



**Motorola 52nd Street Superfund Site
Community Information Event**



Thursday, September 17, 2009

6:30 p.m. to 8:30 p.m.

GateWay Community College, MA 1110N
108 North 40th Street
Phoenix, Arizona

OU#10-032

Arizona Department of Environmental Quality (ADEQ) and Environmental Protection Agency (EPA) sponsored a community meeting at GateWay Community College with the topic of health risks, assessments and consultation. There were three speakers, Mr. Gerald Hiatt from EPA, "Risk Assessment in Superfund"; Jeanene Hanley ADEQ, "Exposure Pathways and You"; and Jennifer Botsford, Arizona Department of Health Services, "Heath Consultation: What they are and how they are used." Please see the presentations below.

ADEQ then provided a brief review of the recently signed Consent Decree for the OU1 Treatment plant. A question and answer session followed covering topics from all presentations.

If you require further information regarding this event, please contact Wendy Flood, (602) 771-4410.

Health Consultation: What they are and how they are used

Jennifer Botsford

Office of Environmental Health

Arizona Department of Health Services



Leadership for a Healthy Arizona

ADHS Risk Assessment & Health Consultation Program Goal

- To protect human health from exposure to:
 - Hazardous Substances
 - Waste Sites
 - Unplanned Releases
 - Other Sources
 - In Collaboration With
 - Federal (e.g. ATSDR, EPA)
 - Other State (e.g. ADEQ)
 - Local Agencies



How Do We Determine If a Site Poses a Risk to Human Health?

- Public Health Assessments/Consultations
- Determine the presence, and amount of toxic chemicals
- Examine routes of human exposure (air,soil,water,food)
- Calculate the human daily intake of toxic chemicals and the harm they could cause
- ID Sensitive groups/children

Activities

- Public Health Assessments
 - Looks at all media and exposure routes
- Public Health Consultations
 - Addresses specific concerns/questions, usually one media or exposure route
- Health Education & Community Meetings

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Federal Superfund Laws

- Explain EPA's and ATSDR's roles
 - 1980: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), aka Superfund Law
 - 1984: Amendments to the Resource Conservation and Recovery Act of 1976 (RCRA)
 - 1986: Superfund Amendments and Reauthorization Act (SARA)
- ATSDR (or the cooperative agreement state) must produce a Public Health Assessment Document within one year of a site listed on the National Priorities List (NPL)

Risk Assessment and Health Consultation Program

- Funding
 - Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR)
- Purpose
 - Determine public health implications associated with hazardous waste sites and other environmental releases
- Limitations
 - ADHS does not perform environmental sampling nor does ADHS have regulatory authority.

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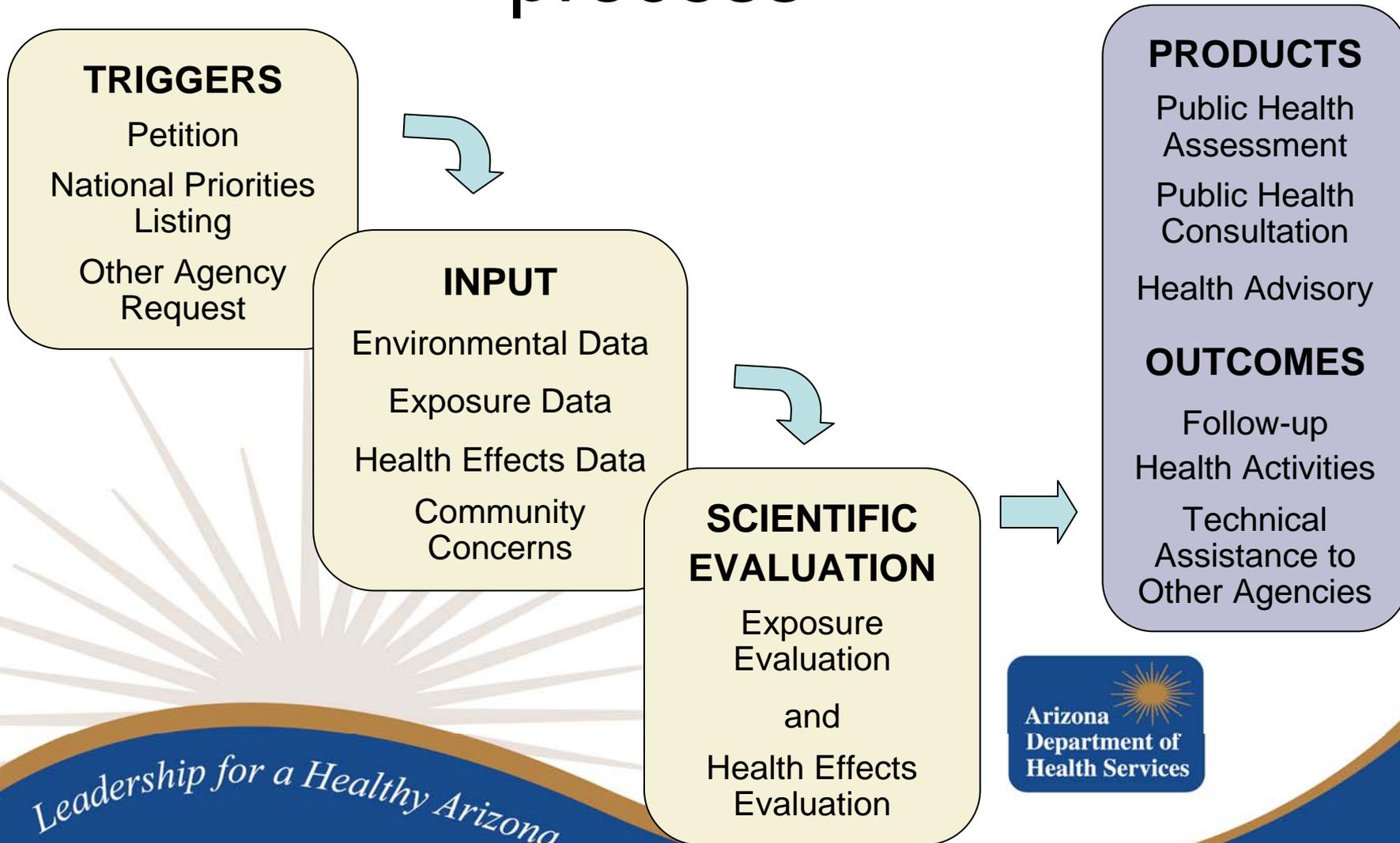
Public Health Assessment (PHA) Process

