



# Fairbanks Fine Particulate Matter (PM<sub>2.5</sub>)

House Finance  
Sub-Committee Overview  
Alice Edwards,  
Director, Air Quality  
February 20, 2014



# Fairbanks Fine Particulate Matter (PM<sub>2.5</sub>)



- Fairbanks/North Pole area exceeds the 24-hour PM<sub>2.5</sub> ambient air quality standard
- Air quality attainment plan to be submitted to EPA in 2014
- Clean Air Act has serious consequences if Alaska fails to plan or implement a plan
- Plan and control options are controversial in community:
  - Home heating sources (wood and coal) are important contributors
  - DEC has been seeking public input on regulations to reduce PM<sub>2.5</sub>
  - Air quality plan to be released for public feedback this spring
  - Continued change outs of wood heaters and expansion of natural gas are important to attaining the standard



## Fairbanks Fine Particulate Matter (PM<sub>2.5</sub>)

- A combination of programs can achieve attainment between 2015 – 2019:
  - Borough programs
    - Woodstove Change Out program
    - Enhanced Solid Fuel Burning Appliance
    - Voluntary Measures and Public Education
  - State programs
    - State Regulation Proposals
    - Expansion of Natural Gas
- DEC is continuing to work with the Fairbanks North Star Borough to seek additional programs that can be implemented to reduce emissions earlier in 2015/2016

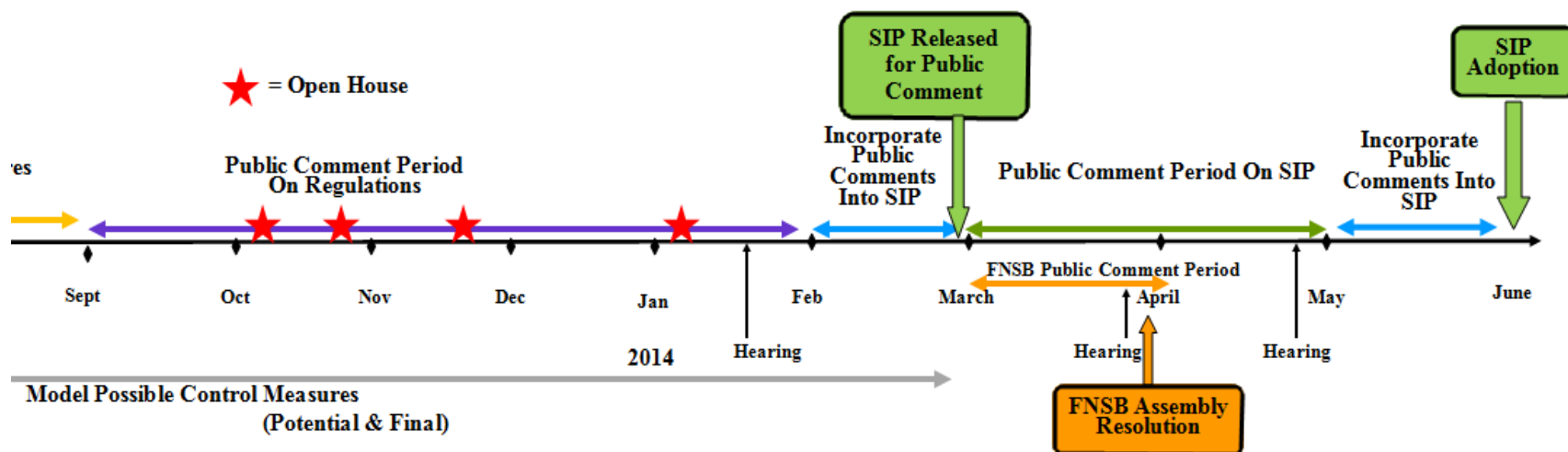


## State PM<sub>2.5</sub> Regulation Proposals

- Emission standards for new wood heating devices in the non-attainment area
- Requirement to burn the appropriate fuels (wood or coal) in solid-fuel heating devices within the non-attainment area
- Wintertime restrictions on outdoor open burning in the non-attainment area
- Statewide emergency episode levels for PM<sub>2.5</sub> coupled with revisions to allow a more flexible response program for wood heaters on formal episode days (high concentration days)



# Working Timeline for State Implementation Plan (SIP)



- It is taking longer for DEC to process comments received on regulations than originally anticipated and is shifting this schedule slightly (by at least one month)
- Processing comments received on the SIP could also take longer





# Questions?





# Update on HB80 Mixing Zones for Cruise Ship Wastewater Discharge

House Finance  
Sub-Committee Overview  
Michelle Hale,  
Director, Water  
February 20, 2014



