

Iron King Mine - Humboldt Smelter Superfund Site

Community Meeting
April 27, 2010



Agenda

6 – 6:50

EPA Presentation

- Remedial Investigation Results
- Superfund Process
- Next Steps
- Community Involvement

6:50 - 7:00

ADEQ and University of Arizona Presentations

7:00 - 7:30

Questions and Answers

7:30 - 8:30

Break and Open House

- Poster Viewing
- Staff available for one-on-one discussions

Introductions

- ◎ **EPA**

- › Leah Butler, Project Manager
- › David Cooper, Community Involvement Coordinator

- ◎ **ADEQ**

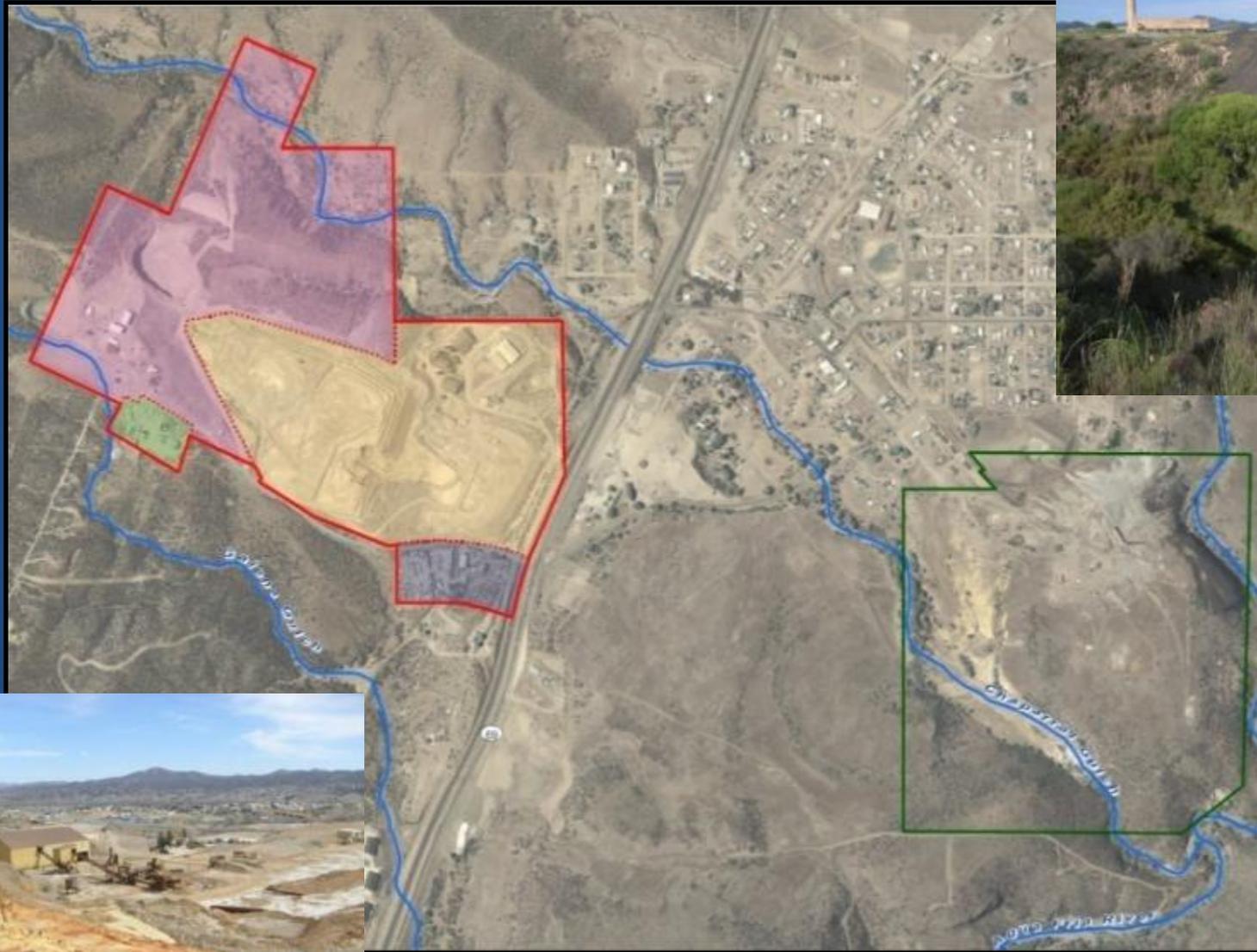
- › Brian Stonebrink, Project Manager
- › Joellen Meitl, Project Hydrogeologist
- › Felicia Calderon, Community Involvement Coordinator

- ◎ **Technical Support**

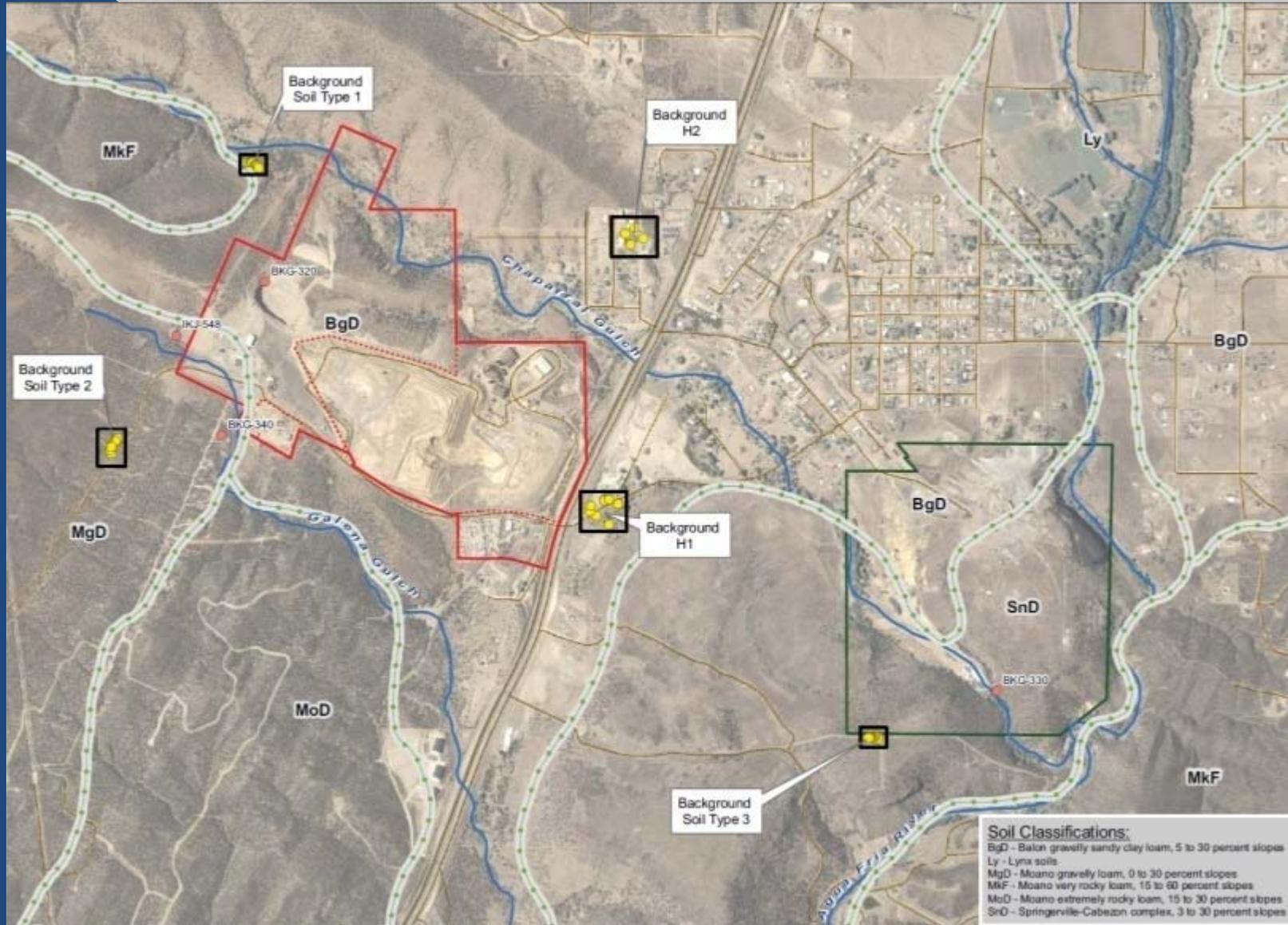
- › Doug McReynolds, EA Engineering, Science, and Technology

- ◎ **University of Arizona**

Background



Background Evaluation



Background Evaluation

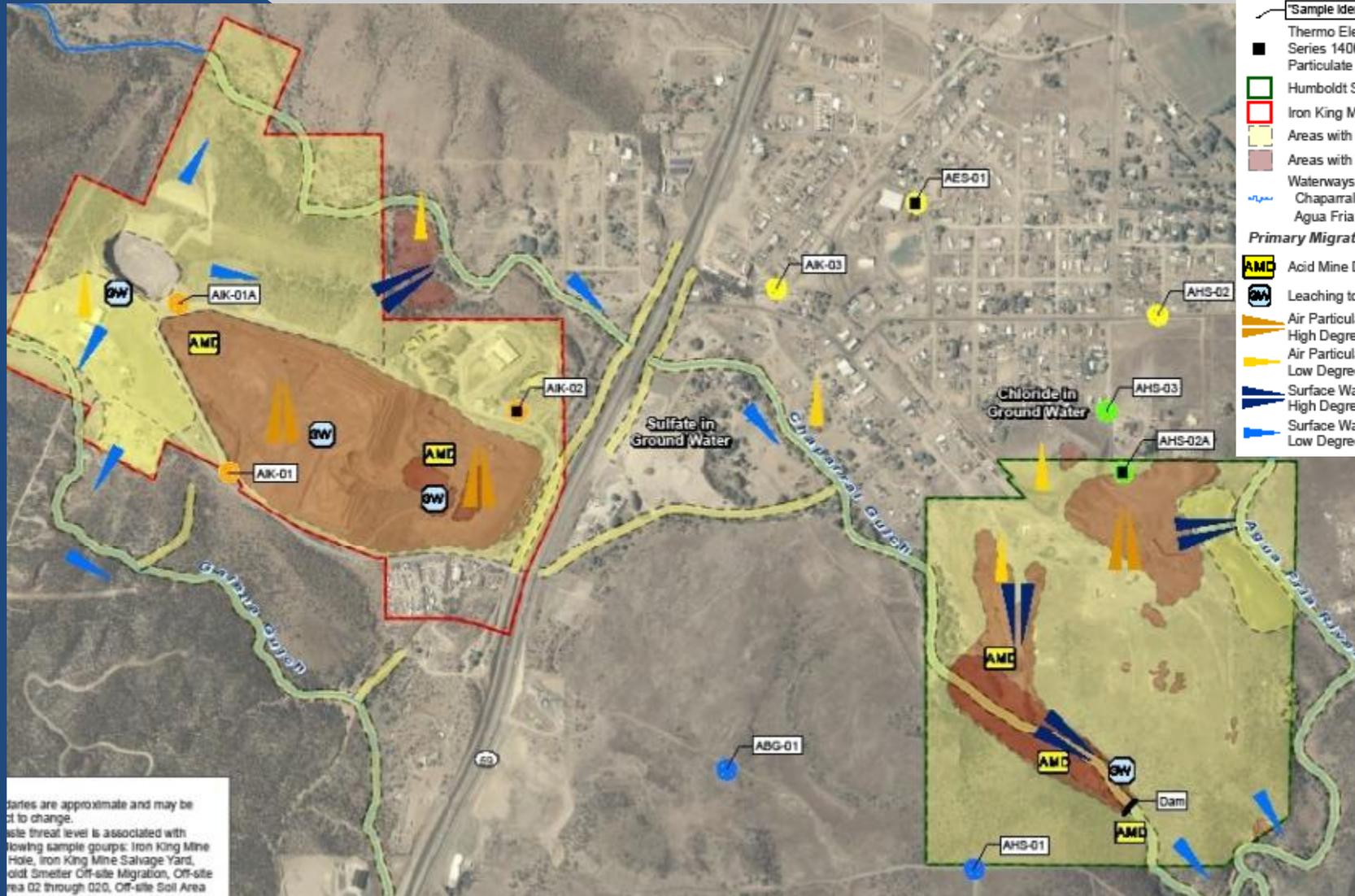
Soil Type	Average Arsenic (ppm)	Average Lead (ppm)
Background Soil Type 1	48	79
Background Soil Type 2	13	10
Background Soil Type 3	12	13
EPA Screening Level	0.39/22	400
AZ Soil Remediation Level	10	400

- EPA is collecting more background samples to verify concentrations in Soil Type 1, numbers may change.