- Find out whether people have been, are being, or may be exposed to hazardous substances
- If so, whether that exposure is harmful or potentially harmful, and should therefore be stopped or reduced.
- Develops health advisories or recommendations
- Identifies needs to evaluate, mitigate, or prevent human health effects

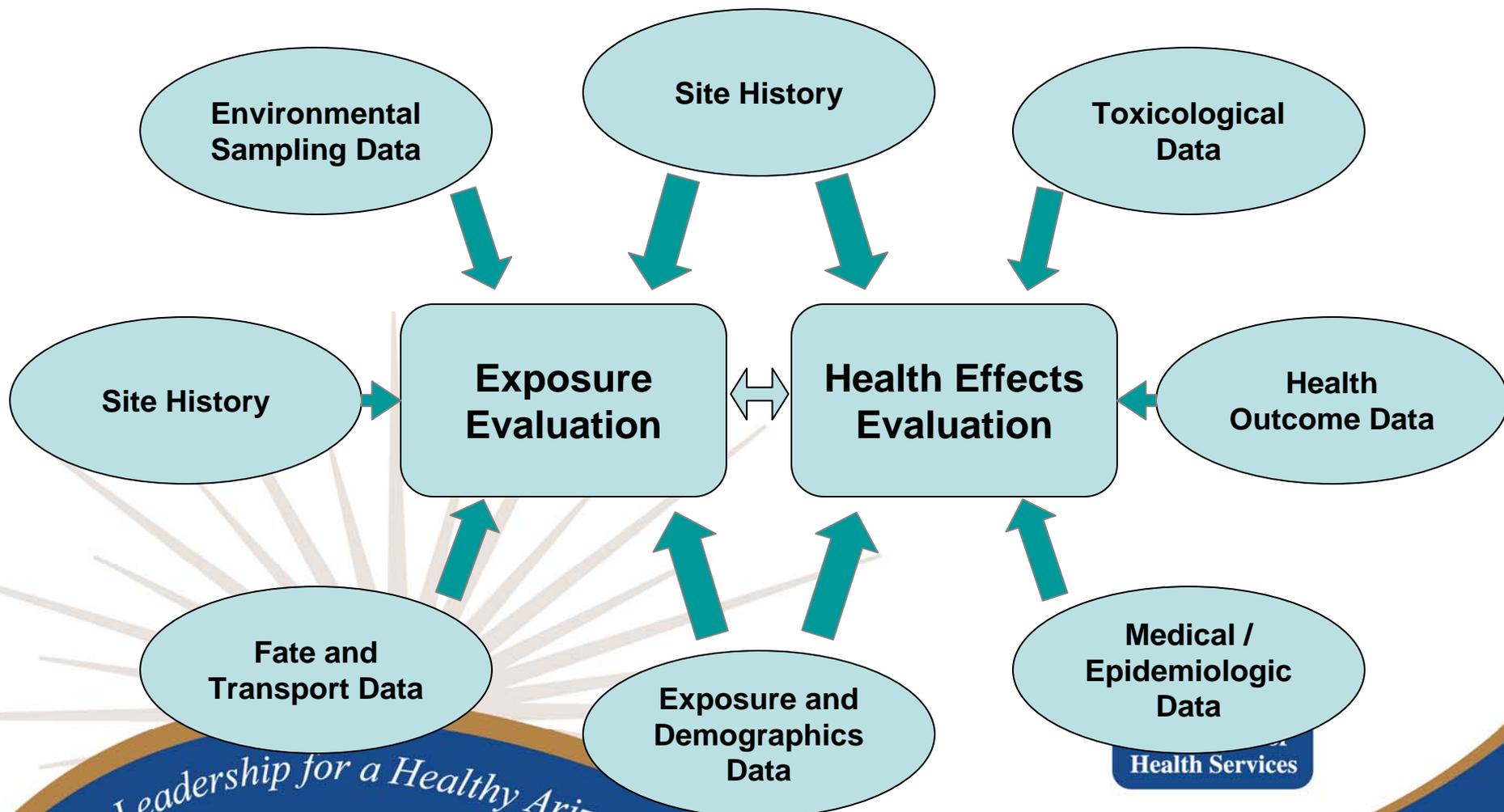
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Basic Components of the PHA process