# Cruise Ship Update

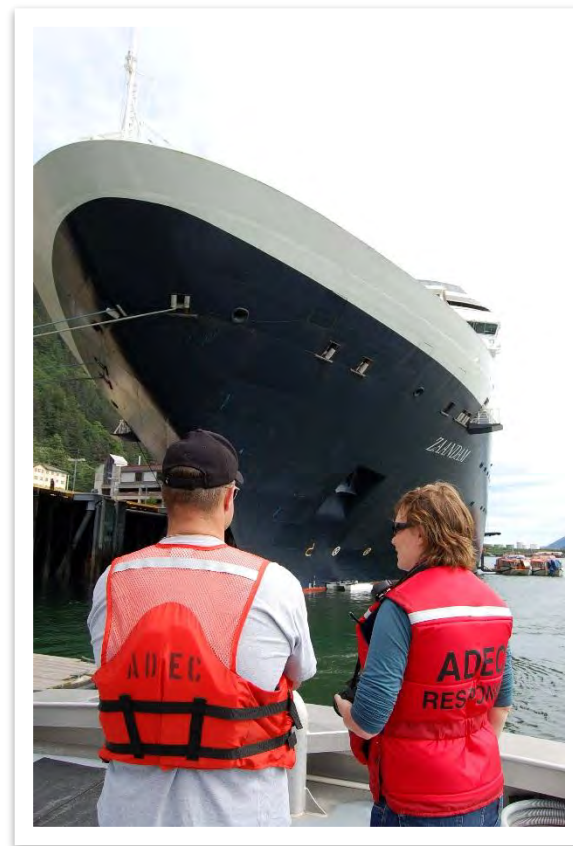
- House Bill 80 passed last session, the first session of the 28<sup>th</sup> legislature
- HB 80 provided:
  - The ability to administratively extend the 2010 general permit
    - DEC extended the permit on March 18, 2013, to December 2015
    - Ships operated under the administratively extended permit in 2013
  - The ability for DEC to authorize mixing zones for cruise ship discharges





# Regulations

- DEC issued updated regulations in December, 2013
- The update was required to bring regulations in line with the revised statute
- Minor clarifications and updates were also made to the regulations at that time





## 2014 General Permit

- DEC is preparing a 2014 General Permit for public notice
- Mixing zones will be authorized in this permit
  - For vessels that qualify for mixing zones
  - For underway and stationary (at the dock) discharges
- If for some reason the permit is not ready for 2014 season, vessels can still operate under the administratively extended permit



## 2013 HFSC Intent Language

Ch 14, SLA 13, Page 14, line 8

*It is the intent of the legislature that the Department of Environmental Conservation make information regarding cruise ship mixing zones, including geographical areas, available to the public on the agency's web site.*





# Addressing Intent Language

- We are updating the web page routinely:  
([http://dec.alaska.gov/water/cruise\\_ships/index.htm](http://dec.alaska.gov/water/cruise_ships/index.htm))
- FAQ with general mixing zone information was made available shortly after the 2013 legislative session
- Area maps of cruise ship routes are available at:  
([http://dec.alaska.gov/water/cruise\\_ships/maps.htm](http://dec.alaska.gov/water/cruise_ships/maps.htm))
- Mixing zone web page at:  
<http://dec.alaska.gov/water/wqsar/wqs/mixingzones.html>



# Addressing Intent Language

- 2014 General Permit will contain more detailed information about mixing zones
- Upon public notice, this information will be posted on the web, including the areas where mixing zones will be authorized
- After permit issuance, DEC will continue to add more information about cruise ship mixing zones, such as taking advantage of GIS capabilities





