Kirtland Air Force Base
Fuel Leak Cleanup

Presenters: Diane Agnew, NMED

Kathryn Lynnes, Air Force

Radioactive and Hazardous Materials Committee
Project Update
November 3, 2017

A Partnership for Success

A collaborative technical team is solving the complex hydrogeologic and engineering challenges posed by the fuel leak with support from Albuquerque's neighborhood groups

Albuquerque Bernalillo County Water Utility Authority

Westside Coalition Neighborhood Assoc.

US Army Corps of Engineers

Siesta Hills Neighborhood Assoc.

ABQ City Council District 6 Coalition of Neighborhood Assocs.

Elder Homestead Neighborhood Assoc.

Christ United Methodist Church

HAWLEY GEOMATTERS

Thomson and Associates

Diane Agnew

New Mexico Environment Department (NMED)

Hydrologist

Regulatory Framework for Cleanup

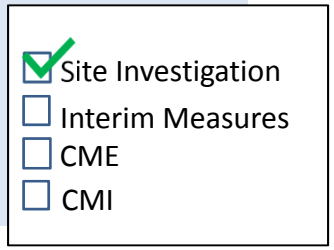
- Site investigation and cleanup activities at BFF follow a specific regulatory process known as Corrective Action
- Process steps and requirements are spelled out in:

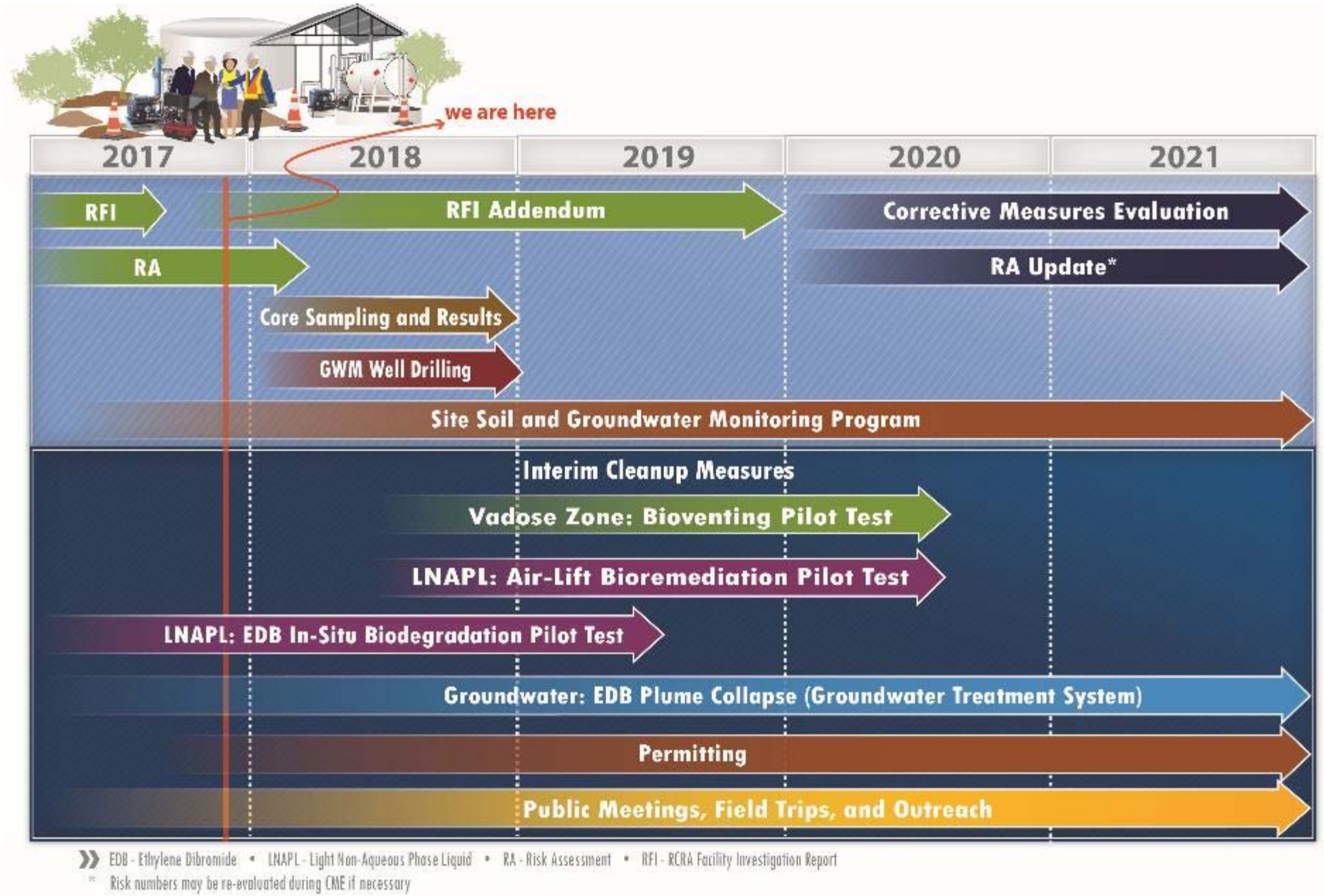
  1 - State and
  2 - Federal regulations

- Additional requirements for Corrective Action are detailed in:

  3 - Part 6 of the Kirtland AFB Hazardous Waste Treatment Facility Operating Permit (RCRA permit)