Source Areas

- Contain high levels of contamination
 - › Chemicals of Concern: arsenic, lead, sulfate
- Contamination can move to other areas
 - › Residential neighborhood
 - › Groundwater aquifer
 - › Rivers and gulches
- Mechanisms for migration
 - › Air
 - › Surface Water
 - › Groundwater

Source Areas



Legend

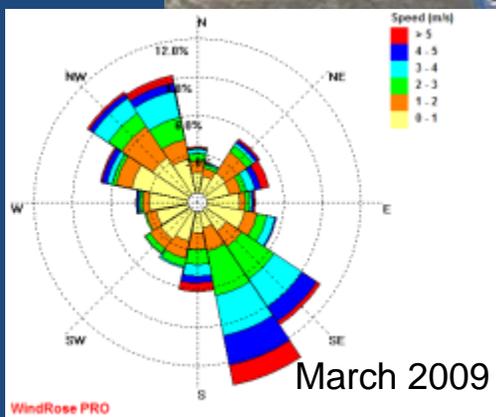
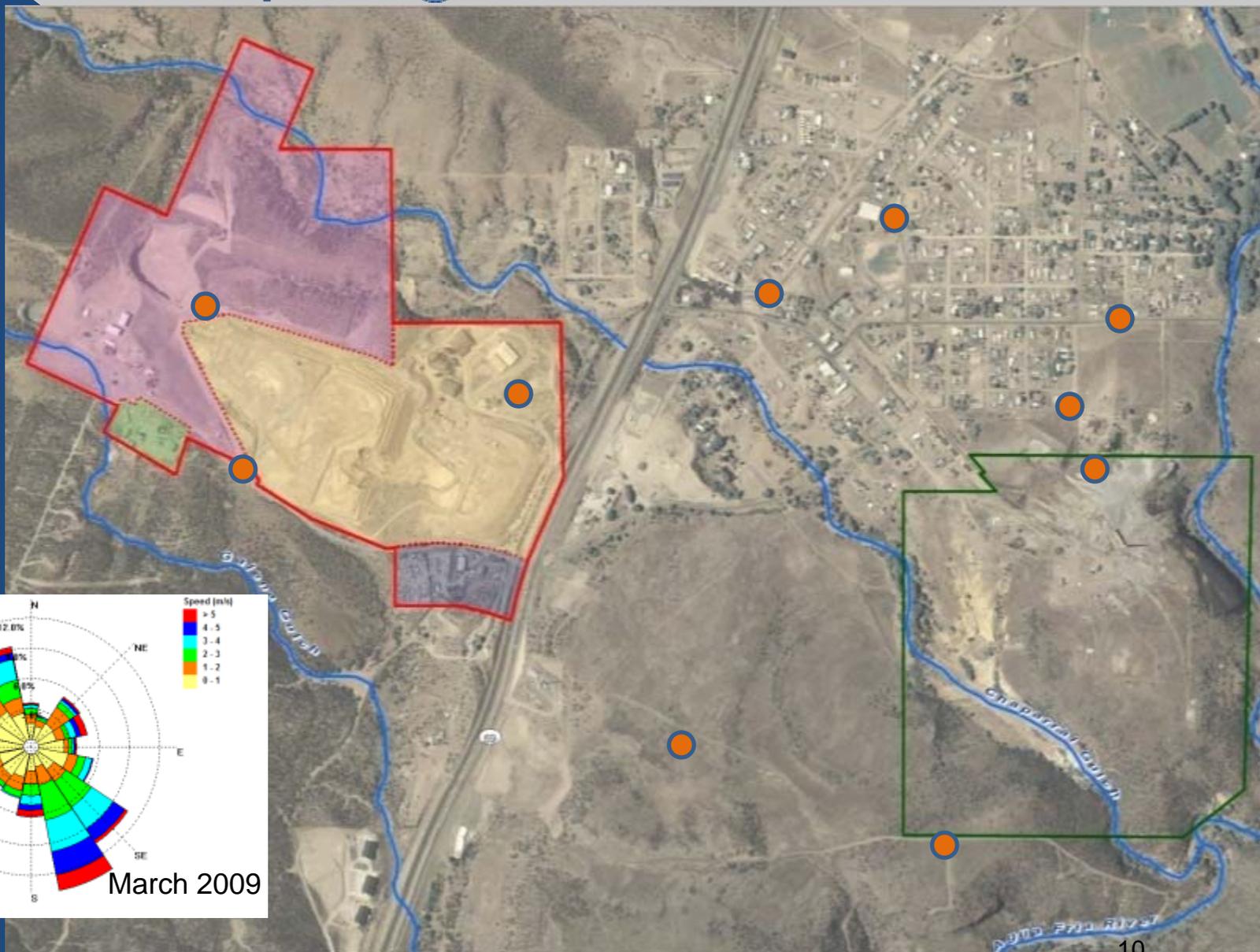
- Iron King Mine Air Sampling Location
- Humboldt Smelter Air Sampling Location
- Humboldt In-Town Air Sampling Location
- Background Air Sampling Location
- "Sample Identification"
- Thermo Electron TEOM Series 1400a Continuous Particulate Monitor Location
- Humboldt Smelter
- Iron King Mine
- Areas with Low-Level Threat Waste
- Areas with Principal Threat Waste
- Waterways
Chaparral Gulch, Galena Gulch, Agua Fria River
- Primary Migration Pathways**
- Acid Mine Drainage
- Leaching to Ground Water
- Air Particulate, High Degree of Severity
- Air Particulate, Low Degree of Severity
- Surface Water, High Degree of Severity
- Surface Water, Low Degree of Severity

Boundaries are approximate and may be subject to change.
 The highest threat level is associated with following sample groups: Iron King Mine Hole, Iron King Mine Salvage Yard, Humboldt Smelter Off-site Migration, Off-site Area 02 through 02G, Off-site Soil Area 02 through 02G, Off-site Soil Area 02 through 02G.

Primary Source Areas

Source Area	Avg. Arsenic (ppm)	Avg. Lead (ppm)
Iron King Mine Impoundment	4,430	3,830
Iron King Mine Main Tailings Pile	3,100	2,380
Humboldt Smelter Tailings Pile	1,320	577
Small Tailings Pile	572	683
Lower Chaparral Gulch	370	454
Humboldt Smelter Ash Pile	167	822
Humboldt Smelter Impoundment	45.3	561
Background	48	79
EPA Screening Level	0.39/22	400
AZ Soil Remediation Level	10	400

Air Sampling



Dust in Air

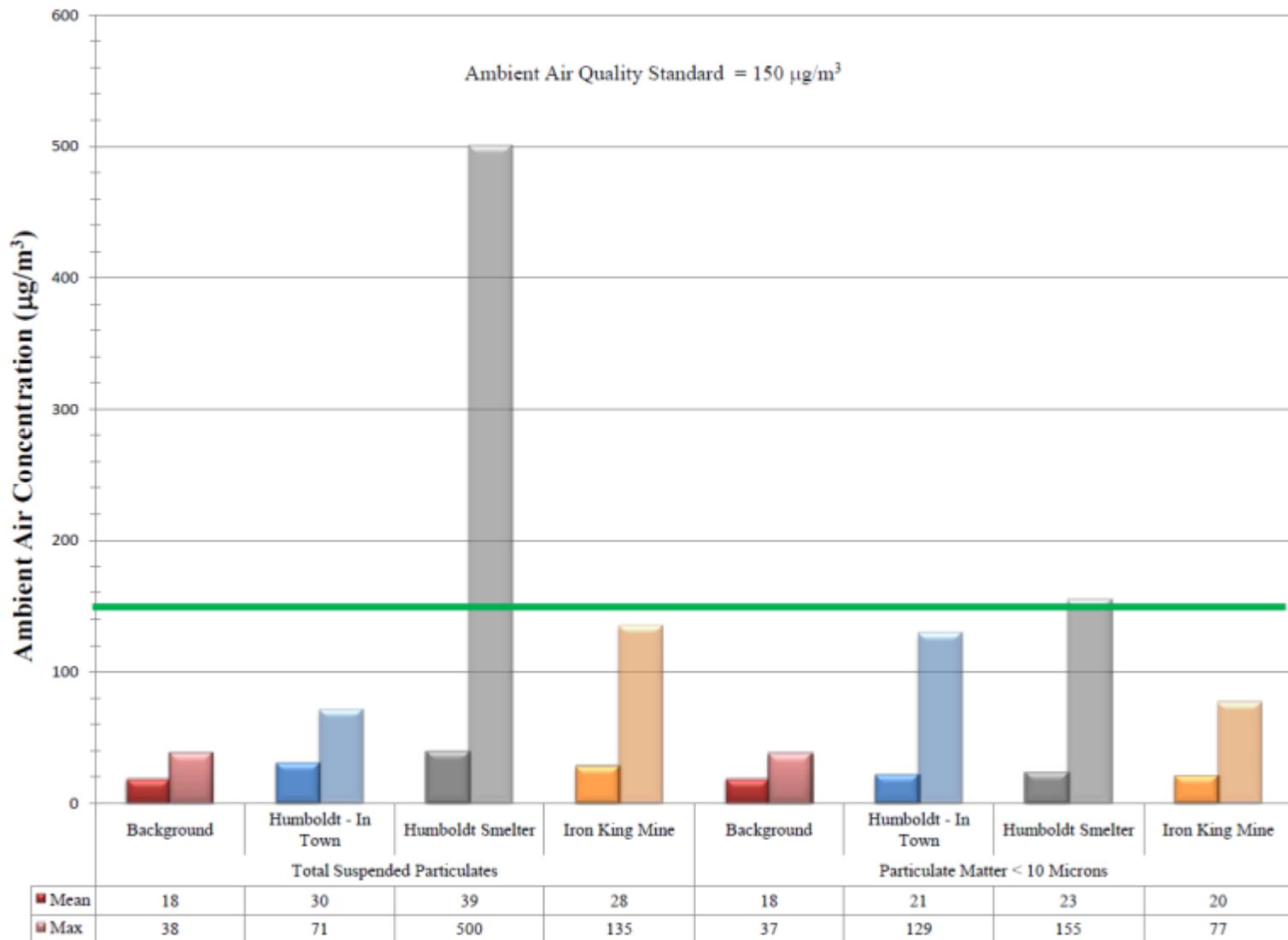
- Peak dust events
 - March, April, July, August
 - Peak dust events correlate with high wind speeds