# Questions?





# North Pole Refinery Contaminated Site

House Finance

Sub-Committee Overview

Larry Hartig, Commissioner

Kristin Ryan, Director, Spill  
Prevention and Response

February 20, 2014



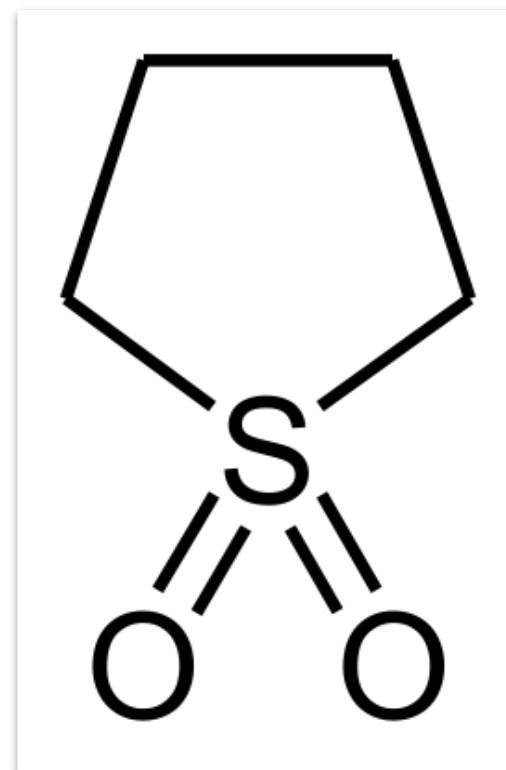
# Objectives of This Presentation

- Provide an overview of the contamination at the North Pole Refinery site
- Outline
  - Background
  - Current status
  - Brief history
  - The cleanup process and the cleanup level
  - What happens if cleanup levels can't be achieved?
  - Summary of State costs to date



# What is Sulfolane?

- An organic solvent used in the refining process to recover aromatic components from petroleum
- Mostly used in gasoline production, but may be in other refined products
- Breaks down in presence of oxygen





# How Did Sulfolane Get Into the Groundwater?

- Wastewater :
  - Historically the wastewater lagoon contained over 35,000 ppm of sulfolane
  - The wastewater lagoon had numerous leaks
- The recorded amount of sulfolane spilled is relatively low (<300 gallons)
- When fuel was spilled:
  - In the past sulfolane content in gasoline was up to 850 ppm
  - Current sulfolane content in gasoline is <2 ppm





## How Did Sulfolane Move so Far and Deep?

- Sulfolane is highly water soluble, allowing it to travel readily in groundwater
- Sulfolane does not tend to absorb into soil or volatilize
- Sulfolane does not degrade rapidly in anaerobic (no oxygen) environments (such as groundwater)
- Because of its high solubility and slow degradation, sulfolane has remained in the groundwater and spread over an extensive area. It has also spread to areas below the permafrost at depths of over 300 feet



# What is Known about Sulfolane?

- In high doses sulfolane can have acute effects on the central nervous system such as hyperactivity and convulsions
- Chronic (greater than 7 years for a human) exposure may affect the liver, kidney and spleen
- Sulfolane is rapidly absorbed into the bloodstream and excreted with a half-life of 3.5 to 5 hrs
- There is no indication that sulfolane is a skin or eye irritant
- Sulfolane does not appear to be carcinogenic



## Priorities Established by SPAR

- Eliminate human exposure to sulfolane
- Eliminate migration of sulfolane off the property
- Stop spills from occurring
- Understand where the contaminant is and where it is going
- Better understand the cumulative risks