Information Needed to Evaluate Exposures and Health Effects



Exposure Pathways



2a. Release & Migration

2b. Environmental Media (air)

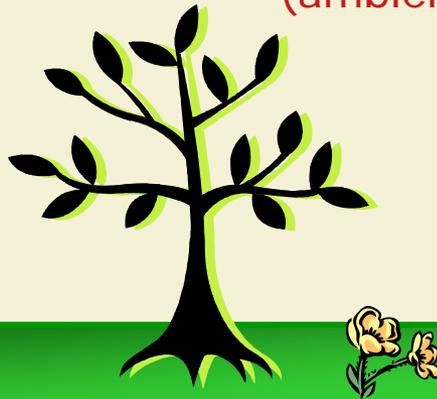
4. Exposure Route (ingestion)



3. Exposure Point (ambient air)

5. Potentially Exposed Population (residents)

1. Source (drums)



4. Exposure Route (inhalation)



3. Exposure Point (Private wells)

2a. Release & Migration



2b. Environmental Media (groundwater)



Overview of Conclusion and Recommendation Process

Hazard

- 1: Urgent Public Health Hazard
- 2: Public Health Hazard

- Health advisory
- Measures to stop or reduce exposures
- Health education
- Health studies / surveillance

No Hazard

- 4: No Apparent Public Health Hazard
- 5: No Public Health Hazard

- Health education
- Possible health surveillance
- Measures to prevent future exposures

Unknown

- 3: Indeterminate Public Health Hazard

- Further characterization of site-related exposures, where possible
- Health education
- Health studies / surveillance

Risk Assessment vs. PHA

- Quantitative Risk Assessment
 - Used by regulators
 - Part of site remedial investigations to determine which cleanup action is needed
 - Provides a numeric estimate of theoretical risk or hazard, assuming no cleanup takes place
 - Focuses on current and potential future exposures
 - Considers all contaminated media regardless if exposures are occurring or are likely to occur.
 - Uses standard/default protective exposure assumptions when evaluating site risk



Risk Assessment vs. PHA

- **Public Health Assessment**
 - **Used by ATSDR/ADHS (vs. regulators)**
 - Identifies possible harmful exposures
 - Recommends actions needed to protect public health
 - **Considers the same environmental data as EPA**
 - Considers past exposures in addition to current and potential future exposures
 - **Focuses more closely on site-specific exposure conditions, specific community health concerns, and any available health outcome data**
 - Provides a more qualitative, less theoretical evaluation of possible public health hazards

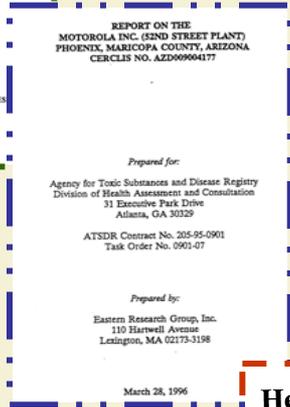
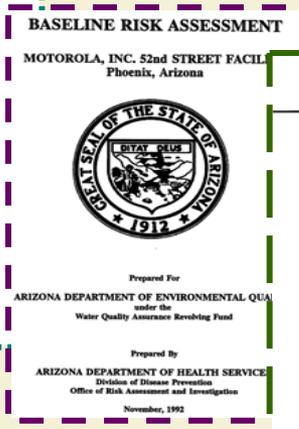
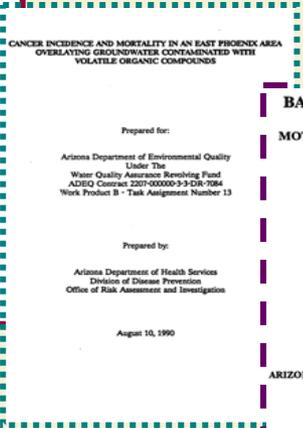
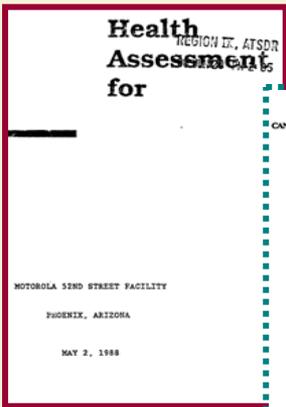


1988
 1990
 1992
 1993

 1996

 2002

 Today



Registries & Databases

- Birth Defects (1986)
- Cancer (1981)
- Birth certificates (late 1800's)
- Death certificates
- Hospital discharge
- Emergency visits (new)
- Reportable diseases