- Short duration:
4 to 8 hours

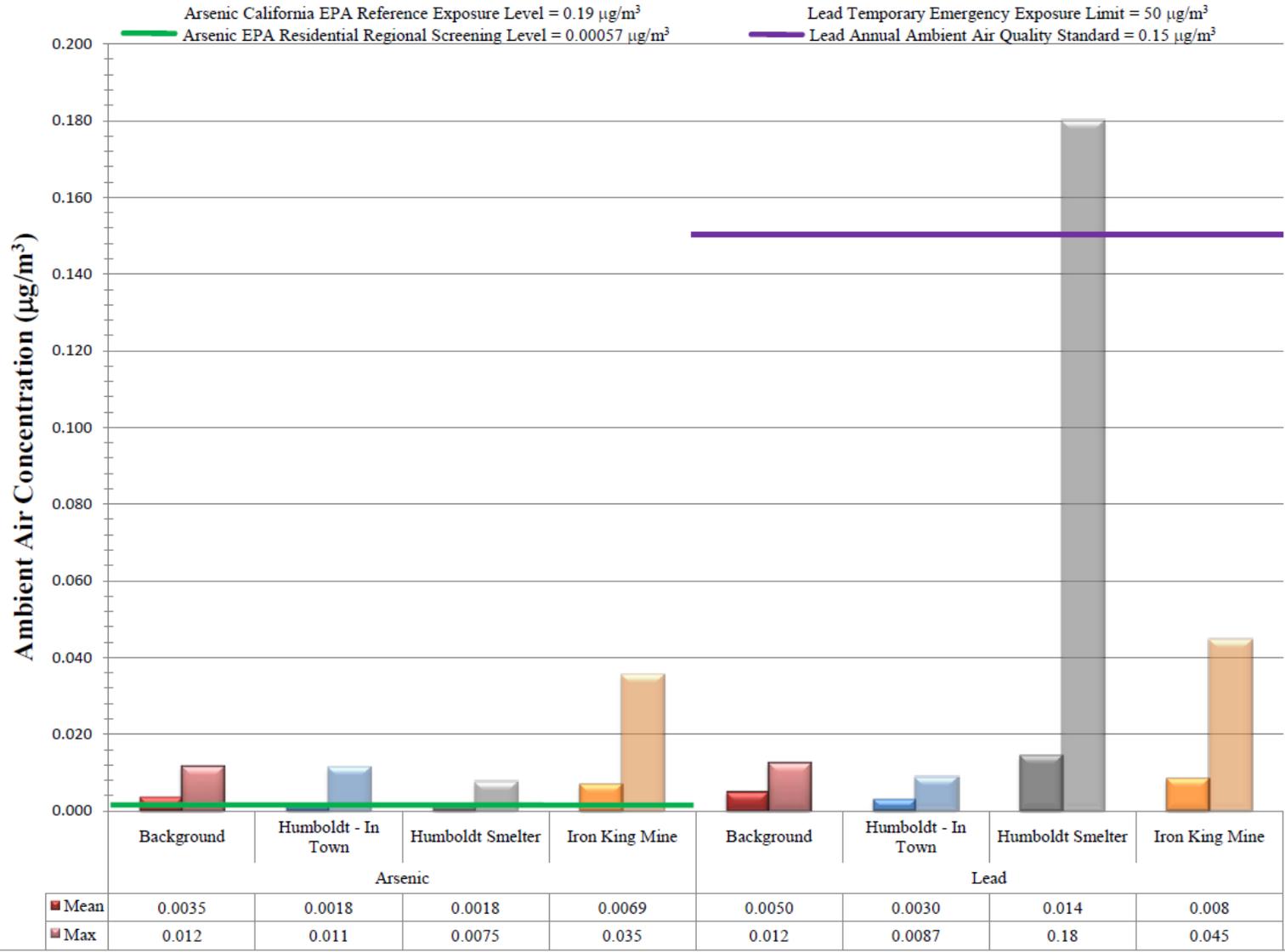
Dust in Air

Figure 5-66 - Particulate Ambient Air Concentrations



Metals in Air

Figure 5-67 - Arsenic and Lead Ambient Air Concentrations



Waterways



Agua Fria River

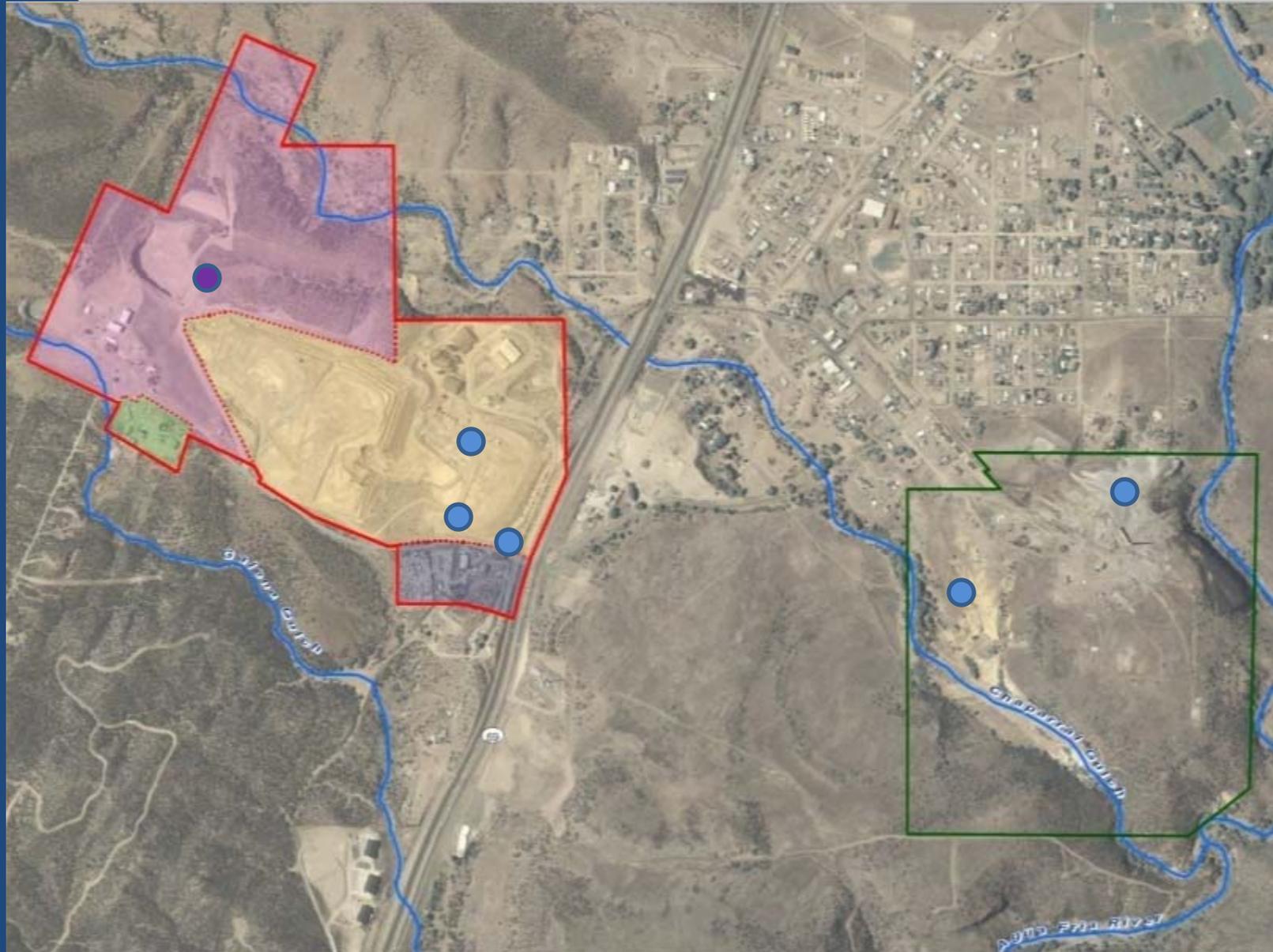
	Soil or Sediment (ppm)	
	Avg. Arsenic	Avg. Lead
Lower CG	370	454
Middle CG	204	241
Upper CG	130	146
Agua Fria River	92.9	349
EPA Screening Level*	0.39/22	400
AZ Soil Remediation Level*	10	400



Chaparral Gulch

*Human Health screening levels.