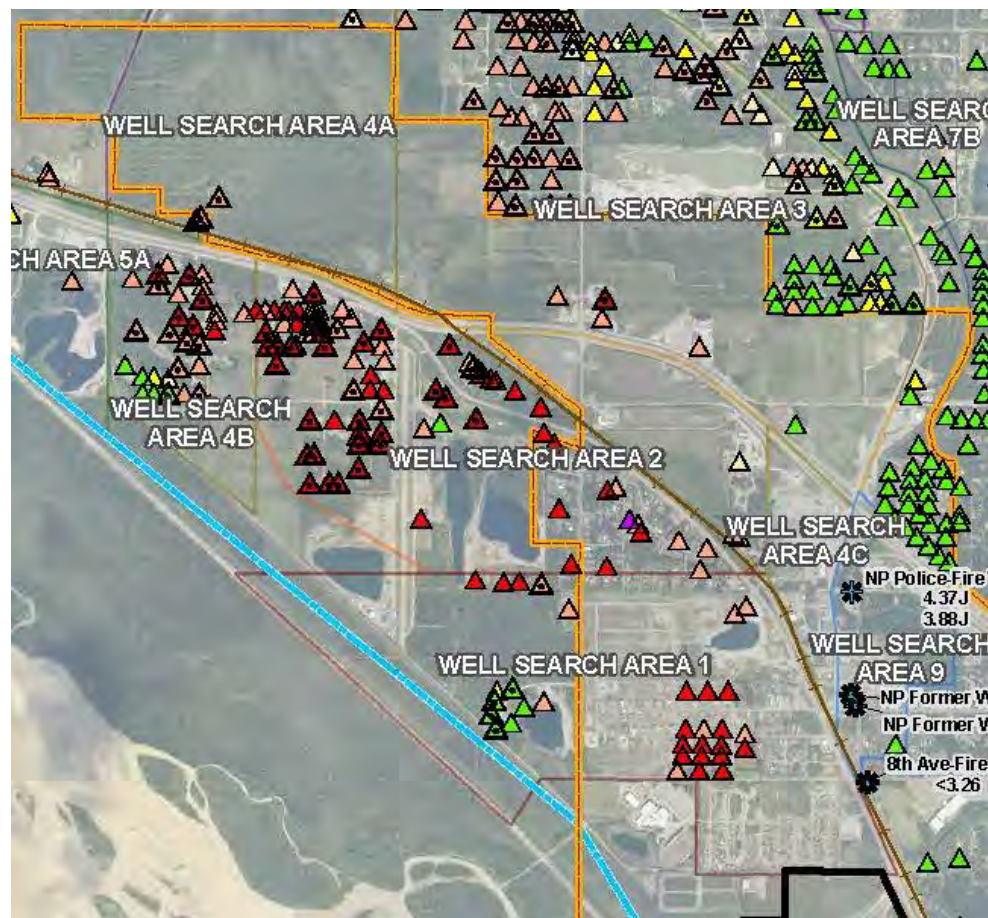


## Current Status of Site

- The plume is 3 miles long by 2.5 miles wide
- Other contaminants are present on the refinery property including benzene, gasoline, etc.
- **As of September 2013 there were 312 affected private properties**
  - 158 Drinking water treatment Systems
  - 28 City water service tie ins
  - 110 Bulk Water Tank Systems
  - 31 Long term bottled water deliveries
- **Approximately 250 homes were not impacted yet, but are located within buffer zone and are on interim bottled water**
- 33 locations have detections but have not selected a long-term solution



# Recent Groundwater Monitoring



## LEGEND:

### Private Well Sulfolane Results

- ▲ Not Detected
- ▲ 3.2 µg/L - 10 µg/L (J-flagged)
- ▲ 10µg/L - 14 µg/L
- ▲ 14µg/L - 100 µg/L
- ▲ 100µg/L - 500 µg/L
- ▲ Greater than 500 µg/L

- ▲ Point-of-entry treatment system sample collected
- Initial sulfolane samples collected during the reporting period
- ✱ Municipal Wells
- North Pole City Boundary
- FHRA Property Boundary
- Well Log Search Areas

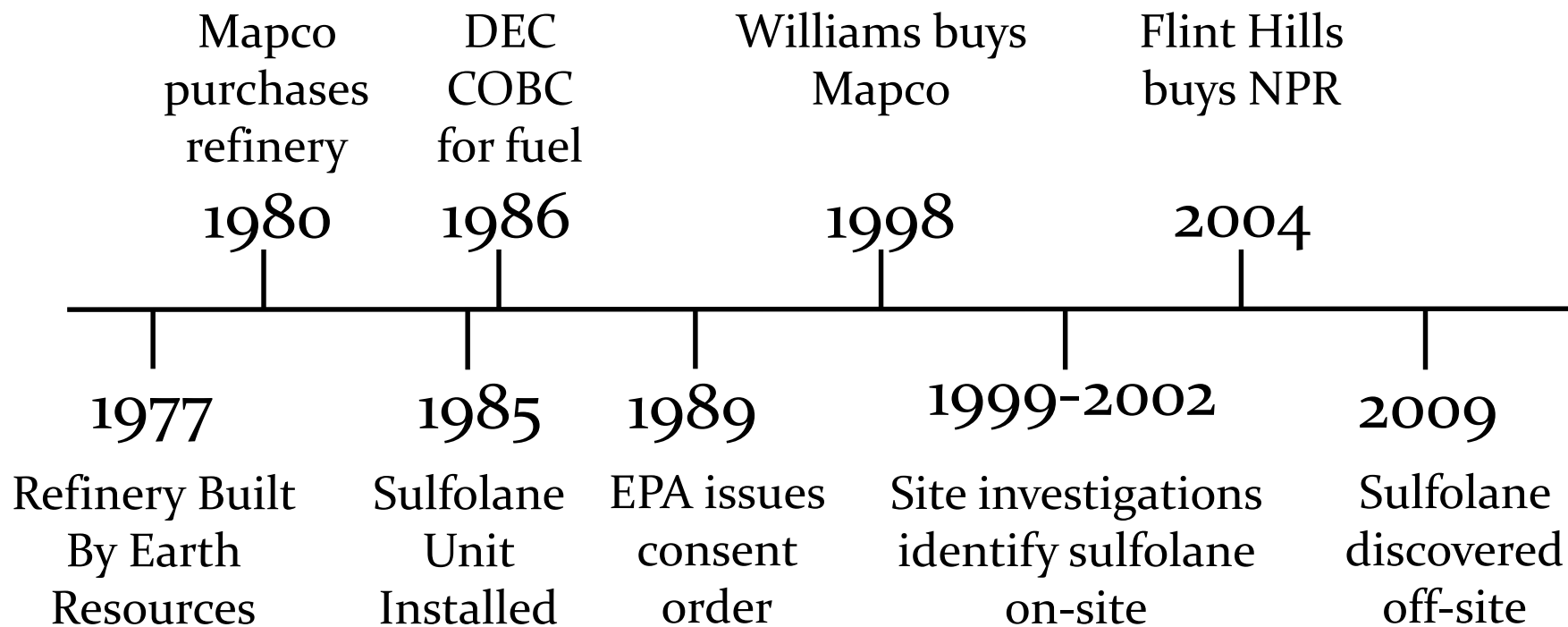
## Notes:

Sulfolane dataset displays the most recent sample collected  
 Sample results span the time period between Fourth Quarter 2009 and First Quarter 2013  
 Image provided courtesy of Pictometry International 2012





# North Pole Refinery History



Recovery of fuel started as early as 1982



## Sulfolane Was Discovered in Drinking Water in 2009

DEC established the Technical Project Team that included:

- Responsible parties: Flint Hills, Williams, and their contractors
- State: DEC, DHSS, UAF, and contractors
- Federal agencies: ATSDR, EPA, etc.
- Other stakeholders: City of North Pole, etc.



# The Normal Cleanup Process

- **Discovery**
  - Initial response (18 AAC 75.310)
  - Interim removal action (18 AAC 75.330)
- **Investigation**
  - Site characterization (18 AAC 75.335)
  - Risk evaluation/cleanup levels (18 AAC 75.340-.350)
- **Remediation**
  - Cleanup Plan (18 AAC 75.360)
  - Institutional Controls (18 AAC 75.375)
- **Closure** (18 AAC 75.380)

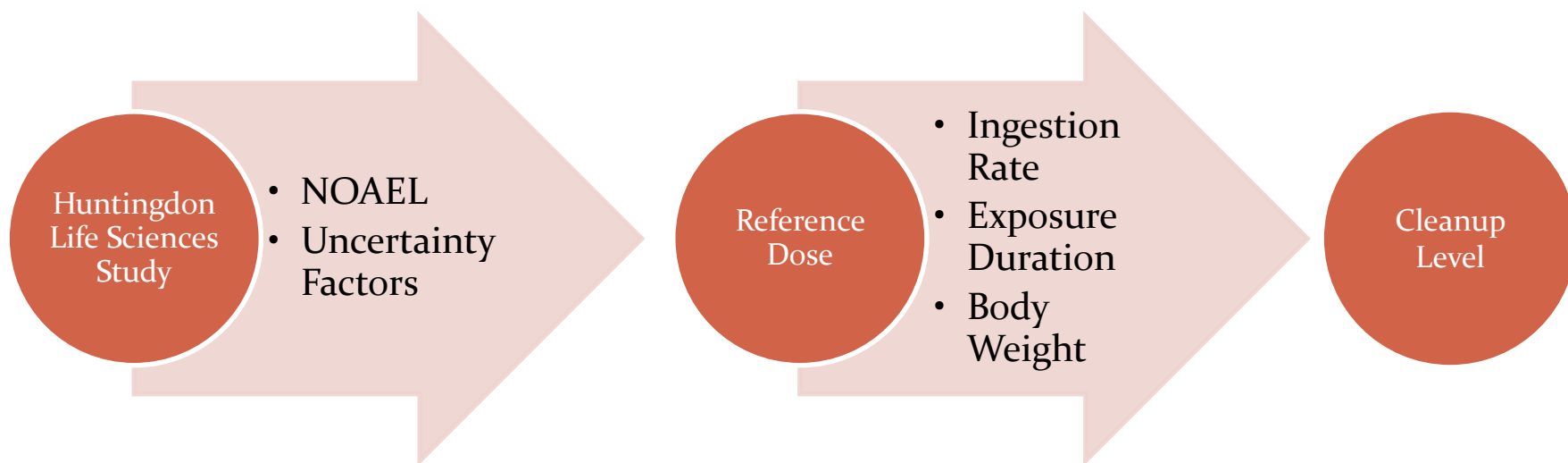


# How is a Cleanup Level Selected?

- There are two main ways a groundwater cleanup level is set in Alaska
- Many contaminants have levels listed in regulation - Table C of 18 AAC 75.345 (b)(1)
- Responsible parties can always conduct a risk assessment (RA) and submit to DEC for approval – the RA identifies the toxicity of a chemical and the potential ways people may be exposed (18 AAC 75.345 (b)(2))
- Because, sulfolane was not listed in regulation, a risk assessment was done by Flint Hills