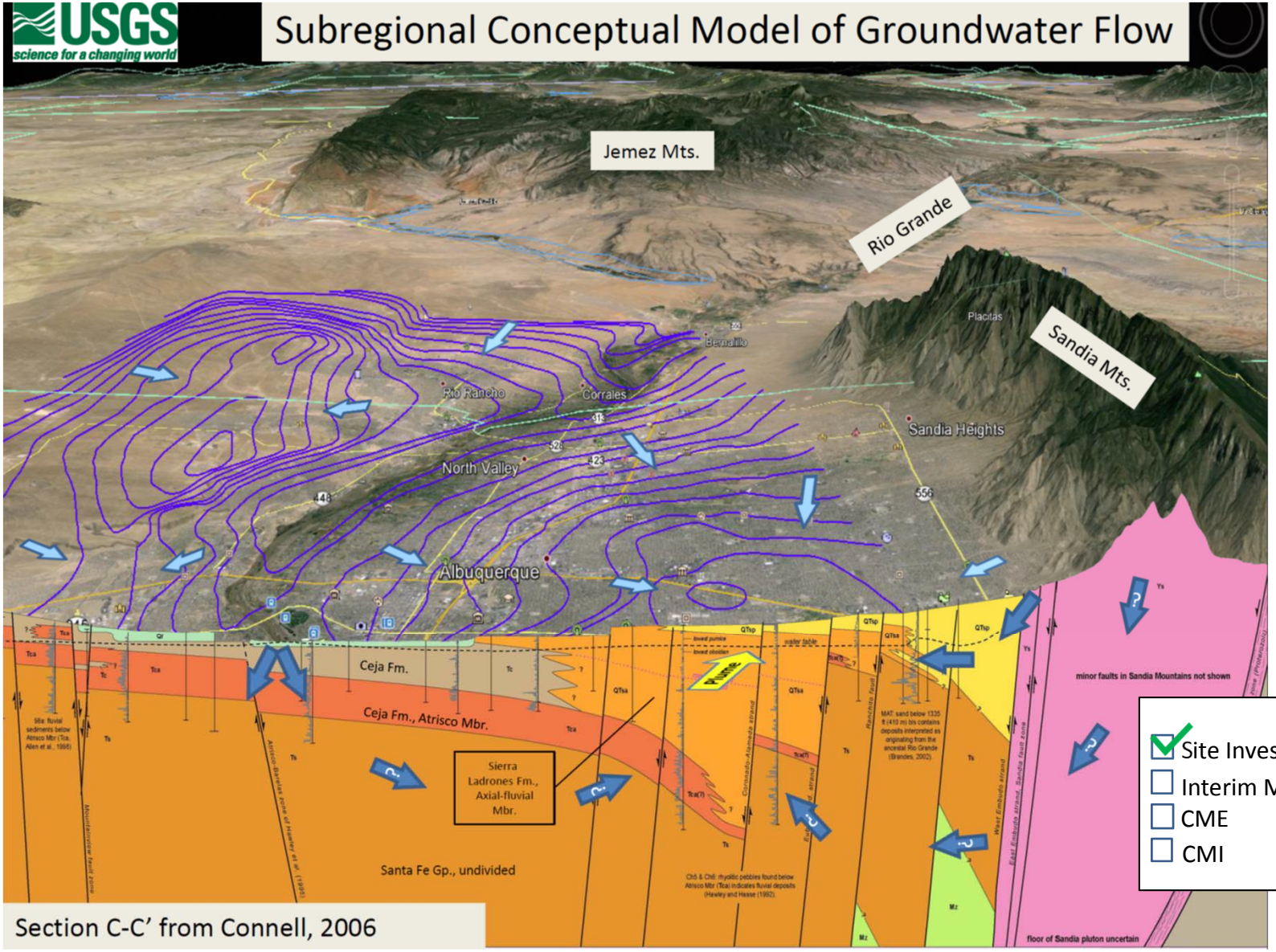
- Corrective Action process includes submittal of a RCRA Facility Investigation report (RFI) to include all data collected during investigation
- Risk Assessment (RA) Reports are also a requirement under RCRA and the Kirtland AFB RCRA Permit
- The RFI and the RA support the Corrective Action process.




we are here
2017
2018
2019
2020
2021
RFI
RFI Addendum
Corrective Measures Evaluation
RA
RA Update*
Core Sampling and Results
GWM Well Drilling
Site Soil and Groundwater Monitoring Program
Interim Cleanup Measures
Vadose Zone: Bioventing Pilot Test
LNAPL: Air-Lift Bioremediation Pilot Test
LNAPL: EDB In-Situ Biodegradation Pilot Test
Groundwater: EDB Plume Collapse (Groundwater Treatment System)
Permitting
Public Meetings, Field Trips, and Outreach
EDB - Ethylene Dibromide • LNAPL - Light Non-Aqueous Phase Liquid • RA - Risk Assessment • RFI - RCRA Facility Investigation Report
* Risk numbers may be re-evaluated during CME if necessary