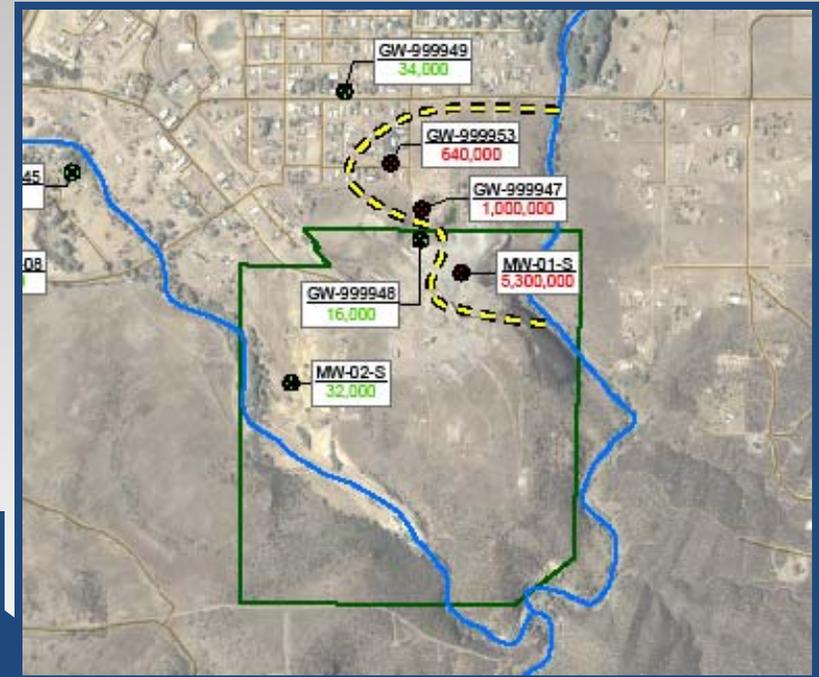
Groundwater Wells



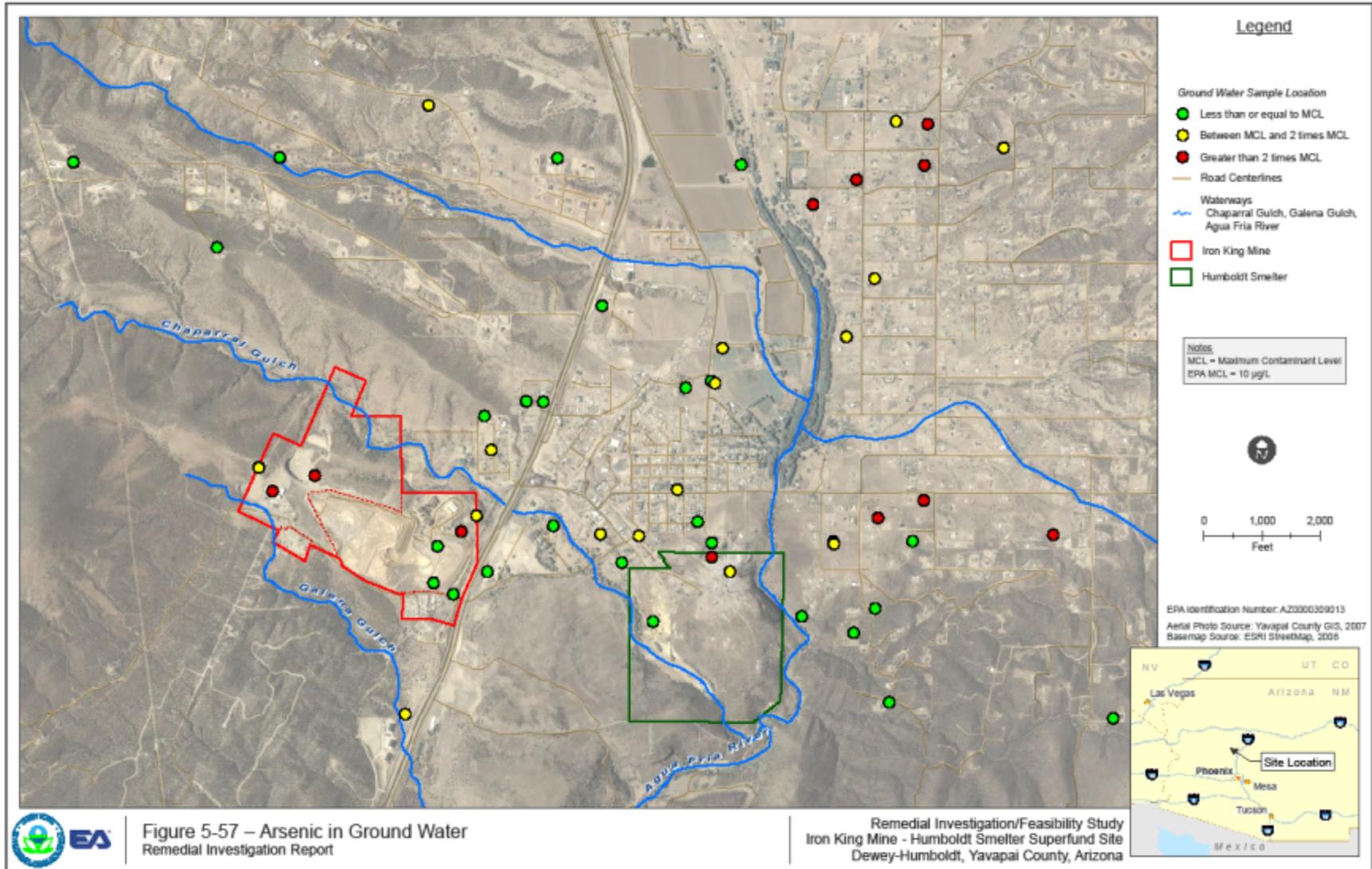
Groundwater

Chloride

Sulfate



Arsenic in Groundwater



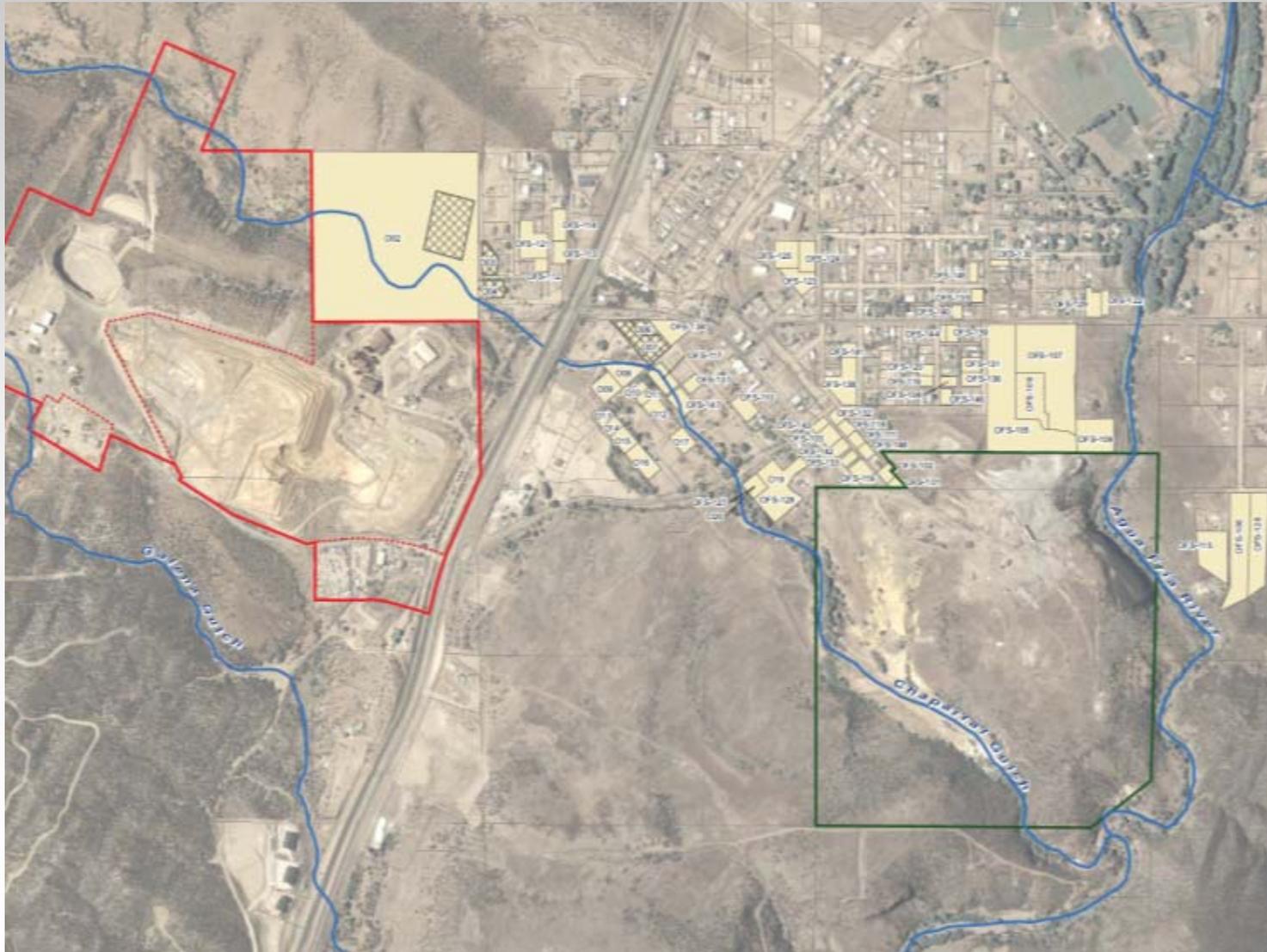
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Arsenic in Private Wells

- Exposure over many years above the standard can cause:
 - > skin damage, problems with circulatory system, may increase risk of getting cancer
- EPA encourages residents with private wells to sample for arsenic and install treatment systems, if needed.
- List of licensed labs available at the information table



Sampled Residential Areas



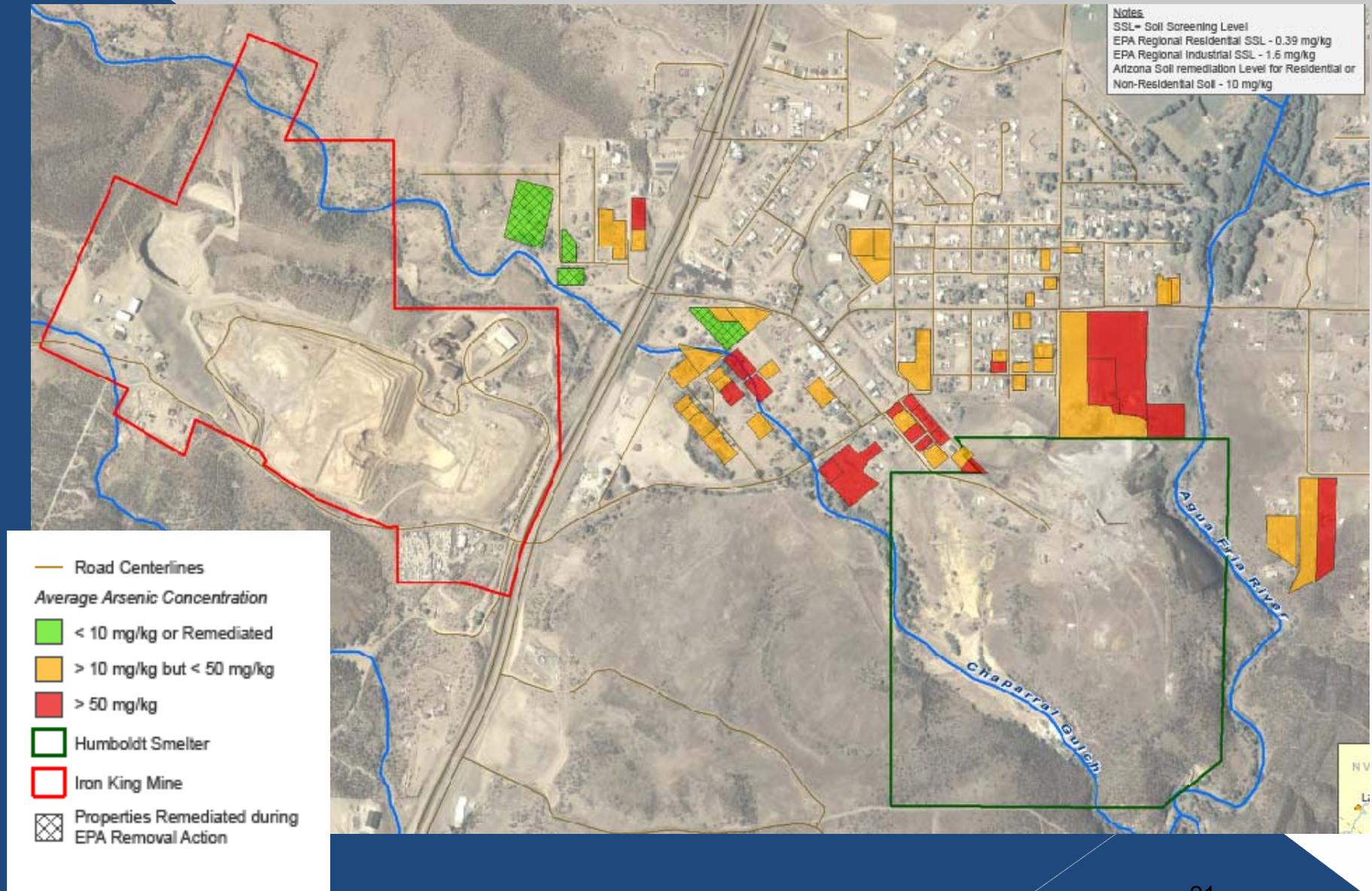
Residential and Public Soils

	Arsenic (ppm)	Lead (ppm)
Minimum	1.8	0.37
Maximum	679	4,090
Background	48	79
EPA Screening Level	0.39/22	400
AZ Soil Remediation Level	10	400



