



COLORADO
Department of
Labor and Employment

Low-Risk Closures in Colorado

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National Tanks
Conference

Pittsburgh, PA

Sept. 13-15, 2022



Closure Standards 1988

1. Must meet MCLs in groundwater
2. Soil contamination must allow #1 to be met
3. Recover all LNAPL!!!



Basis for RBCA

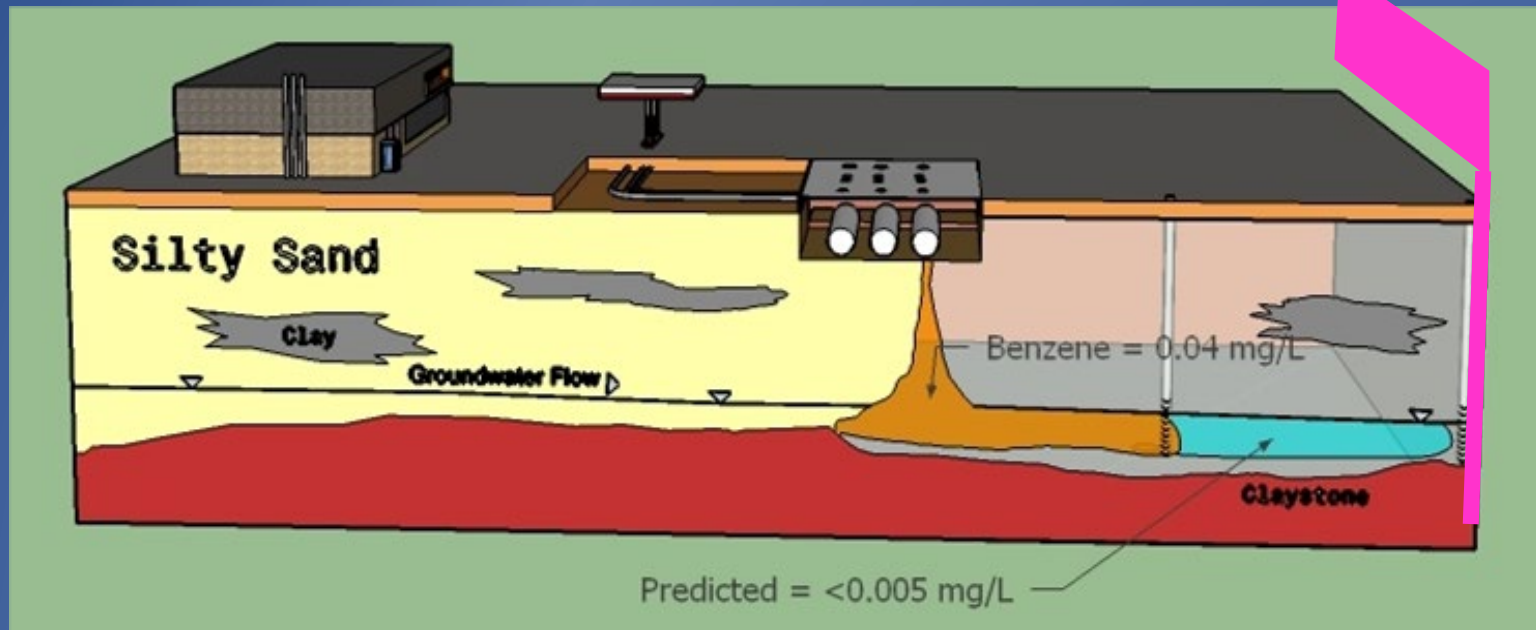
1994: ASTM Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites
[ES-38-94]

1995: OSWER (now OLEM) Directive 9610.17 encouraged RBCA for USTs



Tier II Implementation

- RBCA implemented in 1999, allowed computer F&T models
- Tier II allows only onsite contamination to remain in soil and groundwater



What was the Problem?