Conceptual Site Model

https://www.env.nm.gov/NMED/Issues/KirtlandFuelPlume/KAFBProjectImages.html



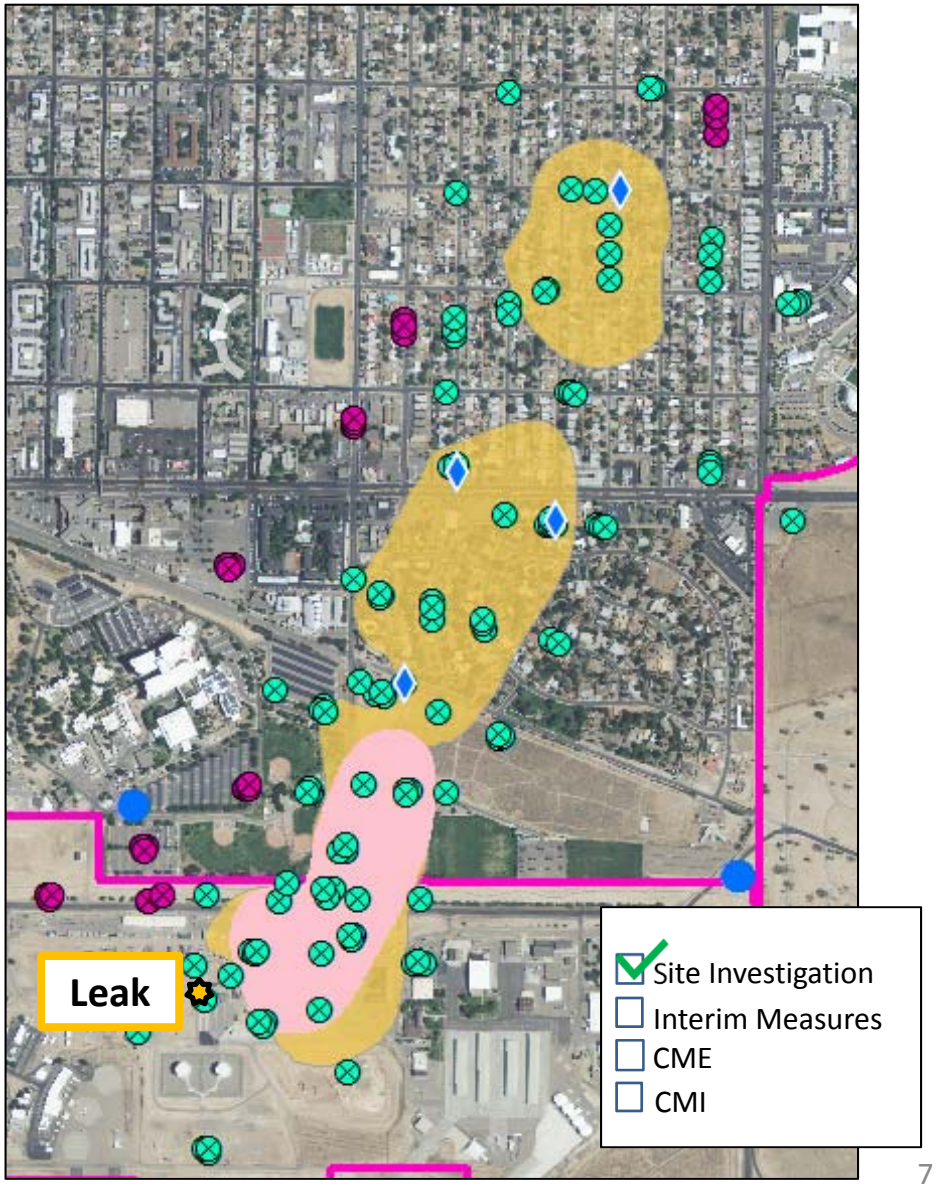
More to be done!

Vadose Zone and LNAPL:

- Interim measure bioslurping removed light non-aqueous phase liquid (LNAPL)
- Historic rise and fall of water table affected LNAPL
- Need to estimate mass of LNAPL remaining in vadose zone and submerged

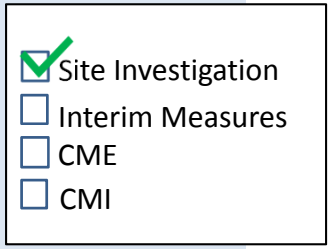
Groundwater

- Rapid rise in water table observed in Q2 2017
- Reduction of water table monitoring network as water table rises



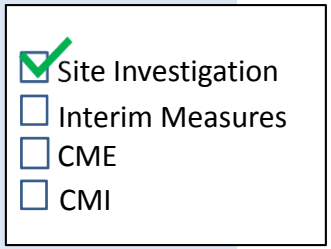
Putting it all together

- As we continue to collect data, we are able to further refine the conceptual site model
  - *Vadose Zone*: Collection of continuous cores in the unsaturated zone to refine soil vapor rebound test results and evaluate the nature of LNAPL suspended in the soil.
  - *Groundwater*: Rising water table necessitates additional wells to evaluate EDB plume mass. Continuous core samples within the saturated soil will refine understanding of "drowned" LNAPL.