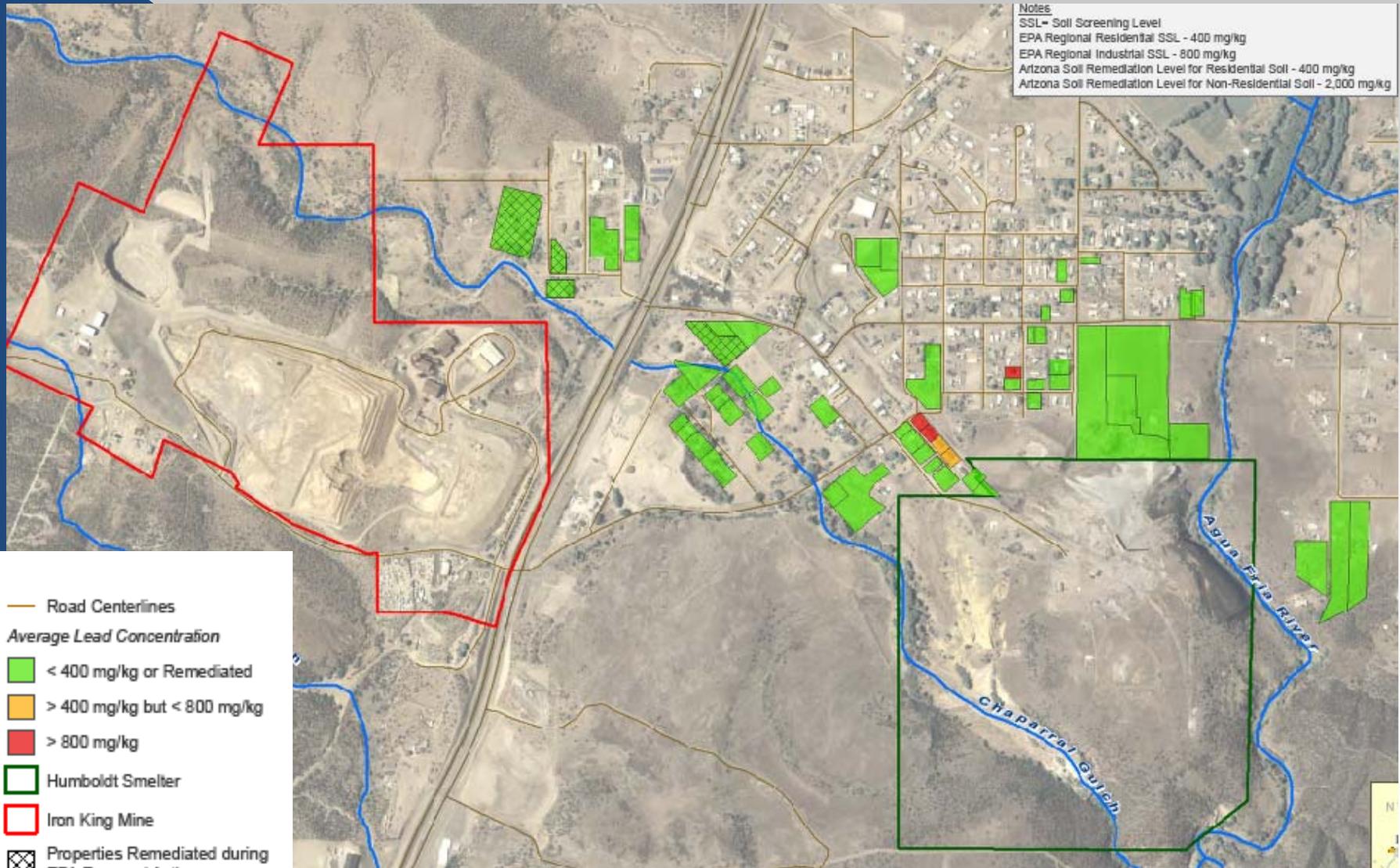
- 24 parcels over background arsenic levels
- 44 parcels over background lead levels
- Impacts are primarily limited to the top few inches
- Humboldt Elementary School playground has levels near background.

Residential Soils - Arsenic



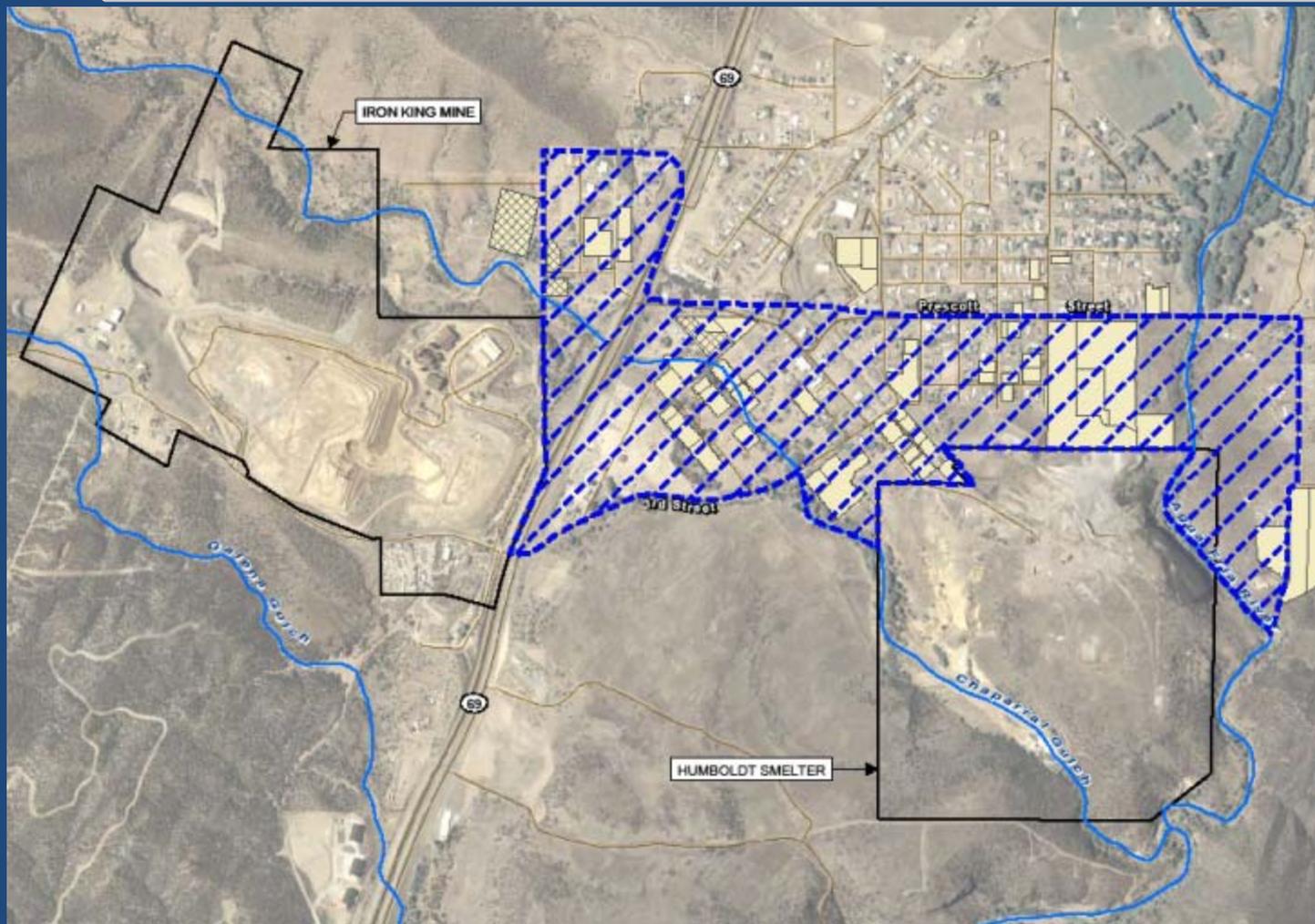
Residential Soils - Lead

Notes
SSL- Soil Screening Level
EPA Regional Residential SSL - 400 mg/kg
EPA Regional Industrial SSL - 800 mg/kg
Arizona Soil Remediation Level for Residential Soil - 400 mg/kg
Arizona Soil Remediation Level for Non-Residential Soil - 2,000 mg/kg



- Road Centerlines
- Average Lead Concentration**
- < 400 mg/kg or Remediated
- > 400 mg/kg but < 800 mg/kg
- > 800 mg/kg
- Humboldt Smelter
- Iron King Mine
- ▣ Properties Remediated during EPA Removal Action

Residential Sampling Area



A Risk Assessment Is:

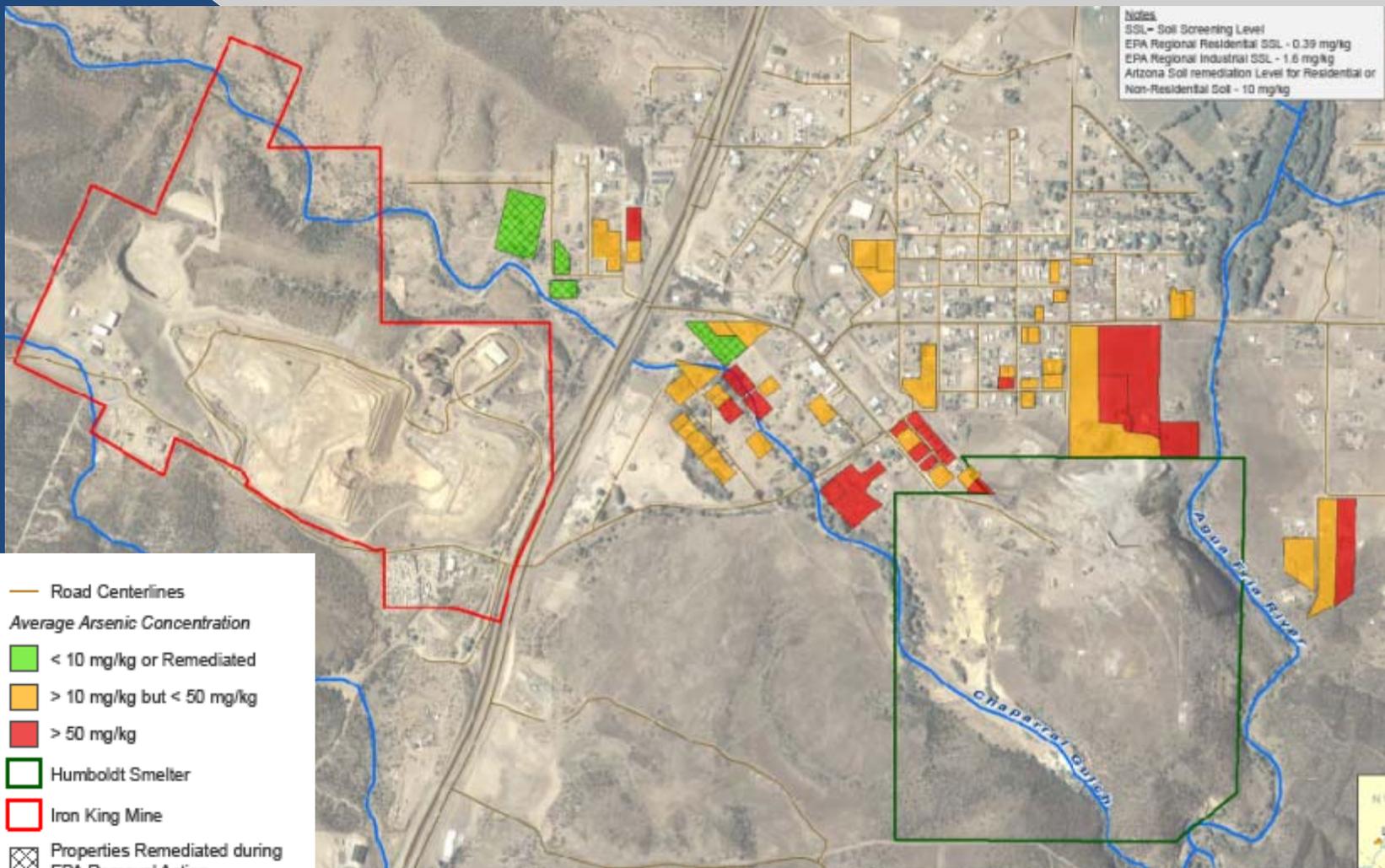
- A comprehensive study of the various ways persons might be in contact with site contamination
- Calculation of how likely it is that human health effects might occur in the **future** because of the contamination
- A way for EPA to determine whether areas need some sort of cleanup action