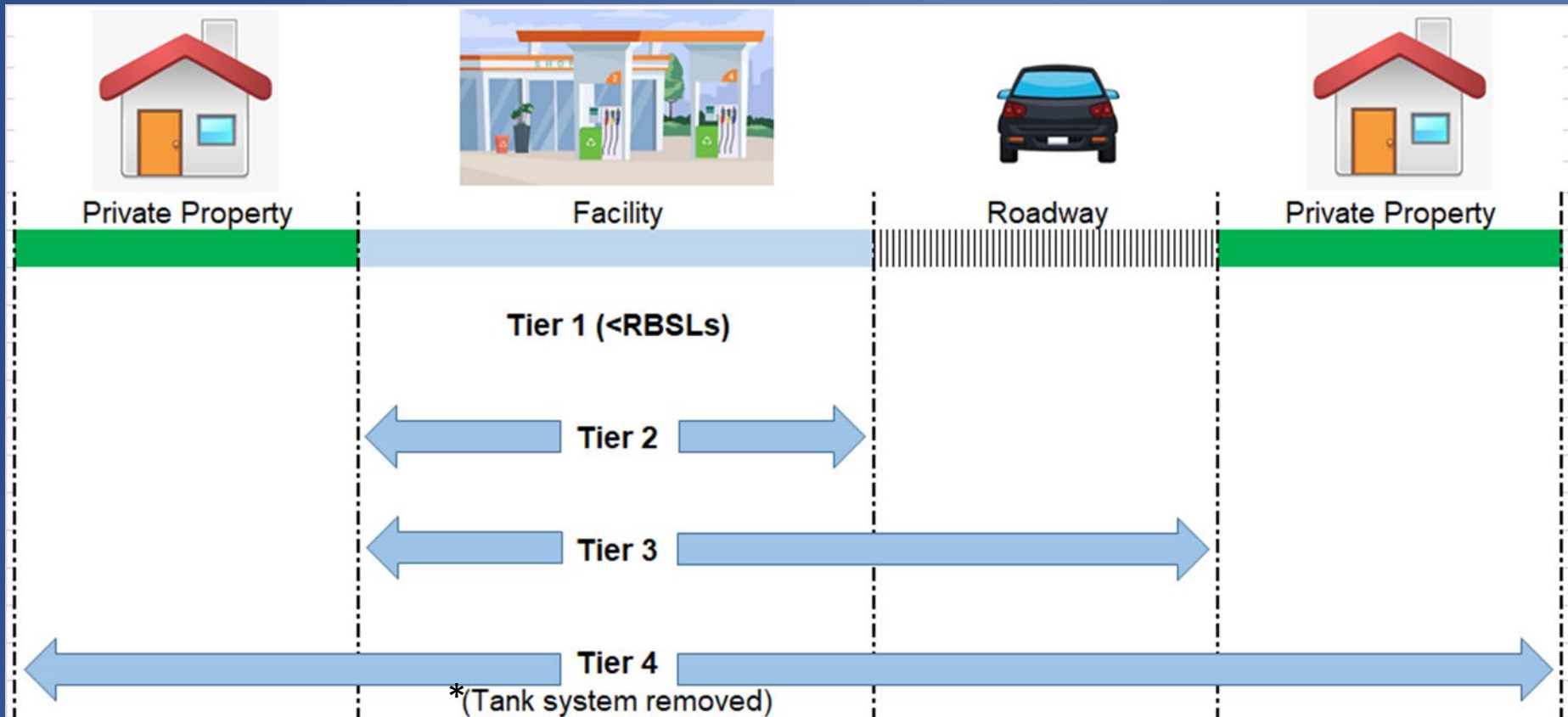
- The majority of open releases were over 10 years old
- Sites over 10 years old were difficult to close under Tier I and Tier II criteria
- Costs increased as time went on, often with diminishing (or no) returns
- Return on investment (risk reduction) was seldom considered

2014: Tier III and Tier IV Closure Criteria

Established conditions to allow for offsite contamination to remain in place based on a risk evaluation.