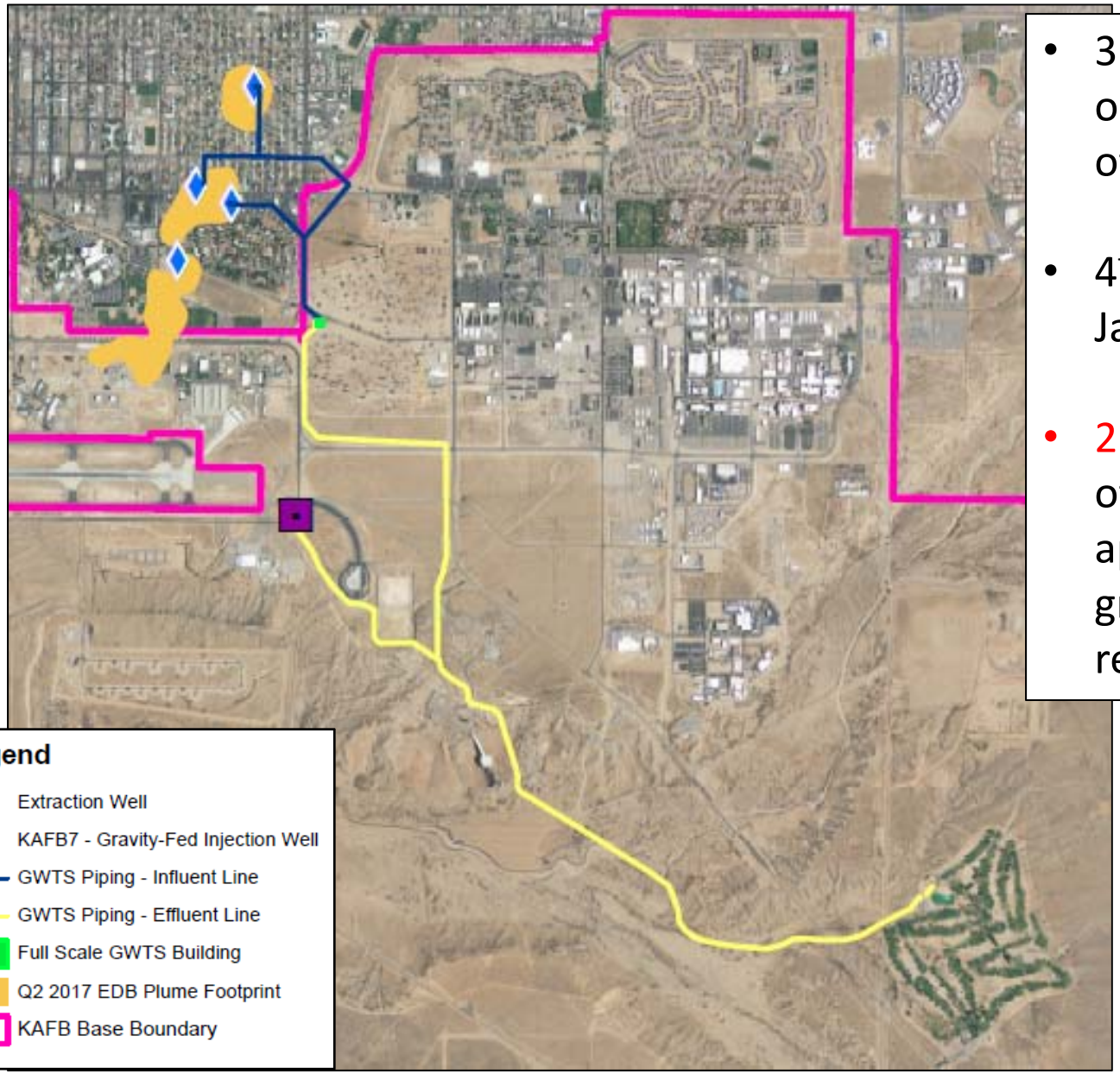


What's next for the RFI Report?

- RFI Report will be refined and improved, including:
  - Revisions to January 2017 RFI report; and
  - Submittal of an RFI Addendum Report with additional data to be collected to close data gaps and update site conceptual site model.
- Data collection will be based on a series of work plans that in production now and will be submitted for NMED review and approval.
- In this way, the earlier submitted RFI with 2015 data can be made dynamic to 2017 site conditions along with current and planned activities.



EDB Plume Interim Measure

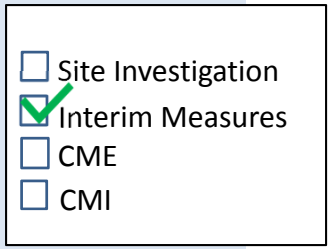


- 3 of 4 extraction wells operating – total rate of 460 gpm
- 4th well operational January 2018
- 263.4 million gallons of water treated; approximately 75.1 grams of EDB removed

- ☐ Site Investigation
- ☑ Interim Measures
- ☐ CME
- ☐ CMI

Source Area Interim Measures

- Phase I of EDB Biodegradation Pilot Test began in October 2017
  - *Goal*: Treatment of EDB trapped in smeared LNAPL through anaerobic biodegradation
- Air-Lift Enhanced Bioremediation Pilot Test planned for mid-2018
  - *Goal*: Treatment of smeared LNAPL through aerobic biodegradation
  - Continuous core data required to complete design
- Bioventing Pilot Test planned for mid-2018
  - *Goal*: Aerobic degradation of fuel and cometabolism of EDB
  - Continuous core data required to complete design



NMED 2018 Strategic Plan

NMED Draft 2018 Strategic Plan will be posted by the end of December 2017 for public review and comment (www.env.nm.gov/kafbfuelplume)

Goal: Protect Albuquerque's aquifer and drinking water supply wells in the area of the fuel leak.

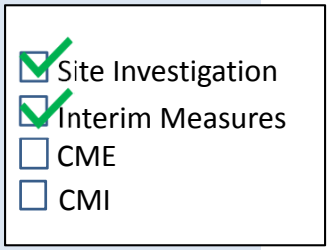
Strategies to Achieve the Goal:

1. Implement a robust site monitoring & wellhead protection program.
2. Deploy multiple cleanup strategies, both simultaneously and sequentially, to cleanup soil and groundwater.
3. Meet or exceed all requirements for providing public comment, information, and involvement.

- ☑ Site Investigation
- ☑ Interim Measures
- ☑ CME
- ☑ CMI

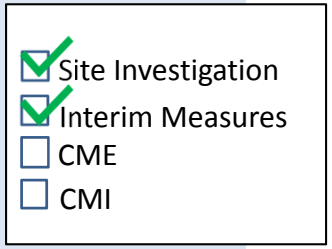
Looking Forward

- Drill, install, and sample water table groundwater monitoring wells (Winter 2018)
- Drill and sample continuous cores to delineate LNAPL extent (Winter/Spring 2018)
- Continued operation of EDB plume collapse interim measure
- Begin operation of 4th groundwater extraction well (Winter 2018)
- Complete installation of pre-treatment sand filters at Groundwater Treatment System
- Continued operation of EDB biodegradation pilot test



Looking Forward

- Prepare Bioventing Pilot Test Work Plan (Summer 2018)
- Prepare Air-Lift Biodegradation Pilot Test Work Plan (Summer 2018)
- Conduct technical working group meetings to continue to evaluate rising water table, LNAPL mass estimates, and advance interim measures using current data
- Continue quarterly public meetings and outreach to neighborhoods and community groups



Kate Lynnes

Air Force Senior Advisor

Air Force Project Team

- The Air Force and Kirtland Air Force Base (KAFB) are committed to remediating the contamination from the Bulk Fuels Facility (BFF) leak and has assigned an experienced team to this project.
- **Kathryn Lynnes.** Highly Qualified Expert representing the Office of the Secretary of the Air Force. Based in Albuquerque.
- **Brian Renaghan.** Program Manager representing the Air Force Civil Engineer Center. Based in San Antonio, Texas.
- **Scott Clark.** KAFB Restoration Program Manager. Based in Albuquerque.
- **Holly O'Grady.** KAFB Environmental Engineer. Based in Albuquerque.