Risk Assessment Questions

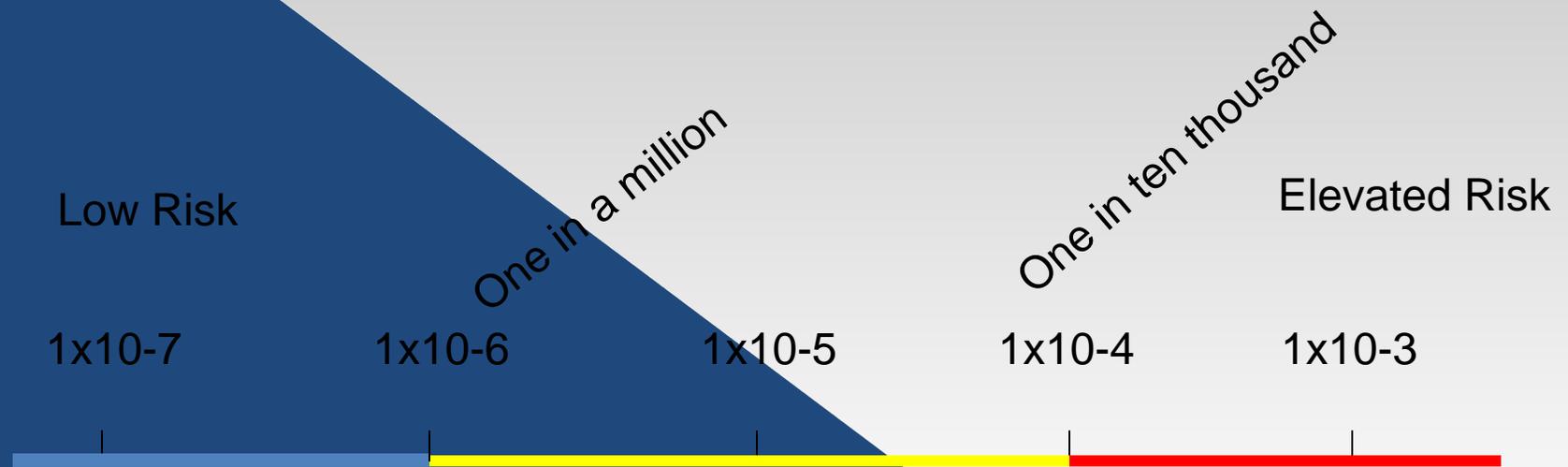
- How are people exposed to site contamination?
- Who is at risk?
- How often are they exposed?
- What is the concentration to which they are exposed?