# How was the Sulfolane Cleanup Level Calculated?



NOAEL: no observable adverse effect level





# Cleanup Timeline for Refinery Site

**Bottled Water Provided**  
(2009–2010)

**Permanent Drinking Water Solutions**  
Implemented (2011 to Present)

**TPT**  
**Established**  
(Mar 2010)

**Garden**  
**Study** (2011)

**Revised Draft Final**  
**Risk Assessment**  
Submitted May 2012

2009

2010

2011

2012

**Sulfolane**  
**Detected in**  
**Drinking**  
**Water Wells**  
(Oct 2009)

**Interim Cleanup**  
**Level set at 25**  
**ug/L based on**  
**Health Evaluation**  
(Feb 2010)

**EPA releases**  
**PPRTV**  
(Jan 2012)

**DEC sets**  
**final cleanup**  
**level of 14**  
**ppb** (July  
2012)



# Why did SPAR's Cleanup Level Change?

- In 2006, when sulfolane was thought to only be on the refinery property, the level was set at 350 ppb
- After sulfolane was discovered in private drinking water wells, SPAR asked the Alaska Dept. of Health and Human Services and the US Agency for Toxic Substances and Disease Registry (ATSDR) to evaluate the level, this resulted in a recommendation of 20 ppb as a safe drinking water level
- In 2012, after more extensive analysis, EPA published a new level through a Provisional Peer Reviewed Toxicity Value (PPRTV) of 16 ppb



## What Number is Safe?

- Flint Hills proposed two toxicity values for sulfolane in the human health risk assessment
  - EPA's Provisional Peer-Reviewed Toxicity Value (PPRTV) = 0.001 milligrams per kilogram body weight per day (mg/kg-d)
  - Flint Hill's Value = 0.01 mg/kg-d
- SPAR accepted the first and not the second because it was calculated following the established DEC process and guidance



# What does SPAR Regulations Require?

When performing a risk assessment, SPAR regulations and guidance documents refer to several sources of reliable data:

- First is EPA's maximum contaminant levels (MCLs)
- Second is EPA's Integrated Risk Information System (IRIS)
- Third is Provisional Peer Reviewed Toxicity Values (PPRTV)
  - US EPA developed and published a PPRTV for sulfolane in 2012.
  - A PPRTV results from a rigorous review and evaluation of available data.
  - Scientists from multiple federal agencies were involved )EPA, CDC, NIOSH, FDA, and ATSDR)
  - Dr. Dan Petersen (EPA, National Center for Environmental Assessment) was lead investigator
- Primary internal reviewers:
  - National Center for Environmental Assessment
  - National Center for Environmental Assessment
- Used by EPA as standard for public drinking water systems including the North Pole drinking water system



## What is the Same about the Two Cleanup Levels?

- Used same principal study
  - Huntingdon Life Sciences (2001)
- Used same critical endpoint
  - Decreased total and differential white blood cell count in female rats
- Both determined standard modeling not appropriate



# Then Why are the Cleanup Levels so Different?

## PPRTV (US EPA)

- Used No Observed Adverse Effects as beginning point  
2.9 mg/kg
- Applied 3000-fold uncertainty factors
- Used controls in study as comparison