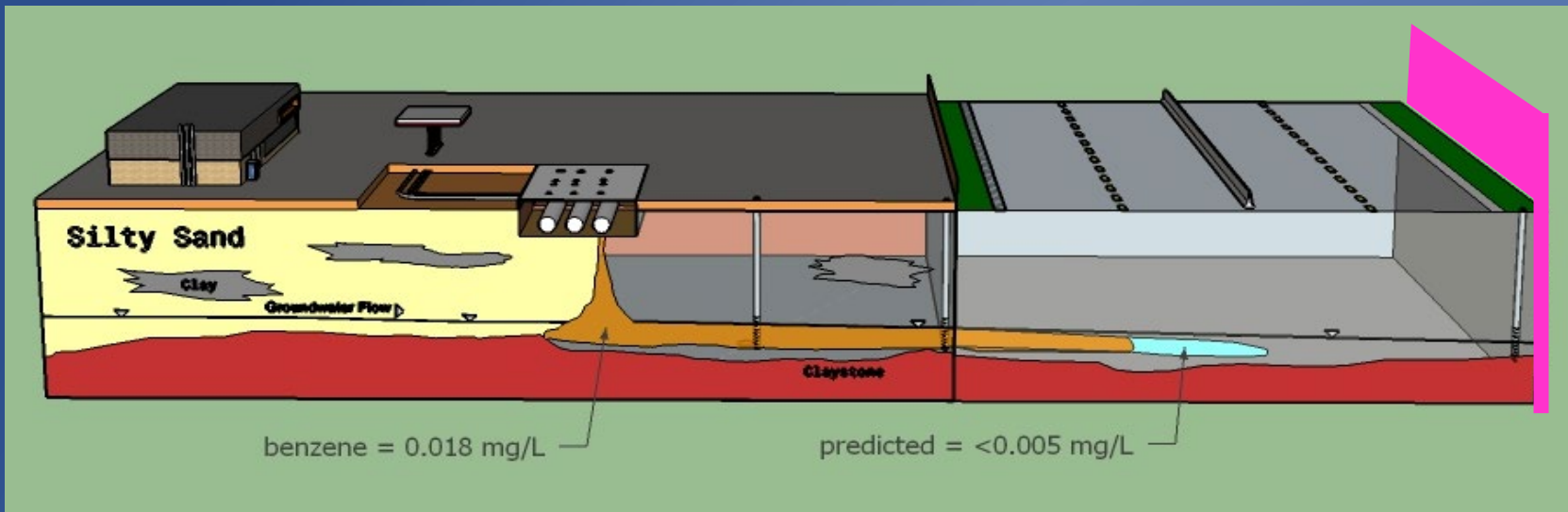
- Tier III applies to public roadways
- Tier IV applies to private property

Closure Tiers



Tier 3 & 4 introduced in October 2014.
Impacted property owners given 30-day notice.
Impacted soil and LNAPL may be offsite if risk conditions permit.

Tier III Closure

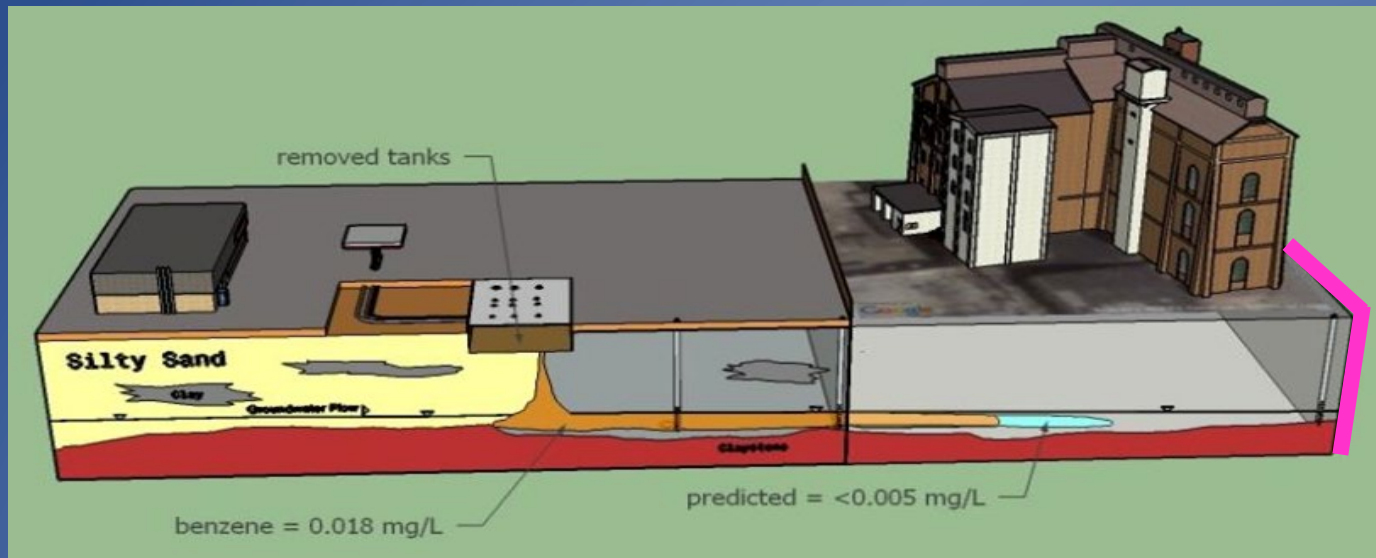


- A public roadway property boundary is the only impacted point of exposure

Fate and transport modeling, empirical data and other lines of evidence must be used to support this

- Remediation has occurred to the MEP...more on this shortly

Tier IV Closure



- Like Tier III except:
 - ✓ Private property boundaries are impacted
 - ✓ The leaking tank system has been removed from the facility

Tier III and IV Criteria

1. Property boundary is the only impacted POE
(no other receptors)
2. Use fate and transport modeling

But, a few issues:

1. Contaminant removal to the MEP
2. Offsite property owners
3. Documentation

Tier III and IV Implementation Issue 1

40 CFR 280.64 Free product removal.

“... owners and operators must remove free product to the **maximum extent practicable** as determined by the implementing agency...”