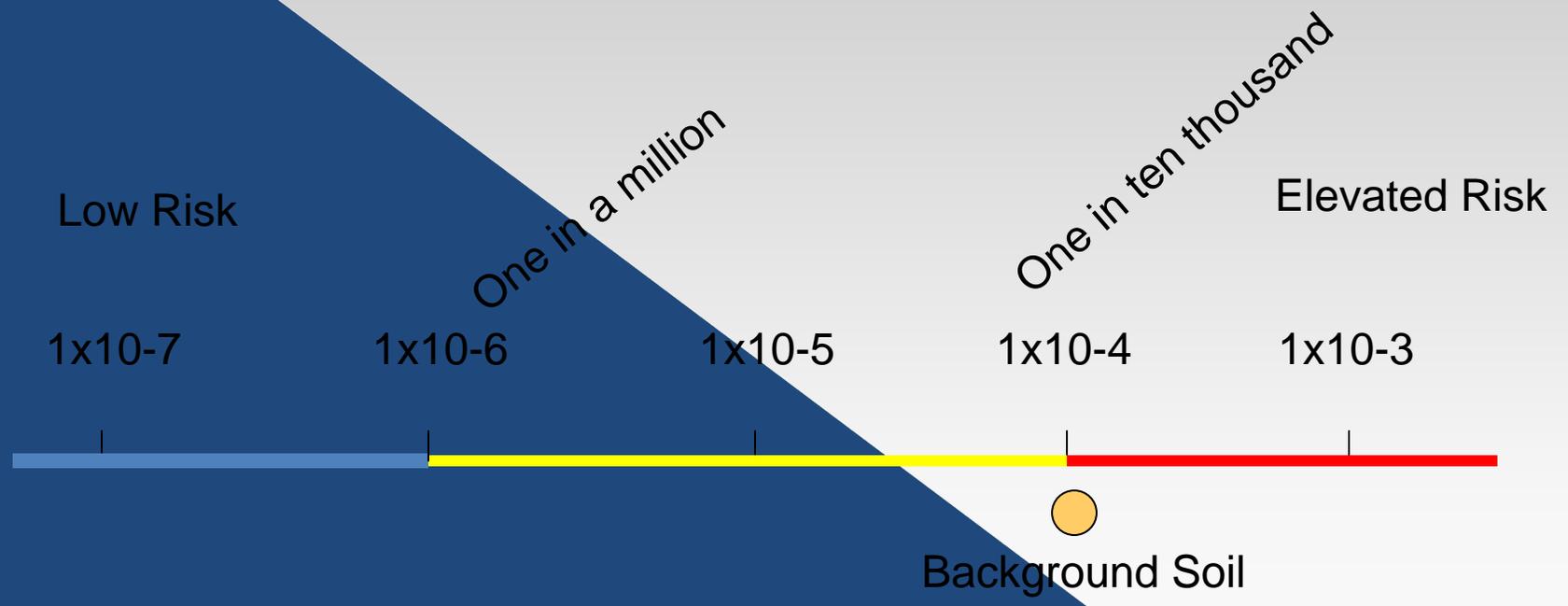
Risks in Residential Areas



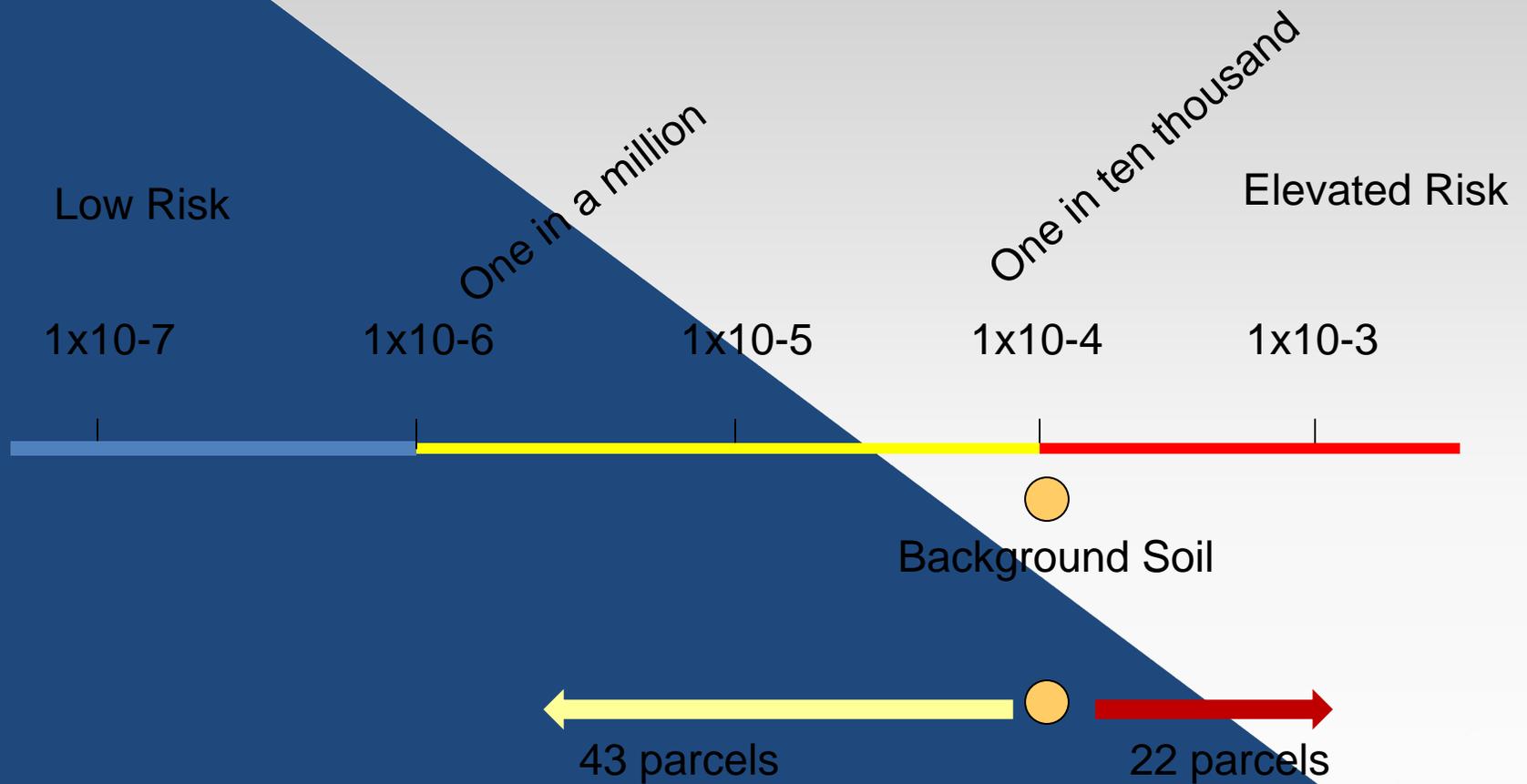
Risk Analysis Cancer



Risk Analysis Cancer

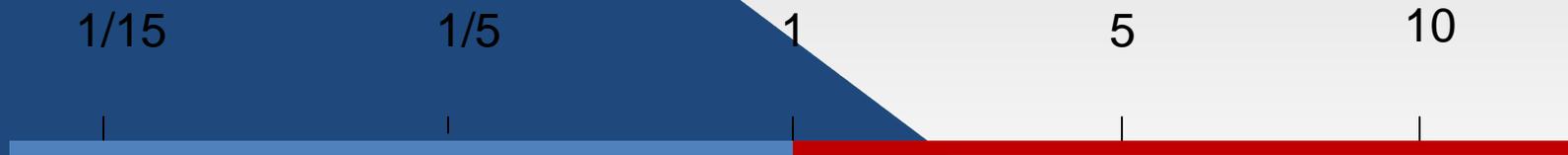


Risk Analysis Cancer – Residential Soils



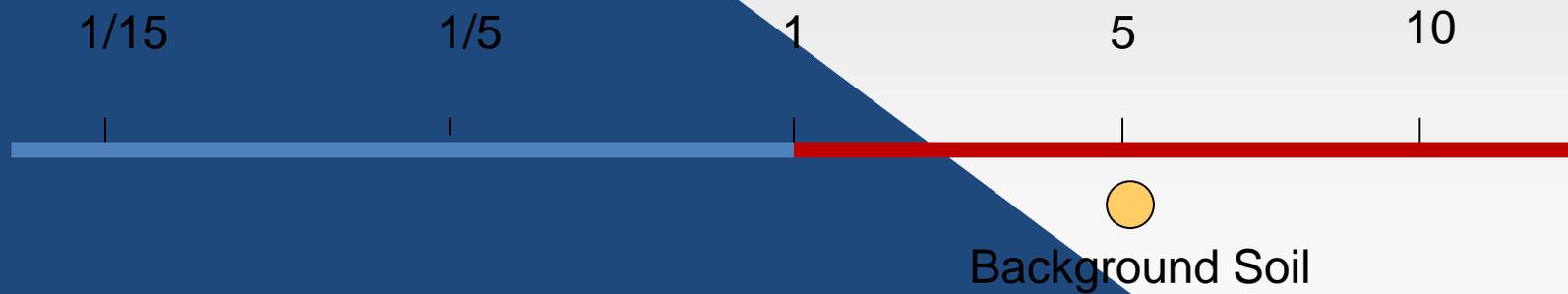
Risk Analysis Non-Cancer

Hazard Index



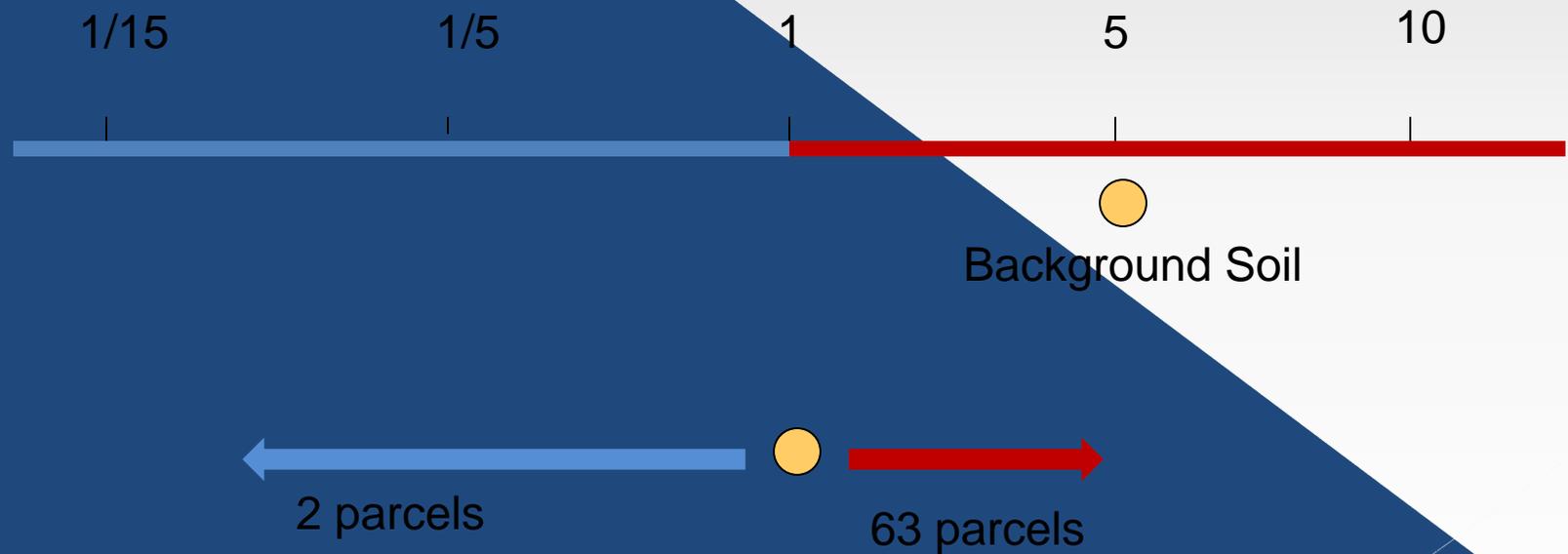
Risk Analysis Non-Cancer

Hazard Index



Risk Analysis Non-Cancer – Residential Soils

Hazard Index





Eco-Risk Assessment



- Iron King Mine and Humboldt Smelter areas pose risks to all ecological groups
 - Terrestrial plants and invertebrates, aquatic and benthic organisms, mammals, birds, reptiles, and amphibians
- Potential risks to ecological groups:
 - Agua Fria River (relatively healthy habitat)
 - In-Town Areas (poor habitat)



Site Timeline

NPL Listing	Remedial Investigation	Feasibility Study	Proposed Plan & Record of Decision	Remedial Design	Remedial Action
Sept 2008	March 2010	Underway	2011	2011-12	2013-15



Site is here

Feasibility Study

- ◉ Rank cleanup options based on the following criteria:
 - Protection of human health and the environment
 - Compliance with state and federal requirements
 - Long-term effectiveness and permanence
 - Reduction of toxicity, mobility, or volume
 - Short-term effectiveness
 - Implementability
 - Cost



Proposed Plan

- EPA proposes a preferred cleanup option
- Public comment period & public meeting
- EPA prepares a response to public comments
- Evaluate community and state acceptance of the preferred cleanup option



Next Steps

- Residential yard sampling: May 2nd – 14th
- Private well sampling: May 6th – 13th
- Additional background sampling: May 2nd
- Dust suppression activities for source areas
- Engineering Evaluation: TBD

Until Cleanup Occurs...

- Avoid contact with source areas
- Pay attention to EPA caution signs
- Avoid dust clouds during windy days
- EPA encourages well owners to test their water for arsenic and install treatment devices, if needed



Technical Assistance Grant (TAG)

- Funding for a technical advisor
- \$50,000 per grant, can be renewed
- One TAG per Superfund site, managed by a community group
- Ashley Preston has notified EPA of her intent to form a group and apply for the TAG
- Ashley's contact info: dhsmelter@gmail.com



TAG Process

- Multiple groups may want to apply for a TAG
- EPA notifies the community about the TAG request, explains process and identifies deadlines
- 30-day “clock” begins for any group to identify its interest in receiving the TAG to EPA and to work with Ashley on a TAG application
- After the deadline, if other groups wish to submit their own application, EPA notifies the community and starts a second 30-day “clock” for receipt of multiple applications

TAG Process

- EPA will award the TAG to the group that:
 - › Best represents the community
 - › Shows the highest capacity to manage the TAG and to share information with the community

- TAG information and application forms are located online:

www.epa.gov/superfund/community/tag/resource.htm

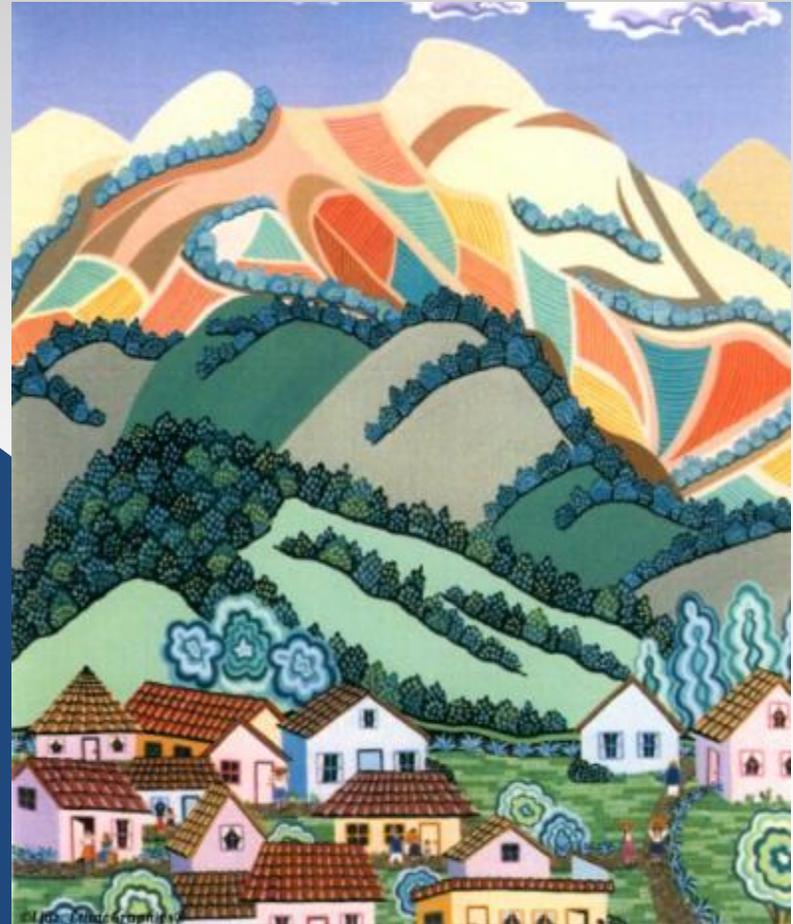
Community Advisory Group (CAG)

- A self-forming community forum that meets regularly to provide input into the cleanup process
- A CAG should include a diverse cross-section of the community, if possible



CAG

- ◎ EPA can provide support to the group, such as:
 - > renting meeting space
 - > advertising CAG meetings
 - > providing copies of cleanup documents
 - > making presentations on site activities



Community Advisory Group



- Ashley Preston has offered to be a point of contact for those who want to form a CAG
- Ashley's contact info: dhsmelter@gmail.com
- Information about the CAG is located at:
www.epa.gov/superfund/community/cag/whatis.htm

Community Involvement

- EPA will continue its own Community Involvement Program as identified in the Community Involvement Plan
- EPA's program includes:
 - › Public meetings
 - › Fact Sheets
 - › Documents in the Town Library and on line
 - › Notices in the Town Newsletter
 - › Presentations to the Town Council
 - › Public Notices in local newspapers



Agua Fria Day, 2009

Contact Information

EPA Contacts

Leah Butler

(415) 972-3199

butler.leah@epa.gov

David Cooper

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cooper.david@epa.gov

Toll free: (800) 231-3075

EPA Website:

www.epa.gov/region09/ironkingmine



Iron King Mine and Humboldt Smelter Superfund Site

Arizona Department of Environmental Quality (ADEQ)
Brian Stonebrink, Superfund Project Manager

ADEQ Mission Statement- To Protect Human Health
and the Environment

Roles and Responsibilities

- Service the Community & Work with the Town of Dewey-Humboldt
- Attend Dewey-Humboldt Town Council Meetings
- Other Programs - Include Voluntary Remediation Program, Solid Waste, Tanks, Water & Air
- ADEQ works with Community Groups for other Superfund sites and we encourage community participation

Support Role

- ADEQ provides support to EPA
- Our Role is to be the voice for the State's Interests
- ADEQ Website www.adeq.gov
- Site Narrative
<http://www.azdeq.gov/environ/waste/sps/statesites.html#ironking>

Contact Information

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Community Involvement Coordinator, ADEQ
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The University of Arizona Superfund Research Program: Who We Are & What We Do



Monica D. Ramirez, MPA, Research Translation Coordinator
PhD Candidate, Department of Soil, Water and Environmental Science

The University of Arizona

USEPA meeting, Dewey-Humboldt, Arizona, April 27, 2010

Today's Outline

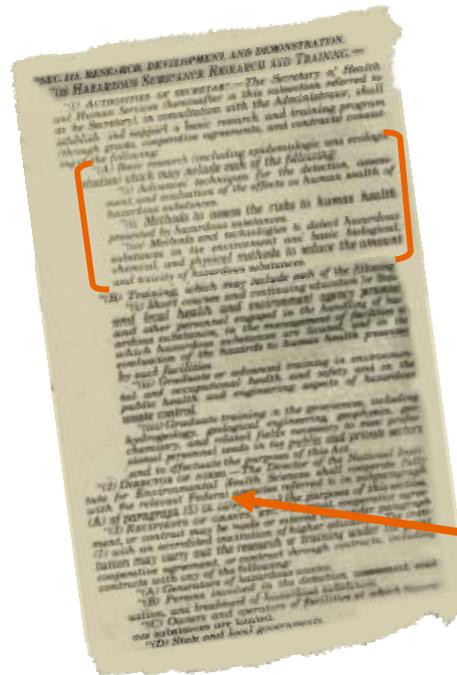
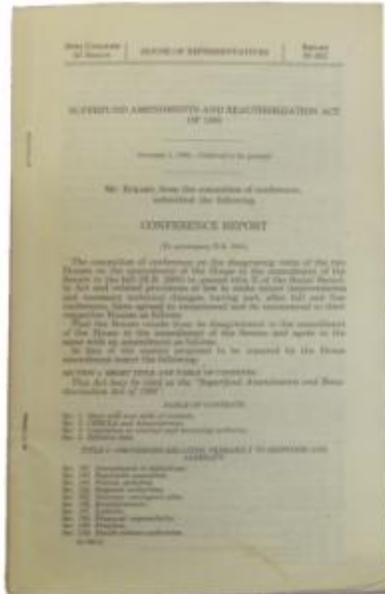
- Introduction to:
 - The University of Arizona Superfund Research Program
 - Current University of Arizona research at Iron King and Humboldt Smelter Superfund Site
- Introduction to *Gardenroots*
 - Background
 - Objectives
 - Project Design
- How to Join *Gardenroots*



Agua Fria Community Festival, October 10, 2009

Introduction: Superfund Research Program

- Superfund Amendment Reauthorization Act (1986), section 311(a): calls for creation of university-based research program --> Superfund Research Program



Under direction of
National Institute of
Environmental Health
Sciences



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are needed to see this picture.



