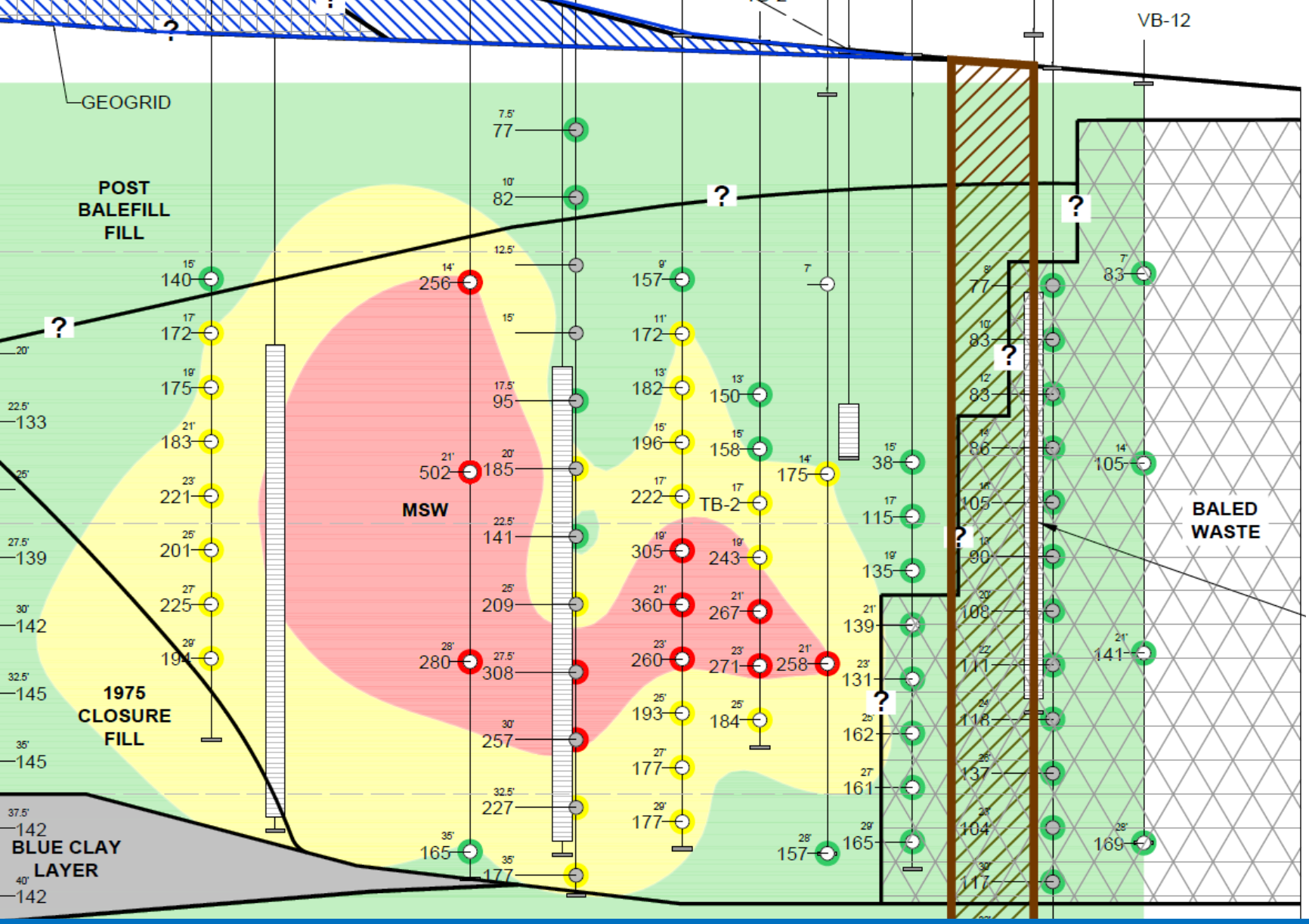
Injecting liquid carbon dioxide until probe won't transmit it or short-circuiting occurs

Example Temperature Response to Carbon Dioxide Injection



Carbon Dioxide Injections

- 21 injection events (June 2014–March 2015)
- Quantity of liquid carbon dioxide injected per event 5,000 to 23,000 pounds (6–15 probes per event)
- Total quantity injected: 255,000 pounds
- Carbon dioxide residence time ~1 week or less
- Oxygen intrusion and uneven gas dispersion appears to limit overall effectiveness