Resulted in numerous failed and costly remedial implementations with negligible risk reduction



Solution

All original CAPs must be designed to meet Tier I or Tier II closure criteria

Tier III or Tier IV closure criteria may be considered for releases that cannot achieve Tier I or Tier II closure criteria with consideration given to MEP

Maximum Extent Practicable?

Consideration given to (in order):

1. Access limitations
2. Feasible technologies tried, options discounted
3. Proper design/implementation of past remedial efforts
4. Possible future risk reduction
5. Cost

What about LNAPL?

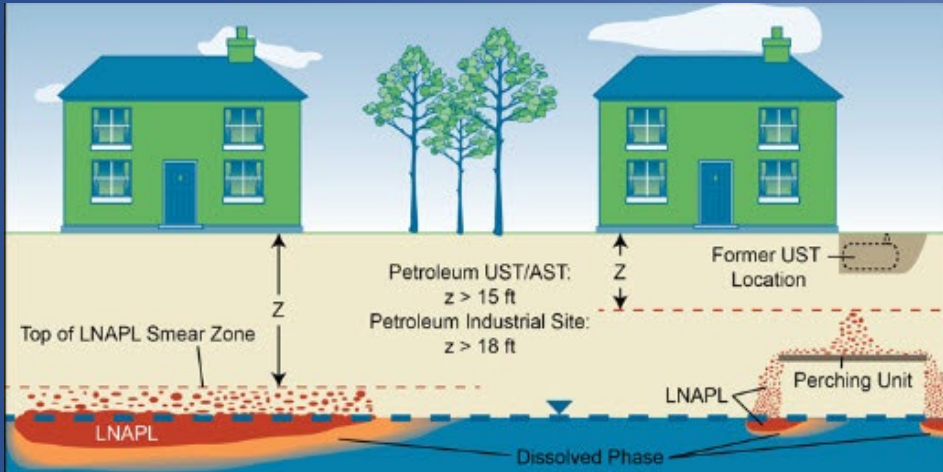
OPS has adopted ITRC Guidance on LNAPL

- Identify LNAPL Concerns
- Set Remedial Goals
- Transmissivity Testing
- Ineffective (per ITRC guidance):
 - ∅ *Manual Bailing*
 - ∅ *Absorbent Socks*
 - ∅ *Passive Skimmers*
 - ∅ *Short-term Vacuum Truck Events*



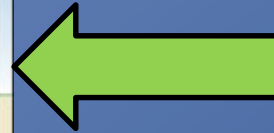
Petroleum Vapor Intrusion

OPS has adopted ITRC Guidance on PVI

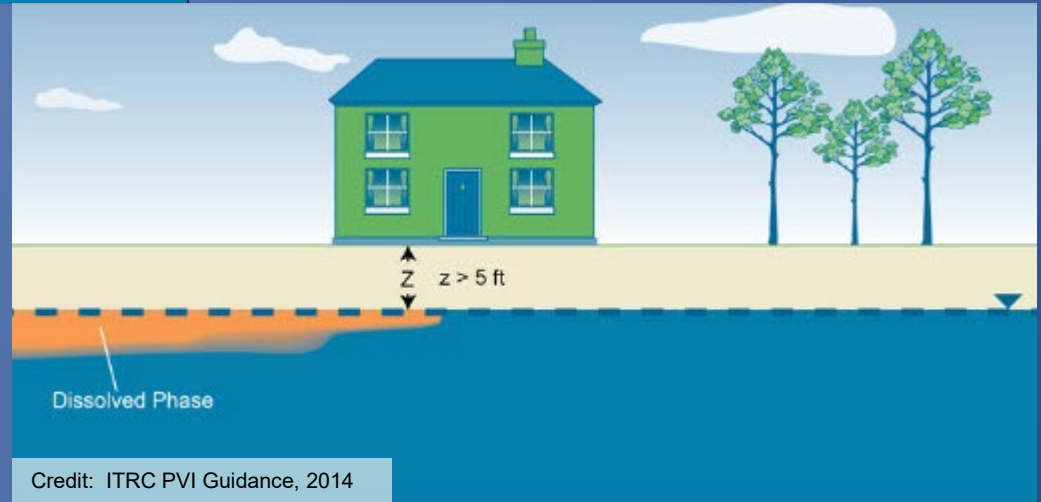


Credit: ITRC PVI Guidance, 2014

15 vertical feet from bottom of a structure to the top of LNAPL source



5 vertical feet from bottom of a structure to the top of dissolved phase source



Credit: ITRC PVI Guidance, 2014

Tier III and IV Implementation Issue 2

Originally, criteria relied on offsite property owner consent:

- Not a deed restriction / covenant
- Included indemnification clause for state
- Owners hired attorneys

Solution

Moved to a notification process in January 2016:

Notify offsite owners >30 days prior to anticipated closure (“closure under consideration”).