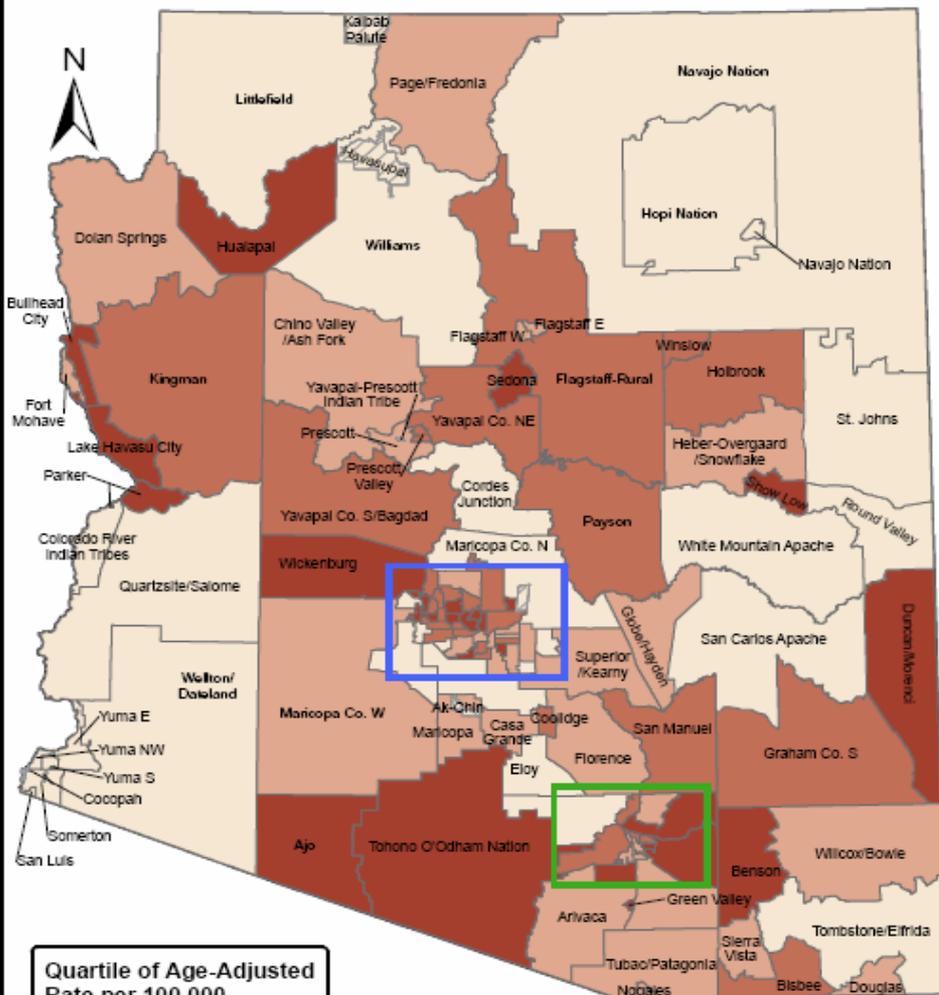
Cancer

- Arizona Cancer Registry:
 - <http://www.azdhs.gov/phs/phstats/acr/index.htm>
 - <http://www.azdhs.gov/phs/azchaa/cancer/cancers.htm>
- Cancers Commonly Associated with TCE/PCE
 - Liver
 - Kidney

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Age-Adjusted Incidence Rate of all Cancers in Arizona by CHAA, 1995 to 2000