Risk Assessment

- Air Force submitted the Risk Assessment (RA) Report to NMED on July 21, 2017 and it is currently under review by NMED
- The RA evaluates:
  - Possible risks to human health
  - Possible ecological risks
- The report is organized by media (soil, soil gas, and groundwater) and location (on-Site and off-Site)

Key Findings of the Risk Assessment

Off-Site

- Because there was never any shallow soil contamination off-Site, there is no risk
- There are no gardening risks above the EDB plume
- There are no risks to recreational users of Bullhead Park
- There are no drinking water risks to residents because no groundwater contamination from BFF has affected community drinking water wells (Albuquerque Bernalillo County Water Utility Authority and Veterans Administration (VA) Medical Center

Key Findings of the Risk Assessment

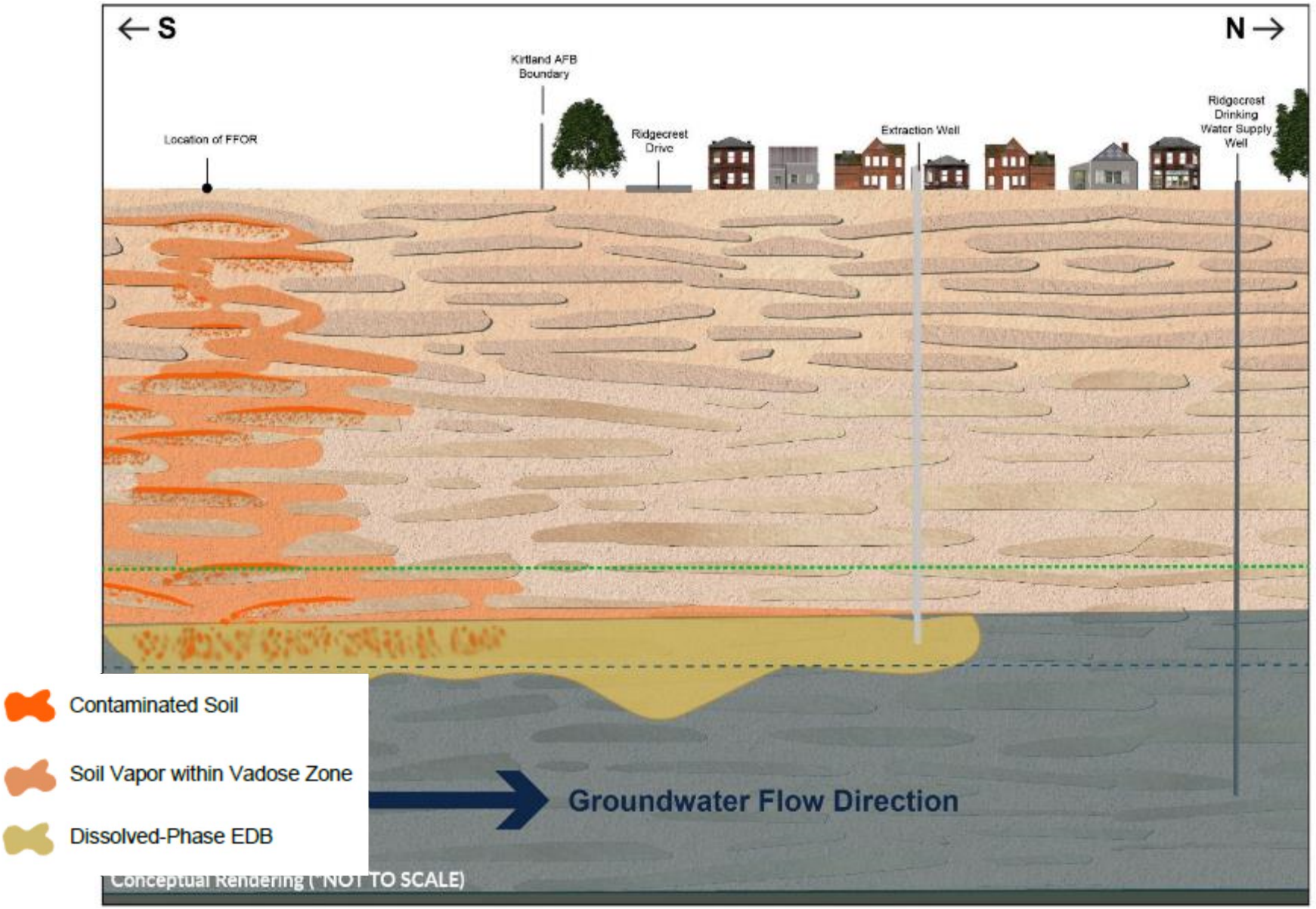
On-Site

- There are no risks to industrial workers from surface soil or soil vapor
- There are no risks to construction workers from surface soil or soil vapor
- There are no on-Site drinking water risks because no groundwater contamination from BFF has affected KAFB drinking water well