Interesting fact: few people contact OPS with questions/concerns

Big picture: engage with offsite property owners ASAP


Lesson learned: separate risk from property value

Tier III and IV Implementation Issue 3

How to record the location of offsite contamination?

- Deed restrictions / covenants expensive, time-consuming, and difficult to implement
- Getting owner agreement difficult

Solution



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[Download Data](#) [About](#)

Petroleum Events

Open Events

Closed Events

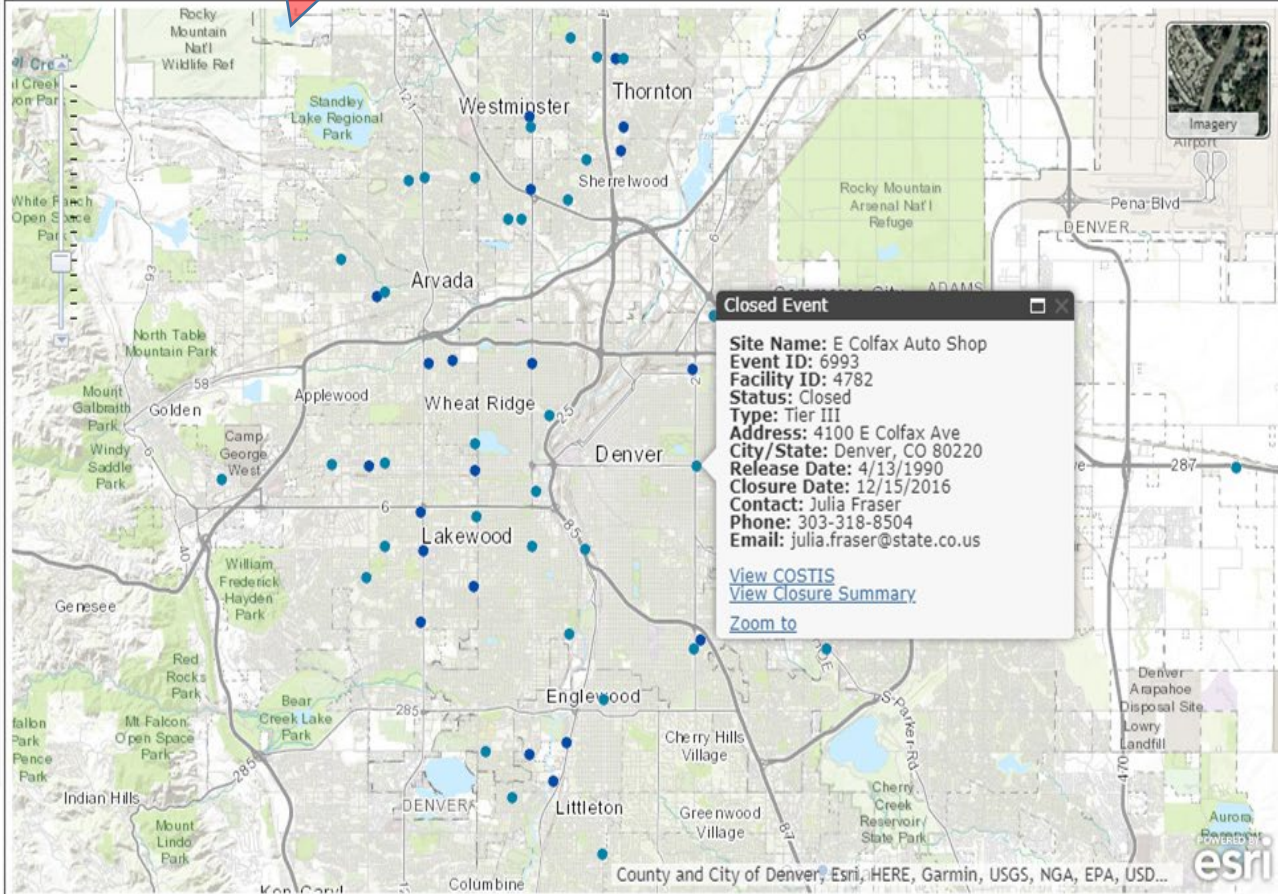
Tier 1

Tier 2

Tier 3

Tier 4

Unknown



Search by Location:

Search by location:

Geocode address: Map click:

1/4 Mile ▾

Search by Attribute:

EVENT ID	FACILITY ID	STATUS	SITE NAME	STREET	CITY STATE ZIP	DATE OF RELEASE	CONTACT	PHONE	EMAIL
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Event 6130 Tier III Closure Summary

Crystal Car Wash

2601 Sheridan Boulevard, Edgewater

Please contact the Colorado Division of Oil & Public Safety (OPS) at (303) 318-8547 if soil excavation, dewatering, or subsurface earthwork is proposed in or adjacent to the petroleum-impacted area depicted below. Our knowledge of petroleum contamination is based on the site conditions at the time of closure. Conditions may change over time. Please contact OPS if newer information is obtained about the site conditions. Please keep in mind soils may be stained and have odor, but not be hazardous or require special handling or disposal. Contact OPS for guidance.

Environmental Conditions at Time of Closure

Closure date: July 13, 2018

Depth to Water: 10 to 18 feet below ground surface (ft bgs)

Groundwater Flow Direction: Southwest

Depth to Utilities: 3 to 10 ft bgs

Impacted Offsite Property Address: Intersection of 26th Avenue and Sheridan Boulevard

Petroleum Contaminants of Concern: Benzene and ethylbenzene

Groundwater Offsite (depicted by blue square) about 18 ft bgs—Benzene up to 0.85 milligrams per liter (mg/L) and ethylbenzene up to 0.78 mg/L.



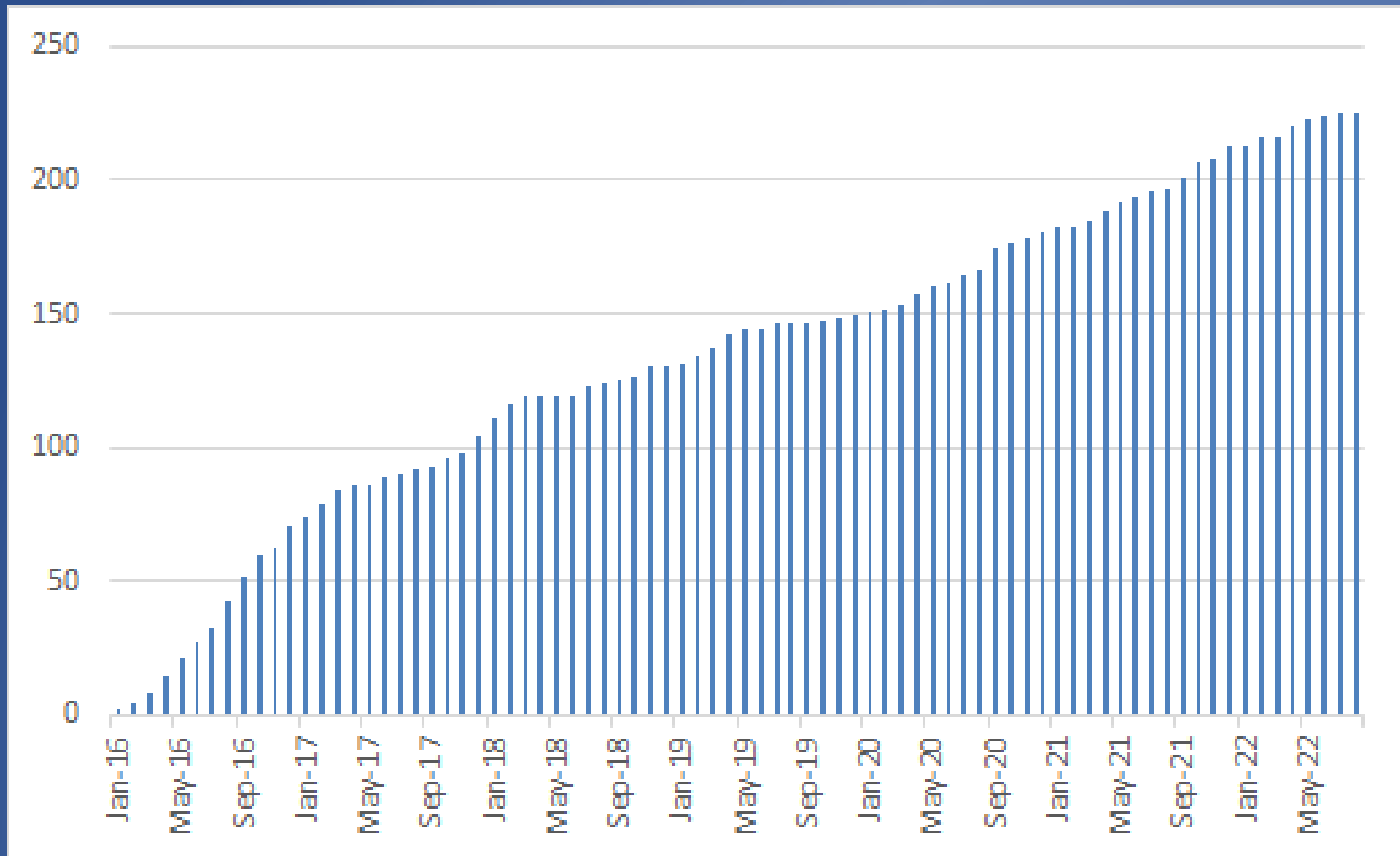
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To learn more, please visit: www.colorado.gov/ops