Quartile of Age-Adjusted Rate per 100,000

- 0 - 369
- 370 - 414
- 415 - 441
- 442 - 3587

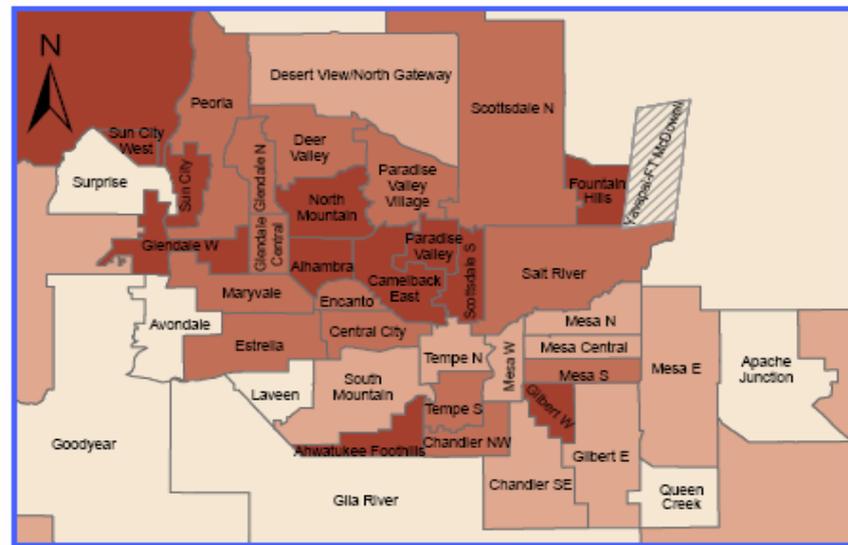
State Rate = 425.65

Count < 10

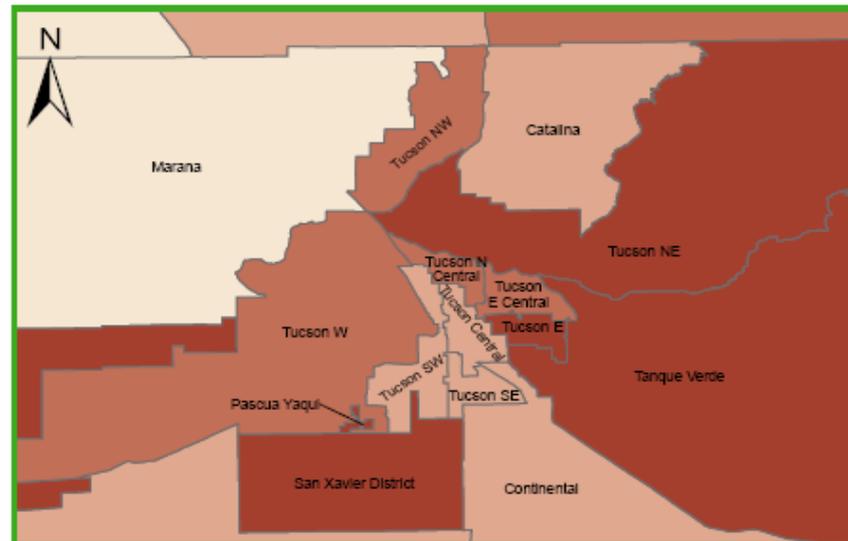


Map Date May 2005

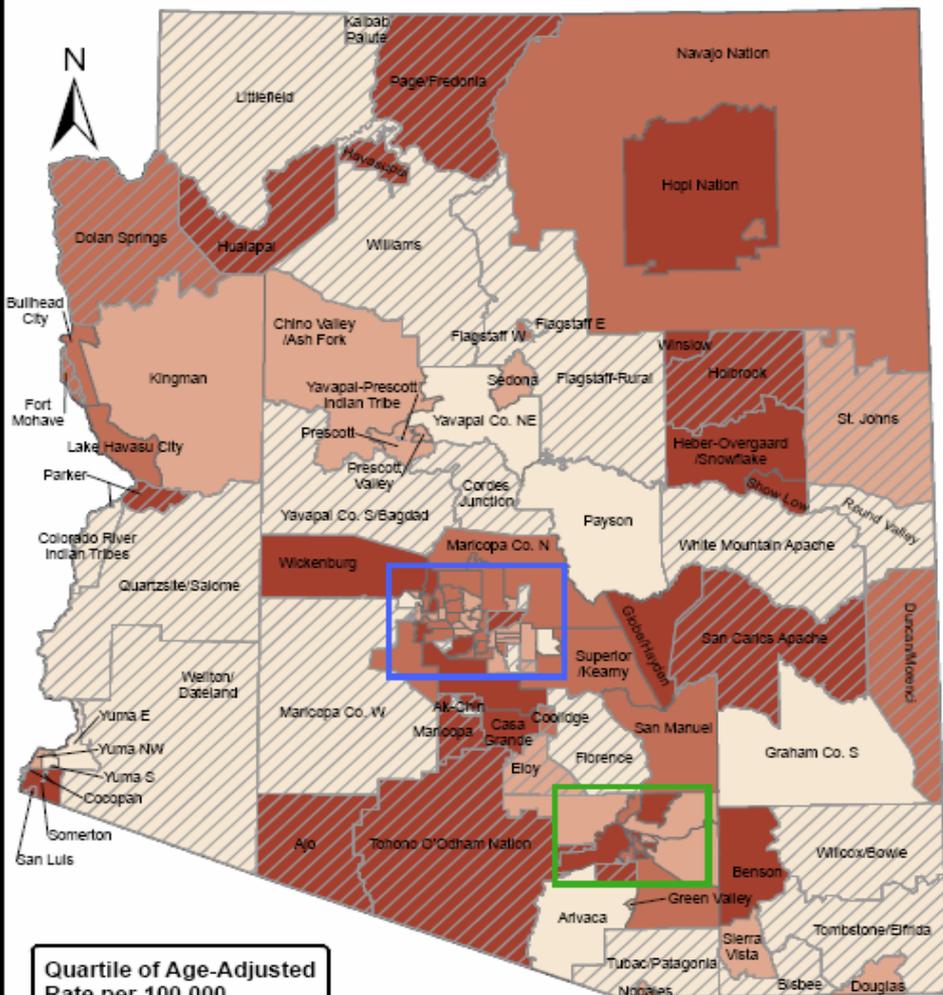
Metro Phoenix



Metro Tucson



Kidney and Renal Pelvis Cancer, Age-Adjusted Incidence Rate, 1995 to 2000, by CHAA