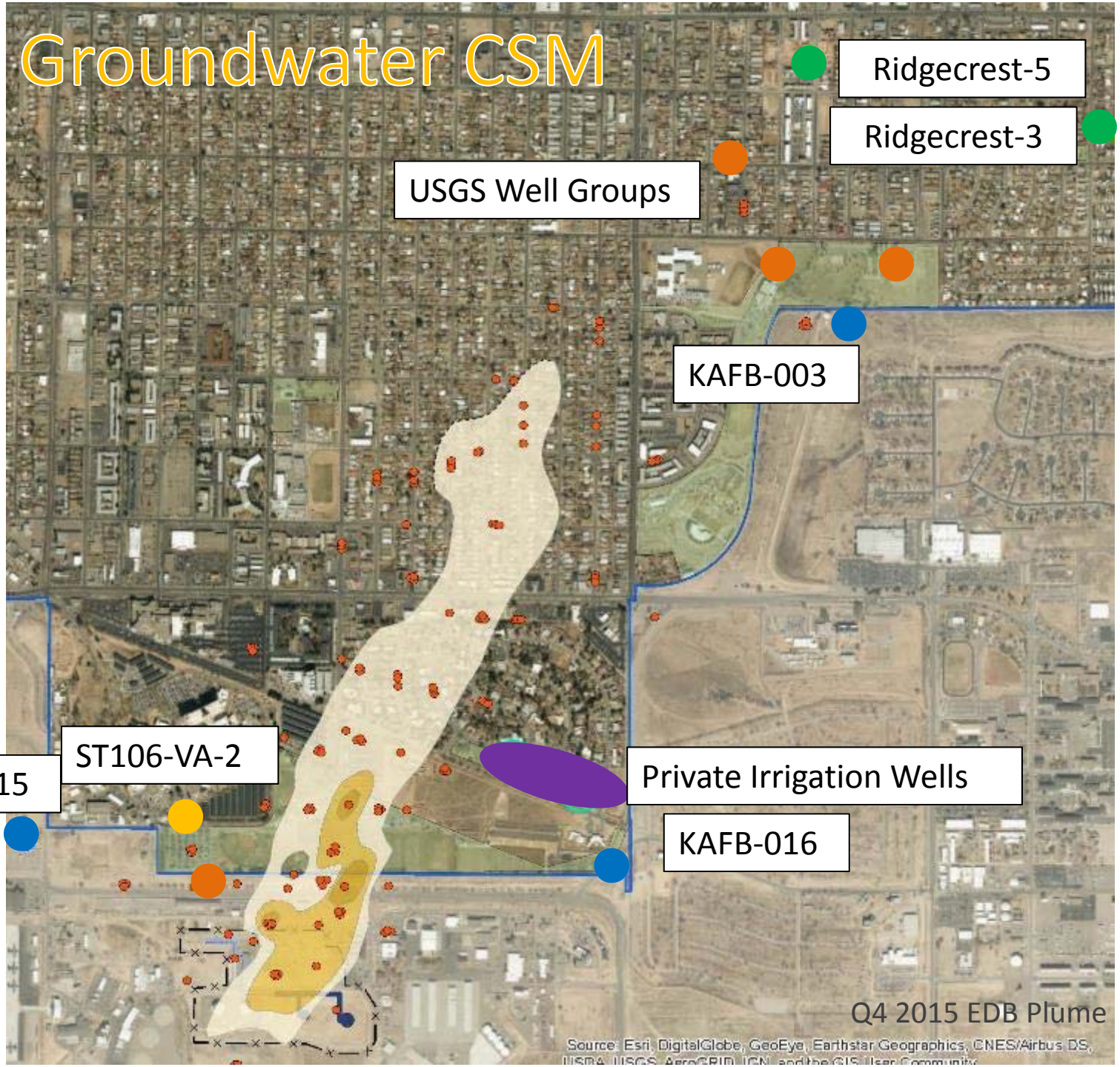
Risk Assessment: Data Used

- The RA used data from the RFI Report and Quarterly Monitoring Reports – focus on fuel-related constituents
  - The highest concentrations in the affected media were compared to NMED criteria
- These data, land use, and other factors were used to develop a conceptual site exposure model (CSEM)

Conceptual Site Exposure Model



Groundwater CSM



Land Use

- The Risk Assessment evaluates current and future land use
  - On-Site land use is primarily industrial
  - Off-Site land use includes recreational, residential, and commercial
- Land use controls:
  - On-Site land use is highly controlled
  - Off-Base land use is subject to zoning restrictions
  - Office of State Engineer enacted a restriction on private well installation in and 500 ft around the plume boundary

Human Health Risk Assessment Overview

Receptor

Potential Exposure Pathway

Residential

Soil 0-10 ft bgs	Indoor Air (Vapor Intrusion)	Tap Water
Ingestion	Inhalation	Ingestion
Skin contact		Skin Contact
Inhalation		Inhalation

Construction

Soil 0-10 ft bgs	Outdoor Air	Tap Water
Ingestion	Inhalation	Skin Contact
Dermal		Inhalation
Inhalation		

Commercial/Industrial

Soil 0-1 ft bgs	Indoor Air (Vapor Intrusion)	Tap Water
Ingestion	Inhalation	Ingestion
Skin Contact		Skin Contact
Inhalation		Inhalation

Soil 0-1 ft bgs	Outdoor Air	Tap Water
Ingestion	Inhalation	Ingestion
Skin Contact		Skin Contact
Inhalation		Inhalation

Off-Site Exposure Pathways

Receptor

Potential Exposure Pathway

NMED Risk Assessment Guidance

Residential

- **Soil 0-10 ft bgs** — Ingestion, Skin Contact, Inhalation — X
- **Indoor Air (Vapor Intrusion)** — Inhalation — X
- **Tap Water** — Ingestion, Skin Contact, Inhalation — X

Recreational

- **Soil 0-1 ft bgs** — Ingestion, Skin Contact, Inhalation — X
- **Outdoor Air** — Inhalation — X
- **Tap Water** — Ingestion, Skin Contact, Inhalation — X

On-Site Exposure Pathways

Receptor

Exposure Pathway

Construction

- **Soil 0-10 ft bgs**
  - Ingestion
  - Dermal
  - Inhalation
- **Outdoor Air**
  - Inhalation ~~X~~
- **Tap Water**
  - Skin Contact ~~X~~
  - Inhalation