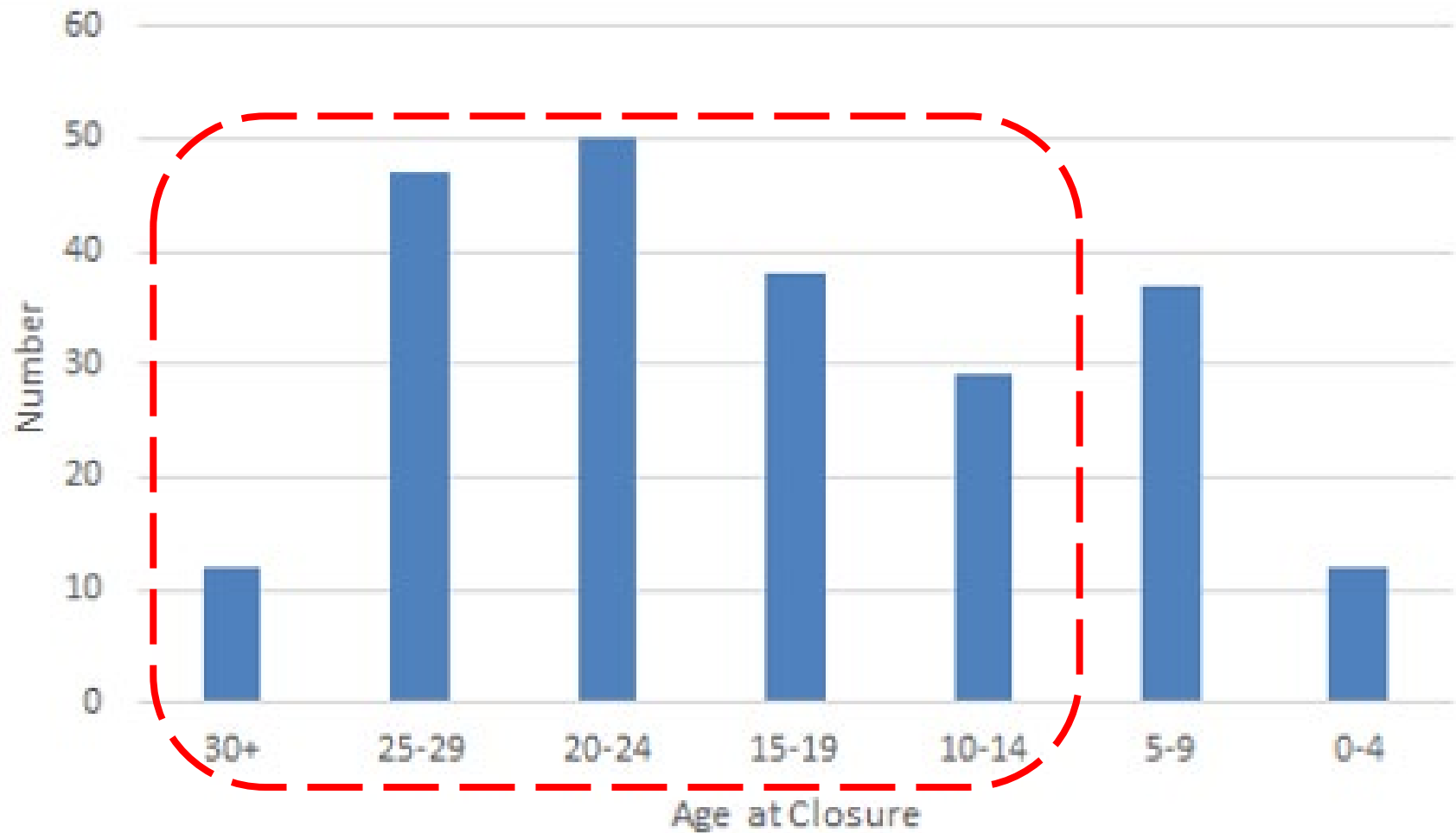
Fact Sheet created
for each Tier III and
IV closure