Quartile of Age-Adjusted Rate per 100,000

- 0.00 - 7.72
- 7.73 - 10.10
- 10.11 - 13.33
- 13.34 - 88.23

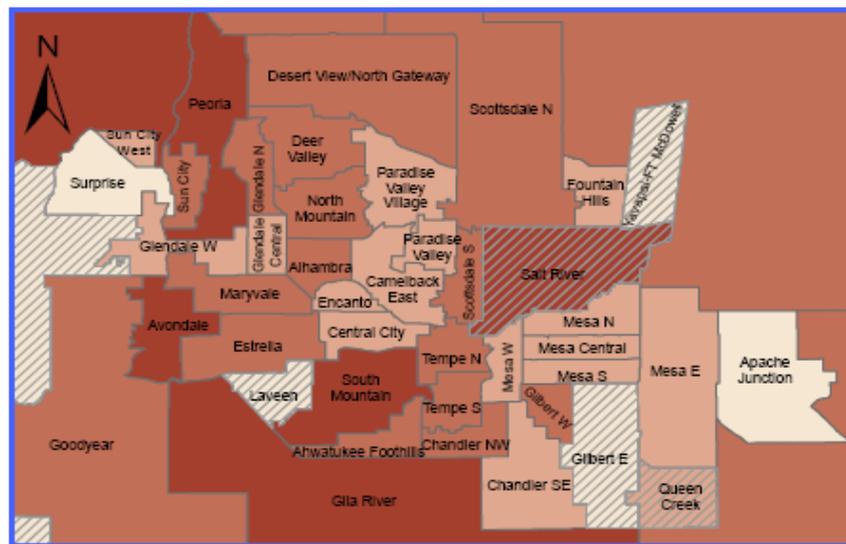
State Rate = 10.91

Count < 10

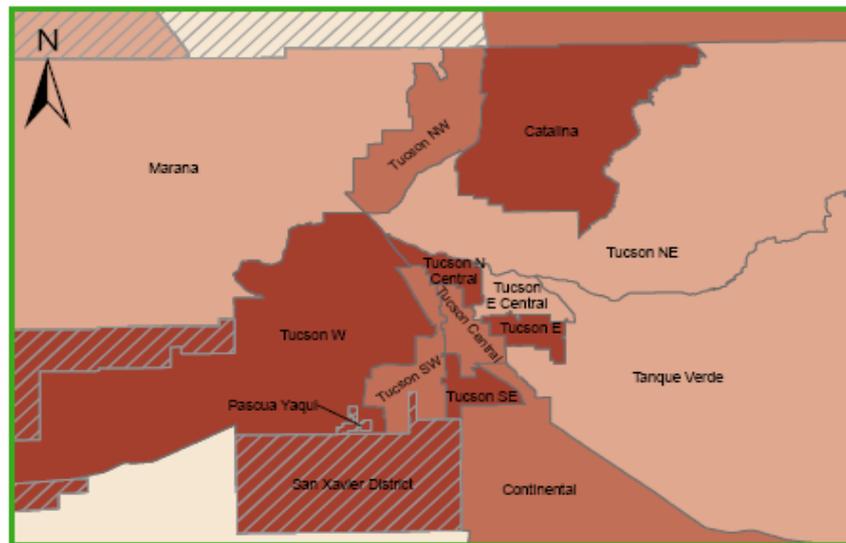


March 2005

Metro Phoenix



Metro Tucson



Contact Information

- ADHS Office of Environmental Health
 - (602) 364-3118
- ADHS Cancer Registry
 - (602) 542-7320

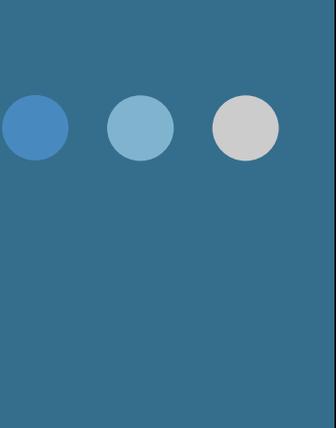
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Websites/Resources

- **Arizona Health Status and Vital Statistics**
 - <http://www.azdhs.gov/plan/index.htm>
 - Hospital admissions/discharges
 - Births/Deaths
 - Birth Defects
- **ADHS Office of Health Registries**
 - <http://www.azdhs.gov/phs/phstats/ohr/>
 - Cancer Registry
 - Birth Defects Registry
- **Health Consultations**
 - <http://www.azdhs.gov/phs/oeh/atsdr.htm>
- **American Academy of Environmental Medicine**
 - <http://www.aaemonline.org/>
 - <http://www.aaemonline.org/states/Arizona.html>
- **American Board of Environmental Medicine**
 - <http://www.americanboardofenvironmentalmedicine.org/index.htm>

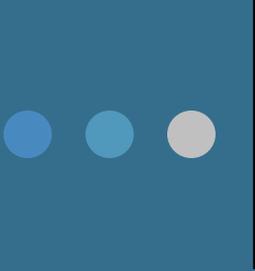




Risk Assessment In Superfund

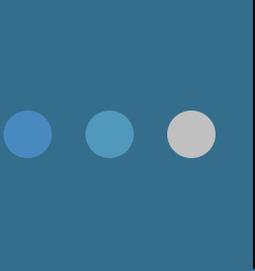
Phoenix, AZ
September 2009

Gerald (Gerry) Hiatt, Ph.D.
U.S. EPA, Region 9
415-972-3064
hiatt.gerald@epa.gov



Overview

- Introduction to the Superfund risk assessment process
- Discussion of how risk assessment is used in the Superfund program



Superfund Goal

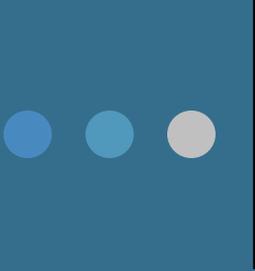
Clean up contaminated sites

- Risk Assessment is one of many tools used by Superfund to achieve health protective clean ups, others include:
 - Health-based screening levels
 - Regional Screening Levels (RSLs formerly PRGs)
 - Promulgated standards under the Safe Drinking Water Act or the Clean Air Act
 - Maximum Contaminant Levels (MCLs)
 - Ambient Air Quality Standards (AAQSs)



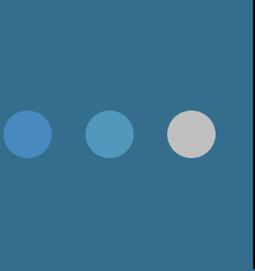
9 Clean Up Decision Criteria Specified by Superfund Law

1. Protection of human health & environment
2. Compliance with environmental standards
3. Long-term effectiveness
4. Reduction of toxicity, mobility or volume
5. Short-term effectiveness
6. Feasibility
7. Cost
8. State acceptance
9. Community acceptance



Risk Assessment Goals

- Risk assessment helps identify:
 - Which sites need clean up?
 - How bad is the site currently?
 - How bad could the site become if no clean up is done?
 - Which areas of a site need clean up?
 - Which contaminants need clean up?
 - How much clean up is needed?