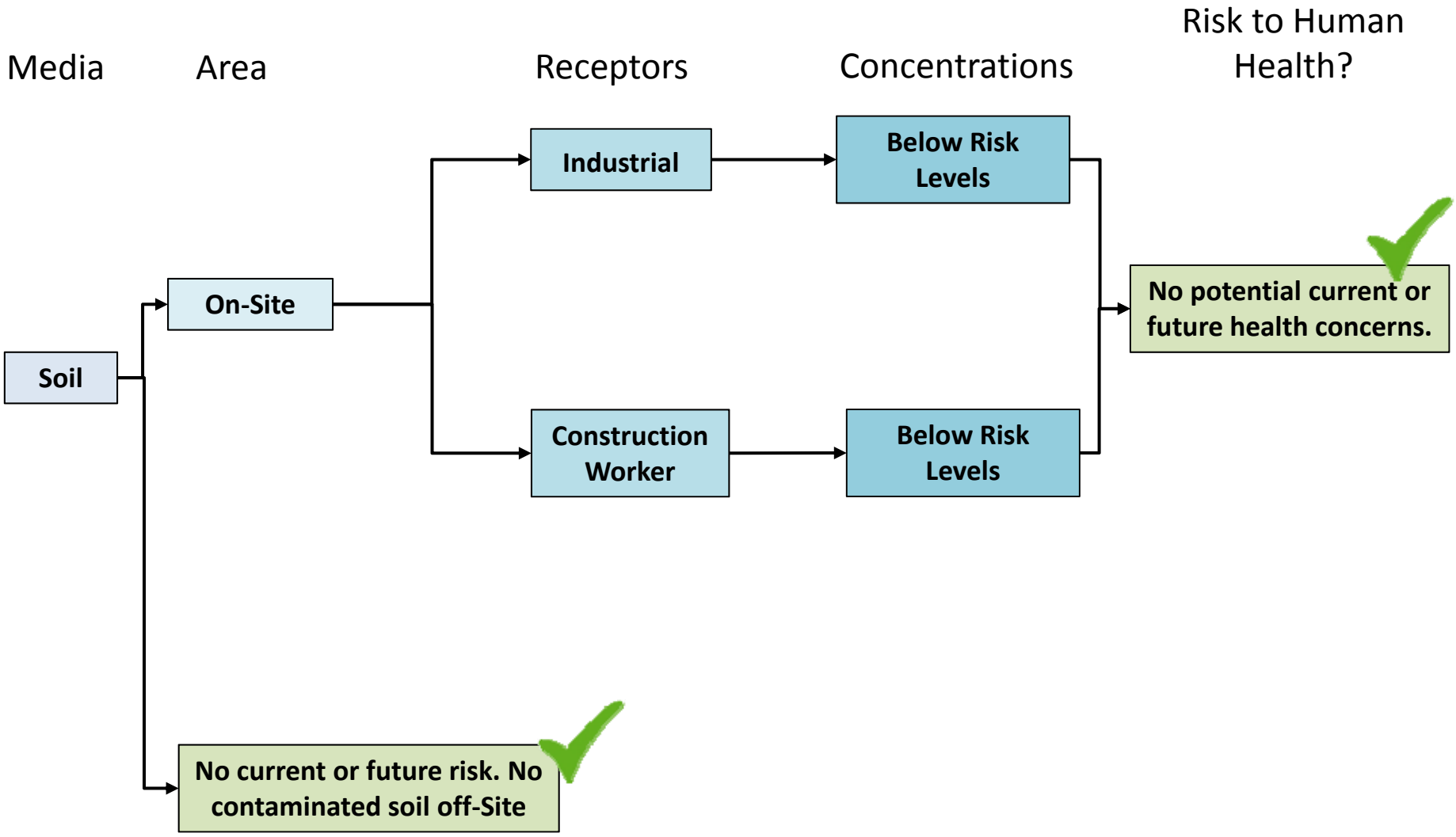
Commercial/Industrial

- **Soil 0-1 ft bgs**
  - Ingestion
  - Skin Contact
  - Inhalation
- **Indoor Air (Vapor Intrusion)**
  - Inhalation
- **Tap Water**
  - Ingestion ~~X~~
  - Skin Contact
  - Inhalation