Snapshot of temperature conditions after injections

Phase 3: Final Fire Extinguishment Actions


Excavate Cement-Bentonite
Wall around Fire Perimeter

Interior Cement-Bentonite Wall
Quench & Mix Operations

Interior Cement-Bentonite Wall Slot Cut & Trench Excavation Plan

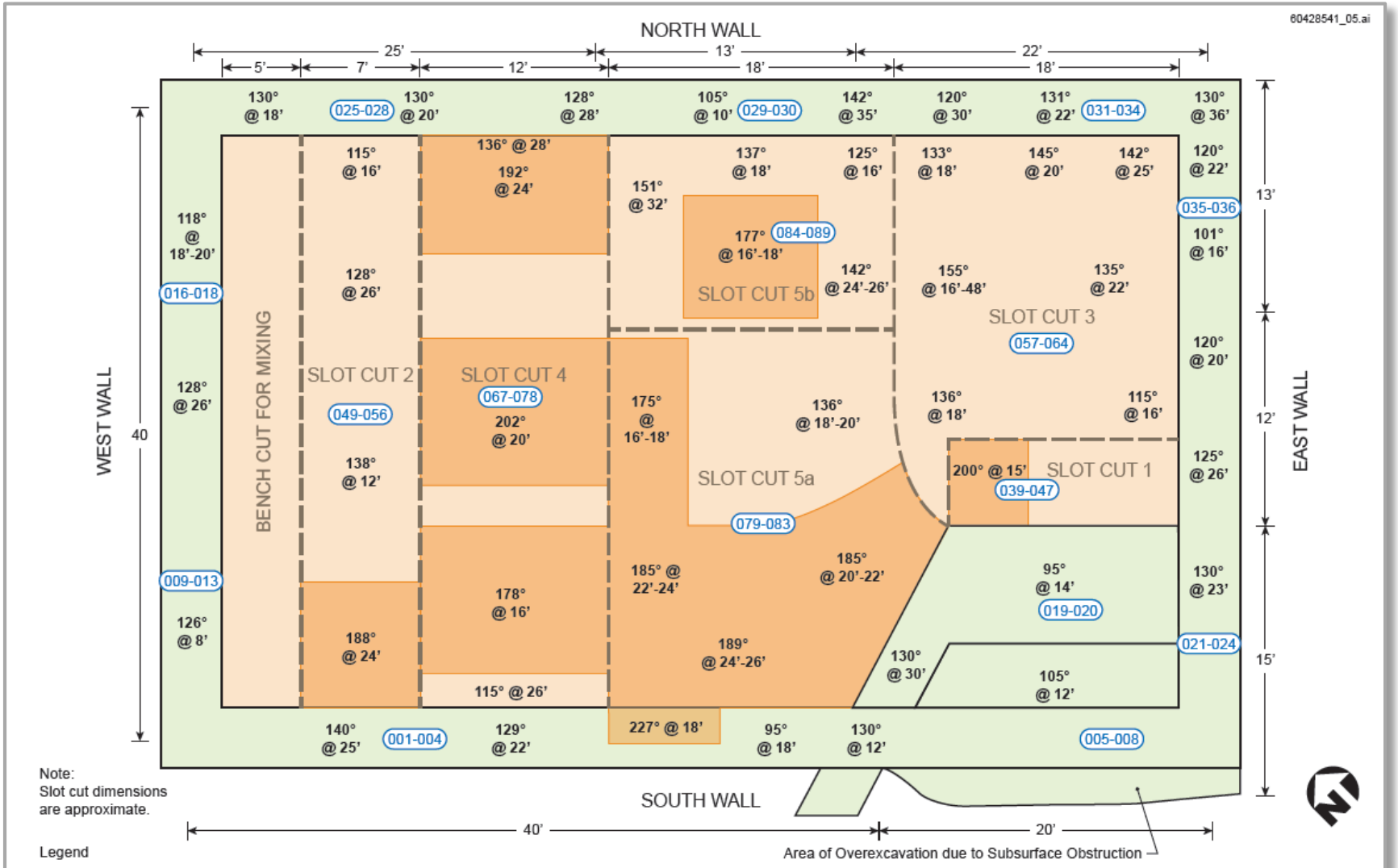


Figure 5

Locations and Depths of Maximum Temperature Measurements

Soil-Cement-Bentonite Barrier Wall in Zone A

Next Steps & Public Participation

Remaining Steps toward Cleanup

1. Focused Feasibility Study (in progress)
2. Draft Cleanup Action Plan
3. Ecology selects preferred cleanup option
4. Negotiate Legal Agreement with potentially liable persons
5. Design and implement Final Remedy