Strengths & Limitations

➤ Risk assessment CAN:

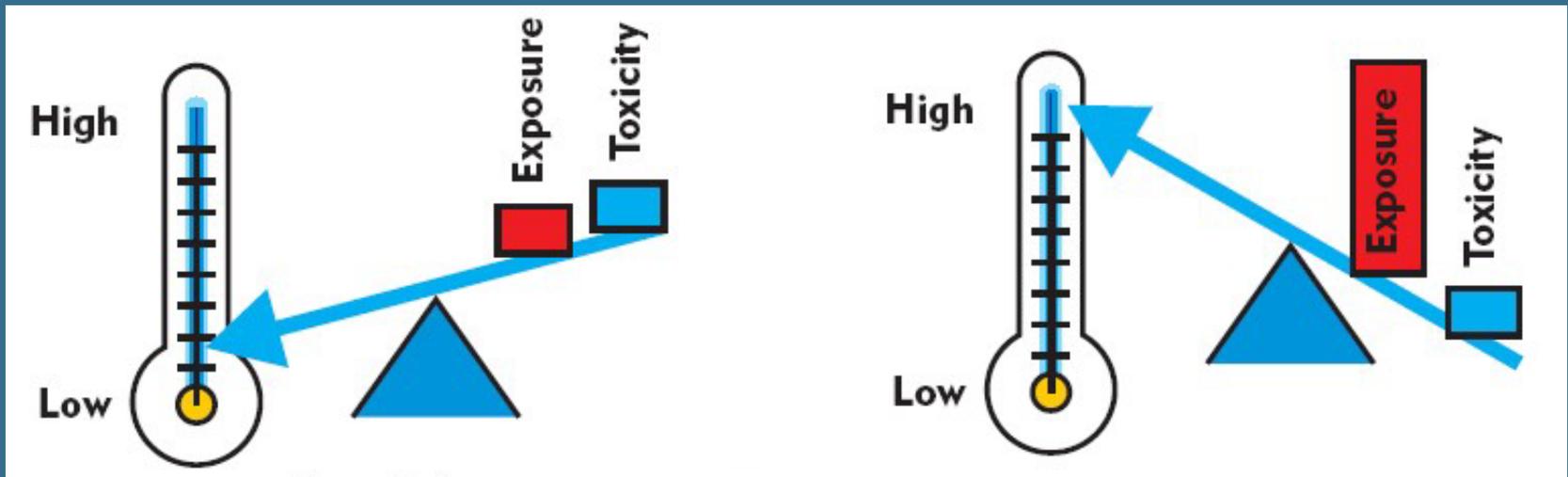
- Indicate the severity of contamination at a site
- Identify important exposure pathways
- Indicate how much clean up is needed
- Indicate where clean up is needed
- Compare different sites to promote consistent clean ups

➤ Risk assessment CANNOT:

- Predict if any specific person will get sick
- Determine if someone who is already sick was affected by contamination at a site
- Predict disease rates in a specific population

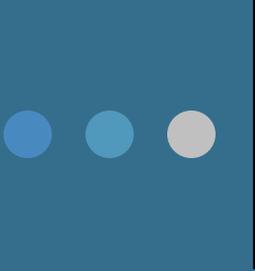
Risk Assessment Equation

$$\text{Risk} = \text{Exposure} \times \text{Toxicity}$$



Exposure LOW relative to toxicity = LOW risk

Exposure HIGH relative to toxicity = HIGH risk



4 Steps to Risk Assessment

1. Hazard Identification

- What chemicals are present, where and how much?

2. Toxicity Assessment

- How are they toxic and at what exposure levels?

3. Exposure Assessment

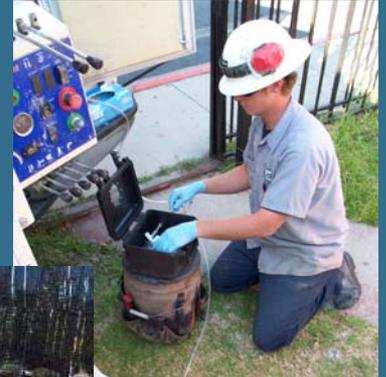
- How are people exposed to them?

4. Risk Characterization

- How much risk do they pose?