UA Superfund Research Program

- **Mission: Improve Public Health through research and education**
 - Explain the relationship between exposure and disease
 - Reduce the uncertainty of risk
 - Develop efficient and cost-effective site assessment and cleanup strategies
- Investigates hazardous waste and public health issues currently confronting the southwestern U.S

UA SRP Research Efforts at Iron King Mine and Humboldt Smelter Site



As a result of the crushing and grinding (milling) processes, the large pieces of rocks are turned into small particles leading to **Mine tailings:**

- Large piles of crushed rock that are left over after the minerals of interest (lead, zinc, copper, silver, gold, etc.) have been extracted.
- Mine tailings consist of desired metals left behind and unwanted minerals

Characteristics of Iron King Tailings - Jon Chorover



0-12 inches down

- Extremely acidic, pH 2.5-4.0
- Water content = 10% - 14%
- Electrical Conductivity = high

12-24 inches down

- Moderately acidic, pH 4.5-6.5
- Water content = 9% - 13%
- Electrical Conductivity = high

Revegetation of the tailings will be
challenging due to the conditions above

Phytostabilization Potential of the Iron King Mine Tailings - Raina Maier



Phytostabilization = use of plants to cover mine tailings to reduce movement by wind and water

- Greenhouse studies has identified four native plants:



Mesquite



Quail Bush



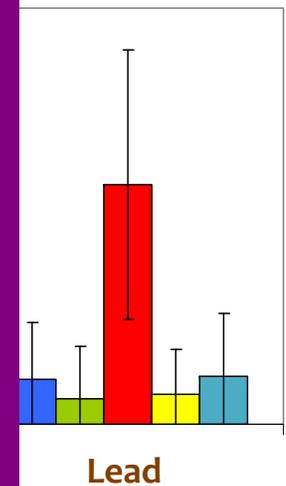
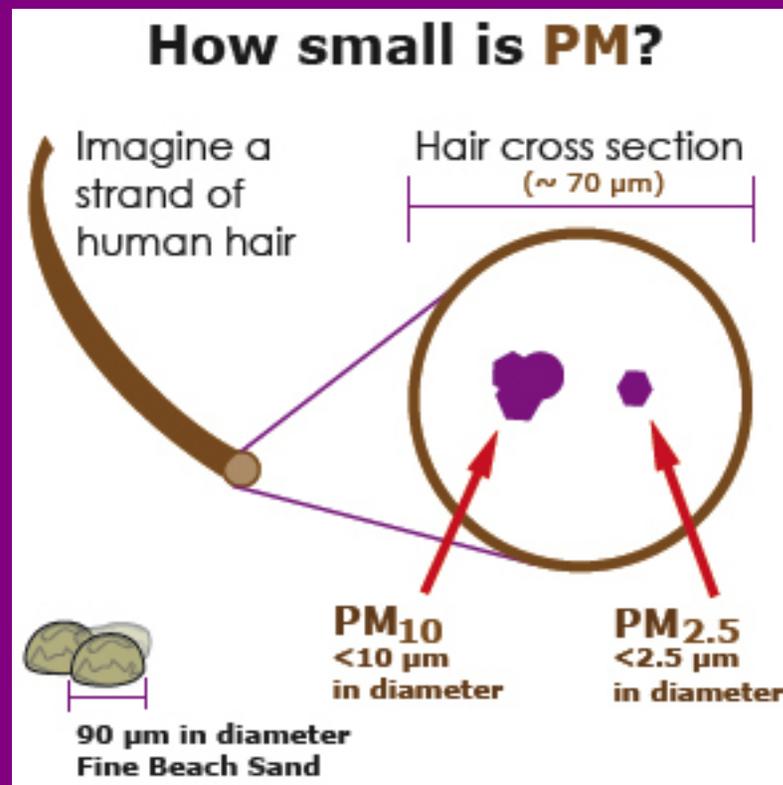
Catclaw Acacia



Buffalo Grass

- 15% compost is the minimum required to support plant growth
- May 2010 - Field trial begins at Iron King Mine and Humboldt Smelter Superfund Site

Characterization of Wind Blown Dust - Eric Betterton





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Want to learn more about your garden and soil quality?
Join real-world research and foster connections for sharing ideas and resources

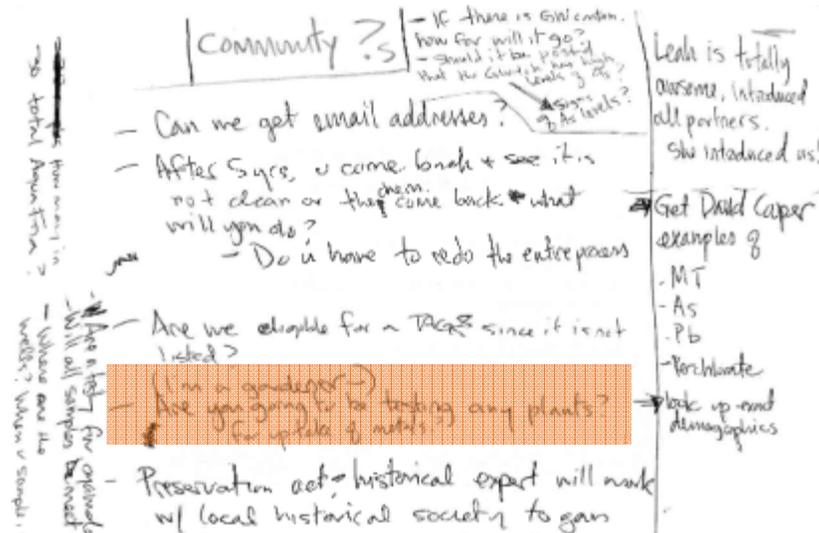
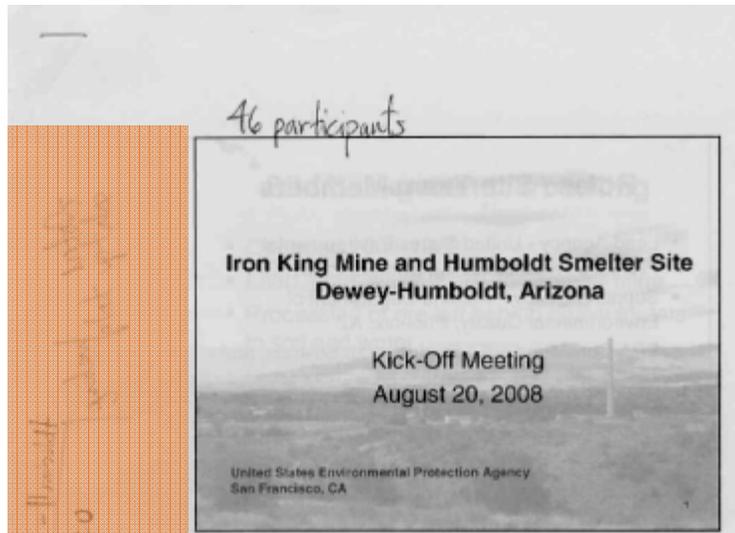
gardenroots

The Dewey-Humboldt, Arizona Garden Project

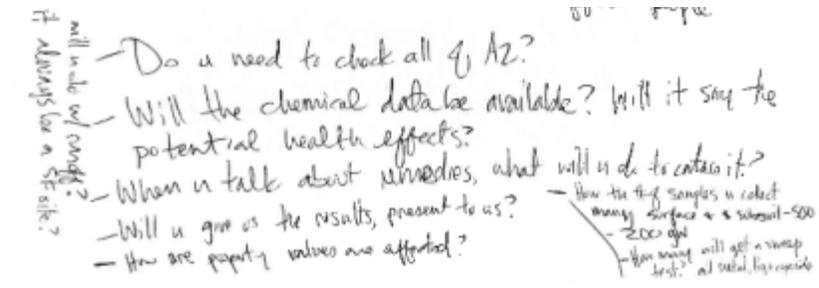
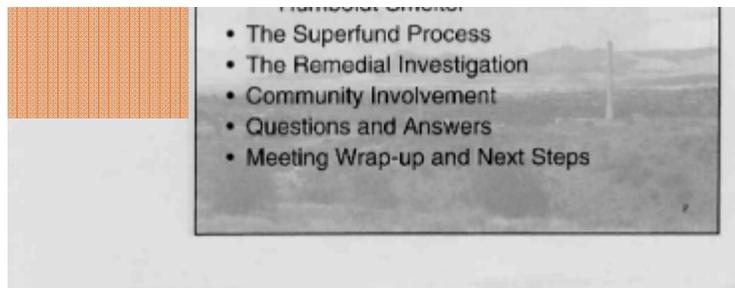


Monica Ramirez

Gardenroots Background



Gardenroots was initiated in response to your research interests



Gardenroots Background

- **Build a Citizen Science Program** where gardeners participate in, and contribute to the collection of data while increasing their own personal scientific knowledge
- **Co-design the educational materials** to explain and illustrate the methodology and results of the project to others in community

Definition of Citizen Science -
“A form of science that relates in reflexive ways to the concerns interests, and activities of citizens as they go about their everyday Business.”

– Jenkins, 1999



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Gardenroots Objectives

- **Together, we will determine:**
 - The metal and nutrient content of the vegetables grown in Dewey, AZ and Humboldt, AZ gardens.
 - The metal and nutrient content of the vegetables grown in the Iron King Mine tailings.
 - Design the educational materials to explain and illustrate the methods and results of the project to others in the community.



Gardenroots Project Design

1. Recruit gardeners!
2. Host training sessions and handout sampling toolkit.
3. Citizen scientist's send samples to UA laboratory.
4. UA analyzes samples and hosts "Laboratory Open House" for citizen scientists.
5. Share results and together, begin the co-designing process of educational materials.



Photo source: sunset.com



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TIFF (Uncompressed) decompressor
are needed to see this picture.



How to Join *Gardenroots*?

- Sign up today!
- Call me: 520.260.6620
- Email me: mdramire@email.arizona.edu
- Attend training sessions, first one in July/August 2010 - Sign up today!



Thank You!