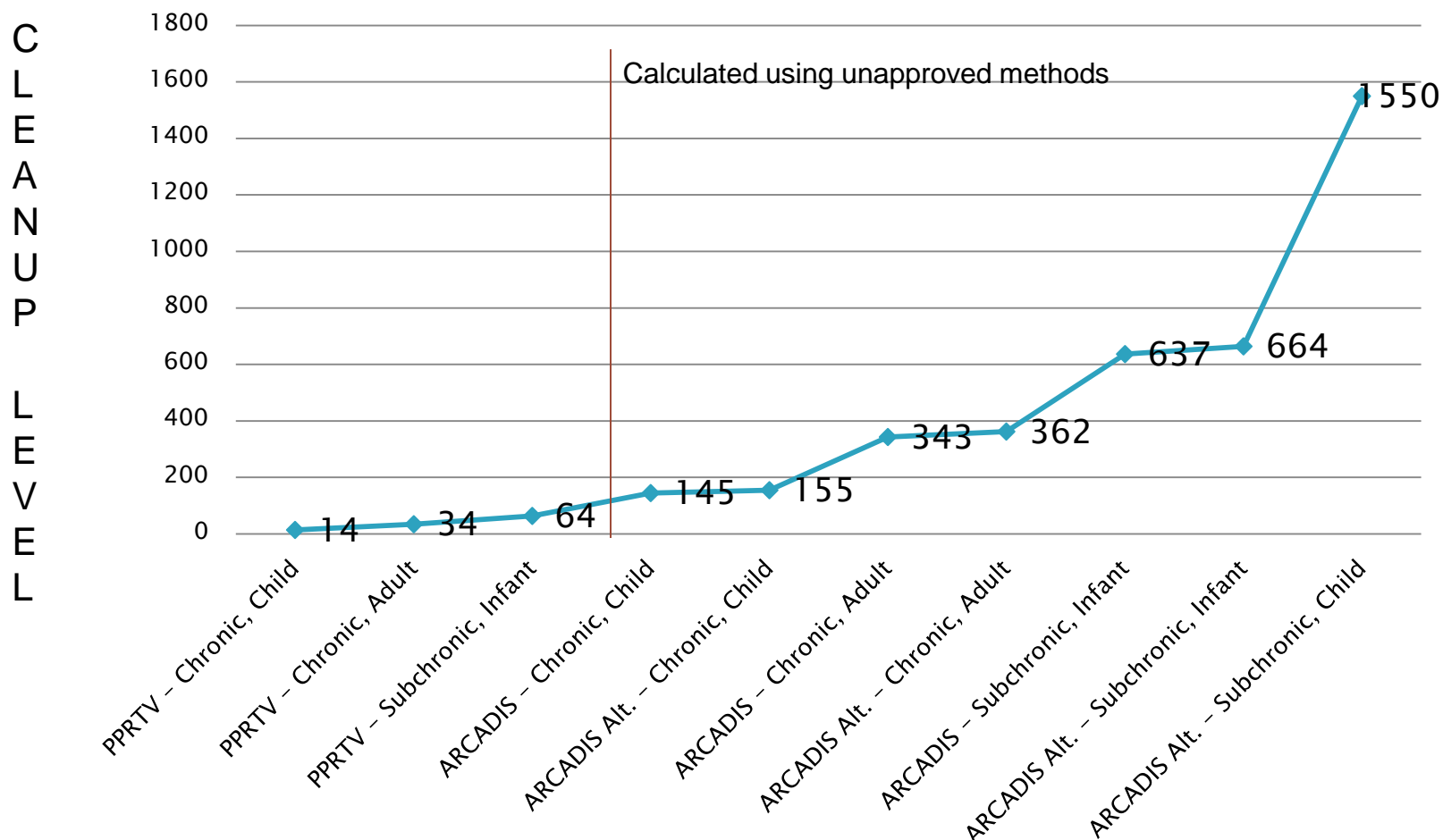
## Flint Hill's Value

- Used non-standard benchmark dose model  
11.64 mg/kg
- Applied 1000-fold uncertainty factors
- Used controls from other studies as comparison





# Cleanup Level Ranges Proposed





# What are Cleanup Levels Elsewhere?

- **Texas** (320 ppb)
  - Based on different study method.
  - Completed before EPA published their toxicity value.
  - No residential drinking water wells in the affected area.
- **Canada** (90 ppb)
  - Uses same study as U.S. EPA but applies different uncertainty factors.
- **Delaware** (1.6 ppb)
  - Sulfolane included in screening levels table. Based on EPA's screening levels.
- **Indiana** (16 ppb)
  - Sulfolane included in screening levels table. Based on EPA's screening levels.