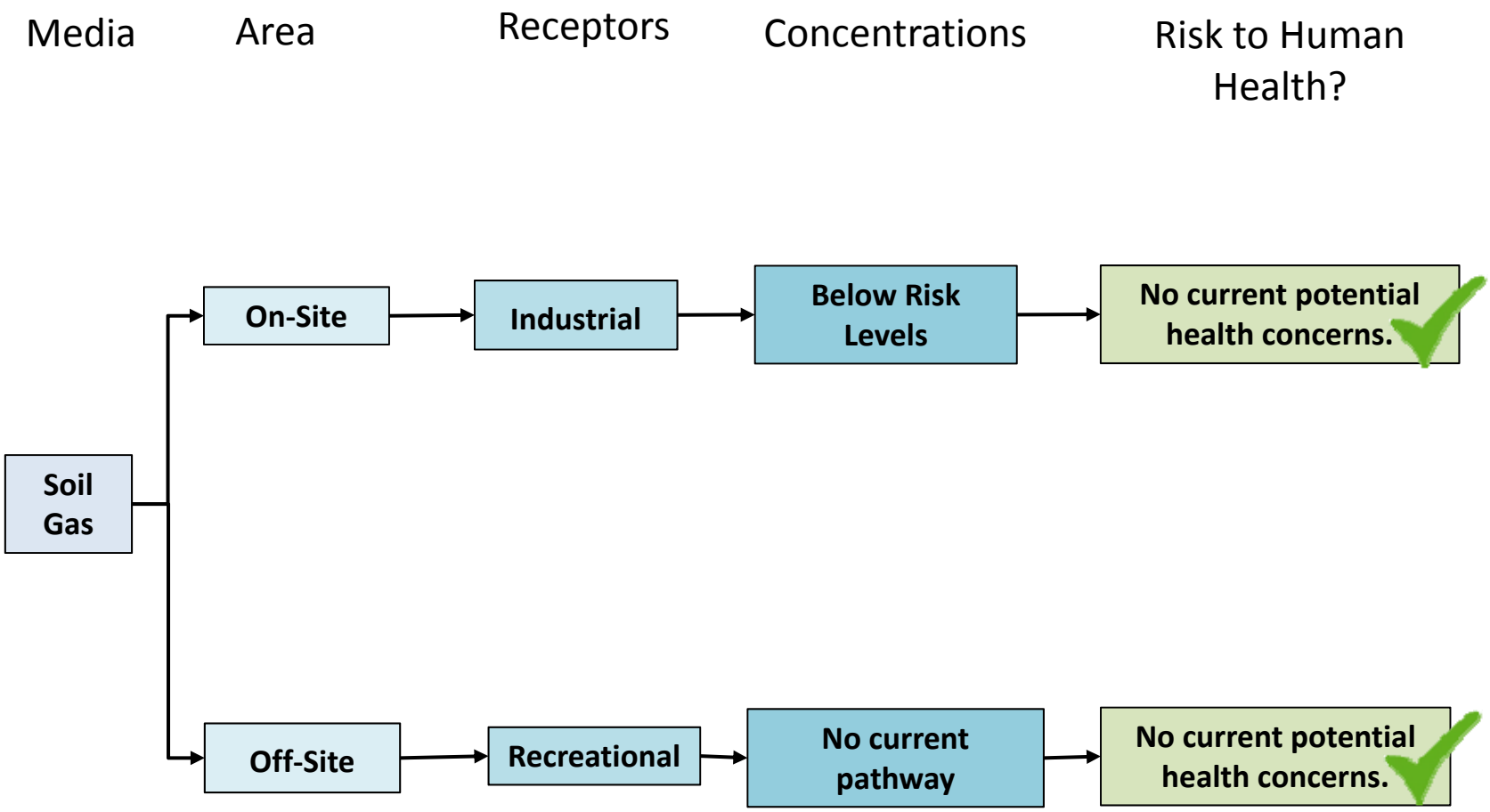
Screening Levels

- Screening Levels (SLs) are developed for each type of:
  - Media (e.g., soil, soil gas, and groundwater); and
  - Land use/exposure scenario (e.g., residential, industrial, etc.)
- At sites where contamination concentrations are below SLs, no further action or study is generally needed
- If a contaminant exceeds an SL, it does not automatically require cleanup or meet the definition of “unacceptable levels of contamination”

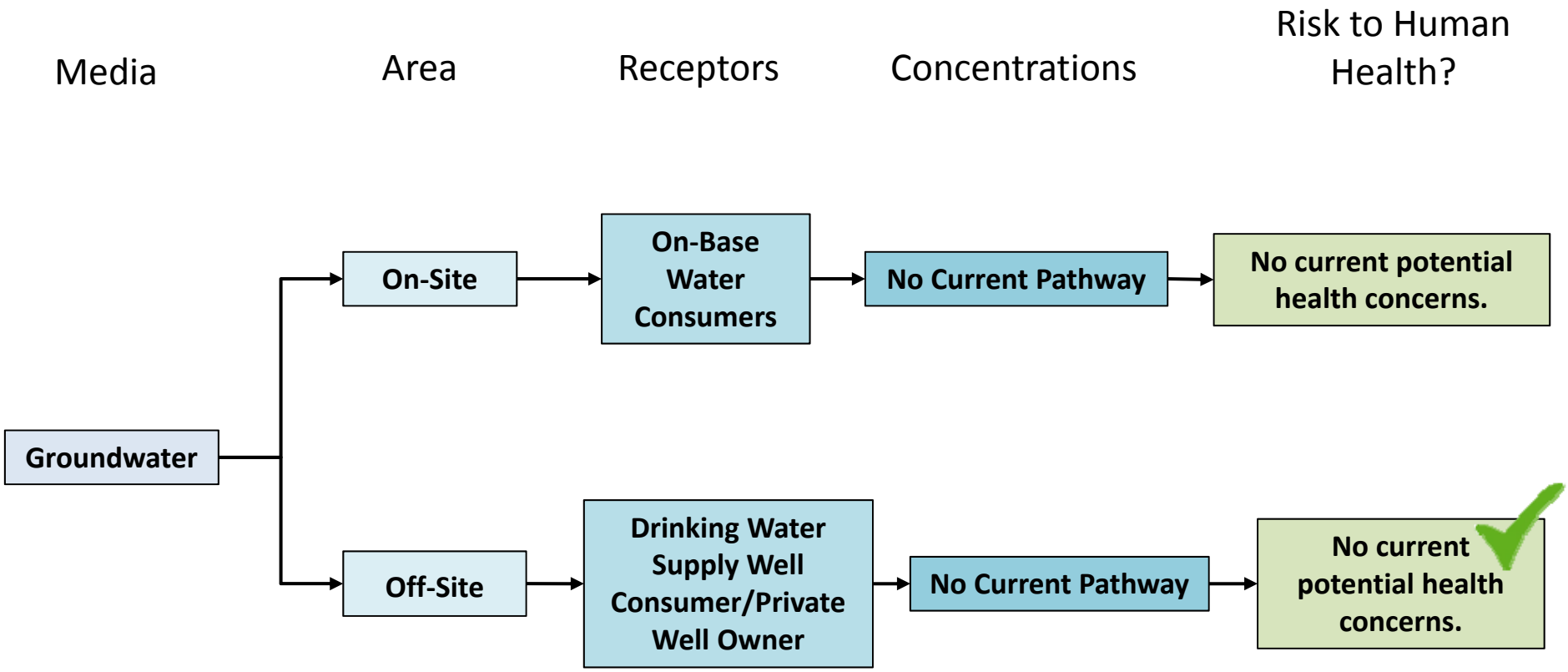
Risk Assessment Results - Soil



Risk Assesment Results – Soil Gas



Risk Assessment Results: Groundwater



Risk Assessment Path Forward

- The Risk Assessment is a snapshot in time – uses current site data

- The Risk Assessment will be revisited during CME process to address:
  - New data collected and presented in the RFI Addendum Report
  - Identify the need for formal land-use controls

How do I get more information?

Contact NMED:

Allison Majure	Communications Lead	(505) 827-2855	Allison.majure@state.nm.us
Diane Agnew	Technical Lead	(505) 222-9555	diane.agnew@state.nm.us

NMED Website and Listserv: www.env.nm.gov/kafbfuelplume

Contact the Air Force:

Kathryn Lynnes	Senior Advisor	(505) 846-8707	kathryn.lynnes@us.af.mil
AFCEC Public Affairs		(866) 725-7617	afcec.pa@us.af.mil
Kirtland AFB Public Affairs		(505) 846-5991	377ABW.PA@us.af.mil

Air Force Bulk Fuels Facility website: www.kirtlandjetfuelremediation.com

Kirtland AFB website: www.kirtland.af.mil **in the Environmental Issues section for Public Records**

Questions?

Photo Credit: Rebecca Cline