30-day public review period for each draft document

Public Participation in Cleanup Decisions
--The Key to Community Acceptance--

- No backroom deals!
- Public Participation Plan
- Public notices, meetings & formal hearings
- Public Participation Grants available for community groups

Effective Public Comments

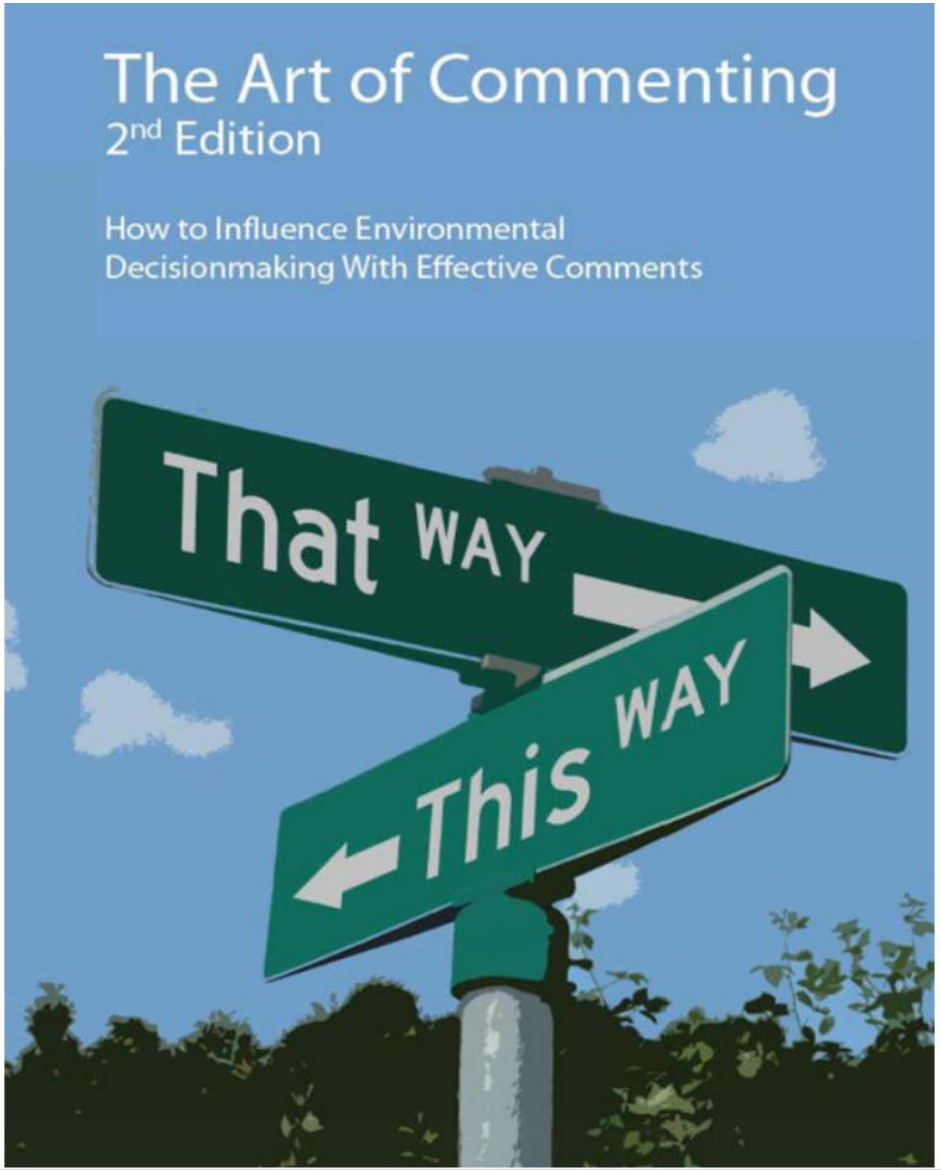
1. Review all documents available for public comment
2. Before drafting comments, contact Ecology or other technical experts listed on the fact sheet
3. Be specific when writing comments
   - Could they be interpreted multiple ways?
   - Explain your reasoning with examples
   - Refer to document pages, paragraphs, etc.
4. Ensure Ecology could enact your ideas within the framework of existing laws

TIP: Coordinate your comments with others!

The Art of Commenting:

How to Influence Environmental Decisionmaking with Effective Comments

By Elizabeth D. Mullin



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