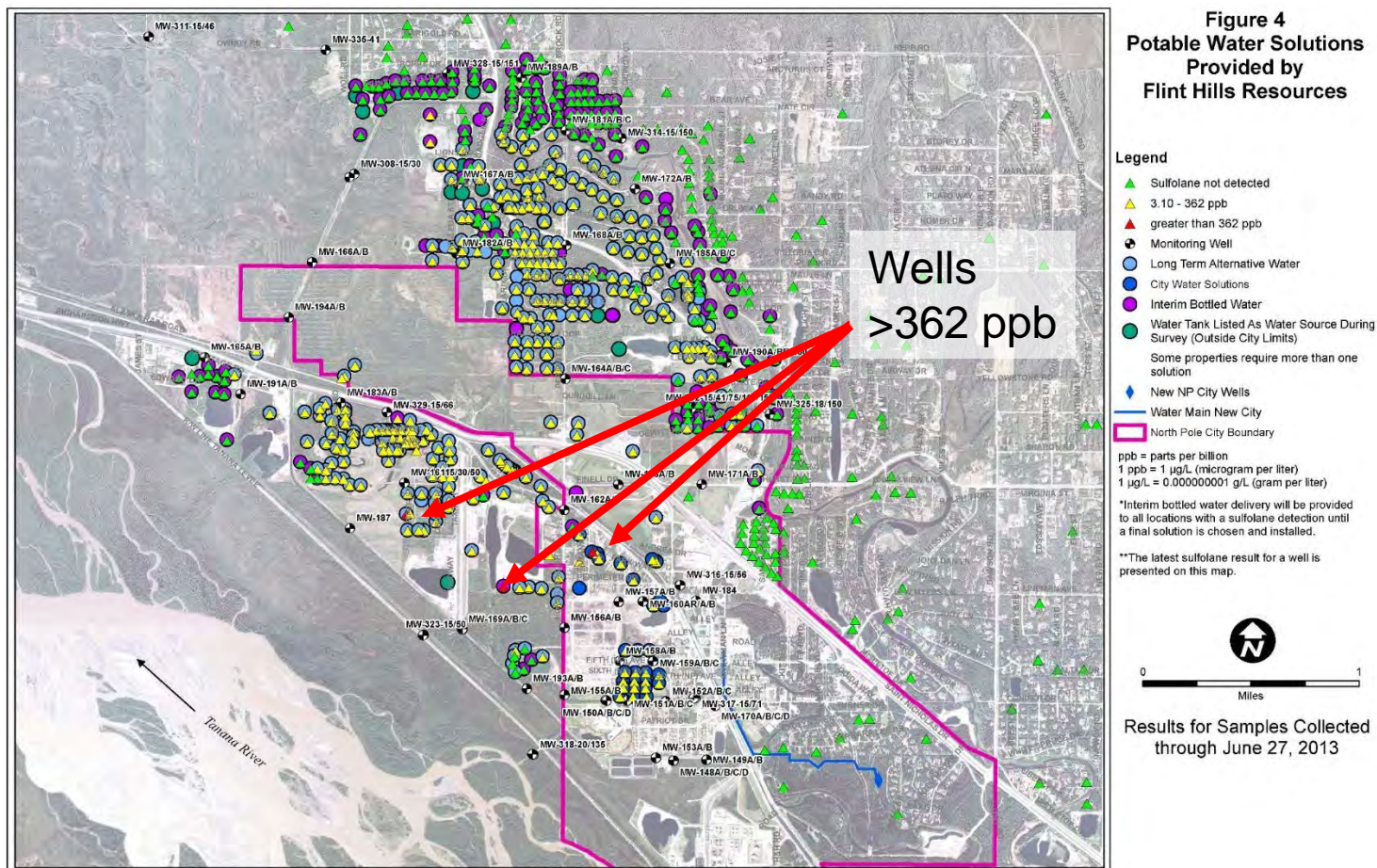


## If a Cleanup Level Can't Be Met – What Happens?

- A **cleanup level** means the concentration of a hazardous substance that may be present within a specified medium and under specified exposure conditions without posing a threat to human health, safety, or welfare, or to the environment (18 AAC 75. 990)
- Cleanup levels are not always feasibly or practically attained, thus a combination of **institutional controls** and mitigation measures can be used until the site can reach these levels
- In this case, institutional controls would include ensuring homeowners with impacted drinking water wells, would continue to receive safe drinking water
- Controls would be placed on deeds restricting future drinking water wells from being put in



# If Flint Hills Value was Used, How Many Homes Would Continue to Receive Drinking Water?





## Why are We Primarily Working with Flint Hills?

- DEC regulations require that costs for cleanup are born by the responsible party
- DEC regulations also require that oversight cost are recovered from the responsible party
- Department of Law (DOL) assists DEC with cost recovery
- The property owner can choose to pursue other responsible parties
- Flint Hills has attempted to pursue Williams and has lost this legal battle
- DOL is initiating cost recovery against Williams





## State Costs

- Total oversight costs expended to date: \$2.9 M
  - Contractual
  - Staff time
  - Reimbursable Services Agreements
    - University of Alaska Fairbanks
    - Department of Health and Social Services
    - Department of Law
- Amount recovered to date \$1.8 M





# Cleanup Issues

- It may be impossible to remove sulfolane from the deeper parts of the aquifer
- In cases where cleanup level cannot be met, protective measures are put in place
  - In this case, it would include safe drinking water for the residents
- Long term maintenance of alternative water supply is key for the protection of receptors
- There is not a formal commitment between DEC and the responsible parties.



## SPAR Believes the Community Deserves Safe Water

- Eliminate human exposure to sulfolane
- Eliminate migration of sulfolane off the property
- Stop spills from occurring
- Understand where the contaminant is and where it is going
- Better understand the cumulative risks



# Questions?