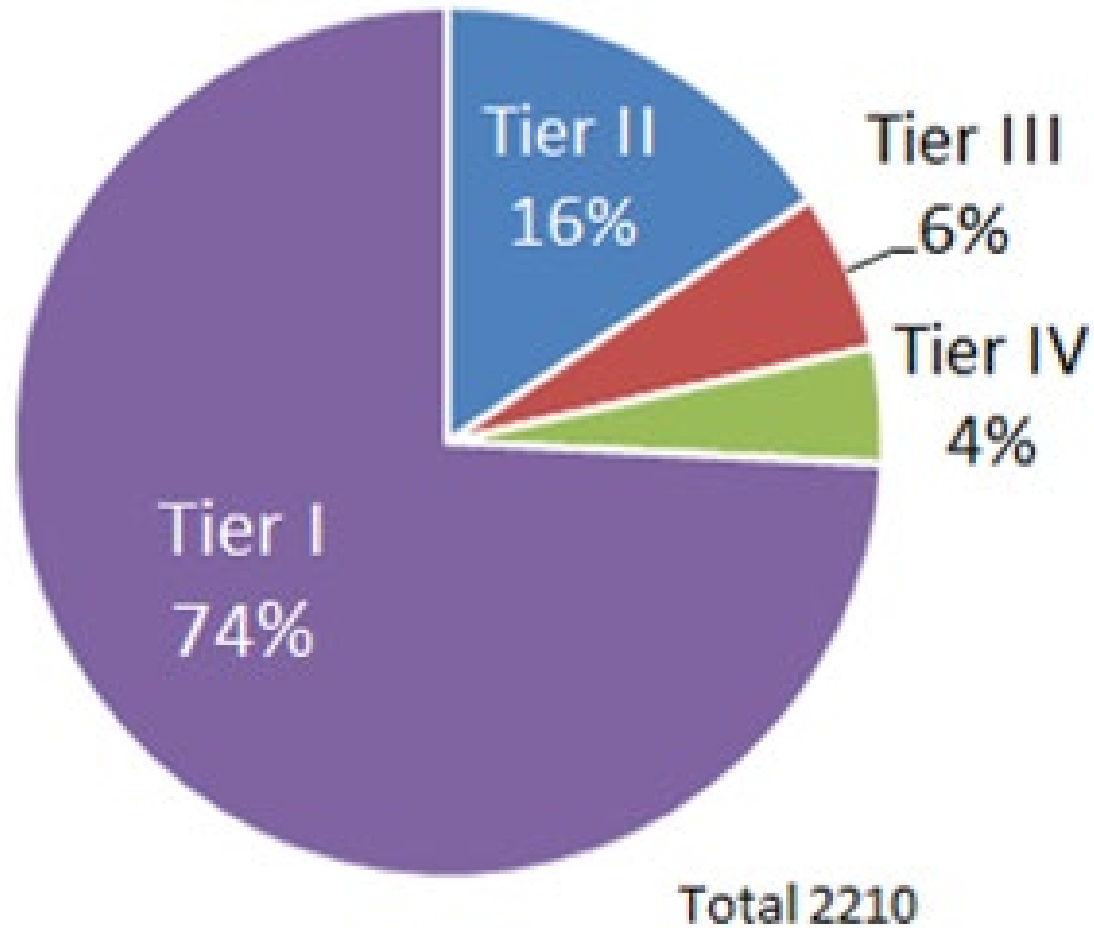
Number of Tier III and IV Closures



Age at Time of Tier III or IV Closure



Closure types since 2014



Summary of Tier III / IV Policy

- Tier I and Tier II closure criteria used exclusively from 1999 through 2014
 - Offsite contamination not permitted nor expected (via modeling)
- Tier III and Tier IV criteria established conditions to allow for offsite contamination to remain in place
- 80% of these closures are over 10 years old, meet MEP, and pose little risk to receptors

Lessons of Tier III / IV Policy

- Focus on risk identification and reduction
 - ❖ Demand well-developed CSMs
- Engage all impacted parties early in the process
- Public notice allows OPS to be notified of changes in presumed risk scenarios after event closure



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Questions & Contact

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