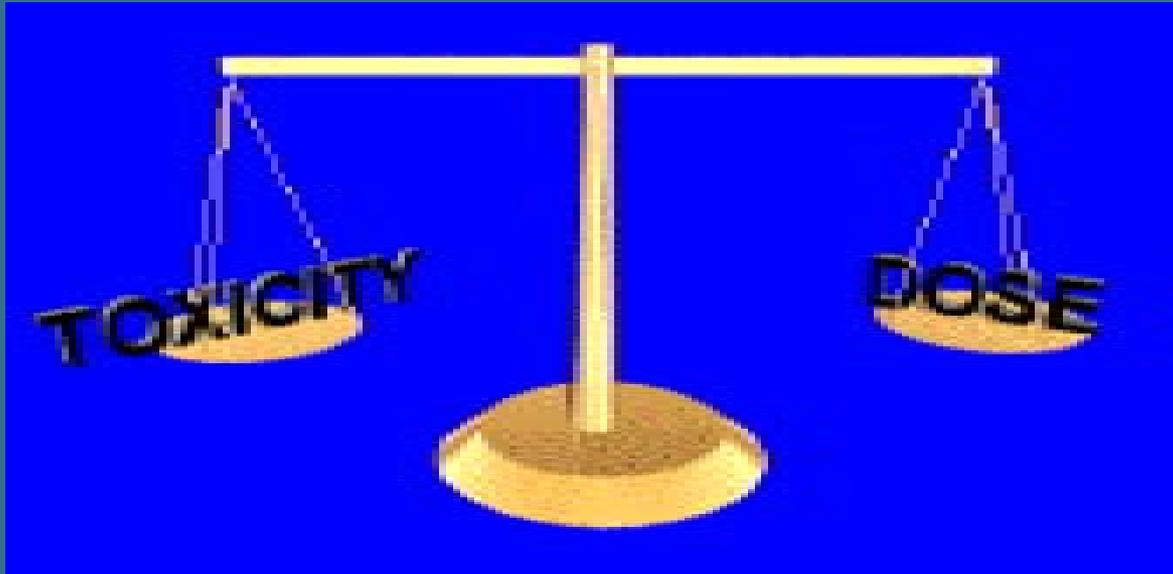
Step 1: Hazard Identification

- Which contaminants are present?
- Where are the contaminants?
 - Uniform distribution vs. hotspots?
 - Soil: surface and/or subsurface?
 - Groundwater?
 - Releases to air (ambient/indoor)?
- How much of each?
- Remedial Investigation:
 - Sample contaminated media
 - Analyze for identity and concentrations



Step 2: Toxicity Assessment

- What adverse health effects are the contaminants capable of producing?
- What is the relationship between the magnitude of exposure (“dose”) and the production of adverse health effects?

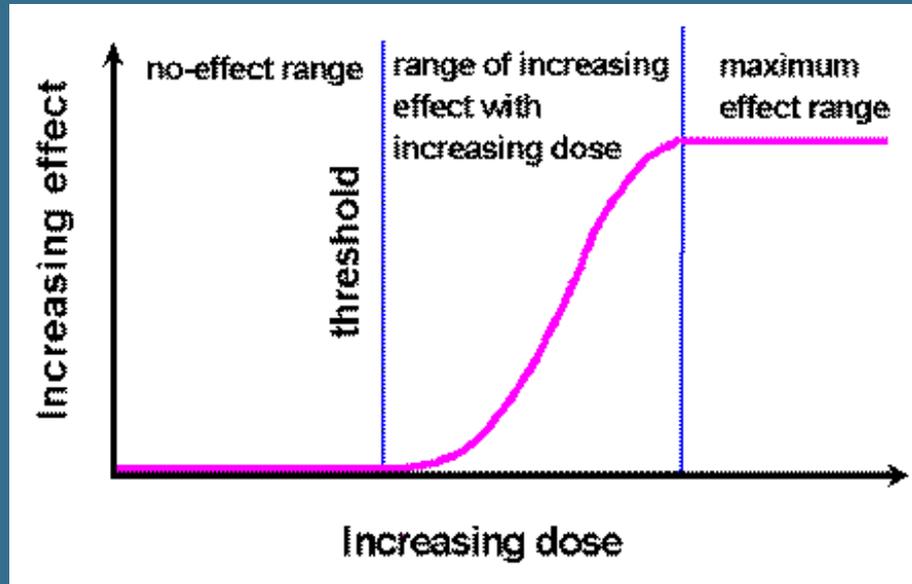




Which Toxicities Are Possible?

- Identify potential toxicity/health effects
 - lab animal toxicity studies
 - epidemiology studies of exposed humans
- Different types of toxicity
 - Carcinogenicity vs.
 - Non-cancer health effects
 - effects on reproductive ability
 - developmental effects
 - neurotoxicity, immunotoxicity, endocrine toxicity
 - Identify the most sensitive endpoint

Dose-Response Evaluation



Dose: Chemical concentration per unit body weight

Response: Level of measured (adverse) effect

- Higher doses create higher % responses and/or more serious effects
 - “Dose makes the poison”

Step 3: Exposure Assessment

➤ Who is exposed and how many?

- Adults, children, special populations?

➤ How are they exposed?

- Ingestion, inhalation, skin contact, other?

➤ How often are they exposed?

- Days per year, number of years

➤ What is the concentration to which they are exposed?

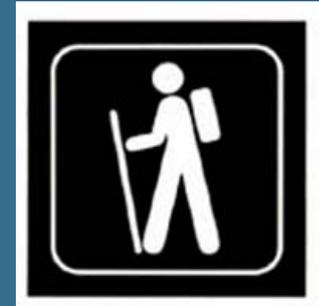
➤ Goal: Average Daily Dose



Exposure Pathway

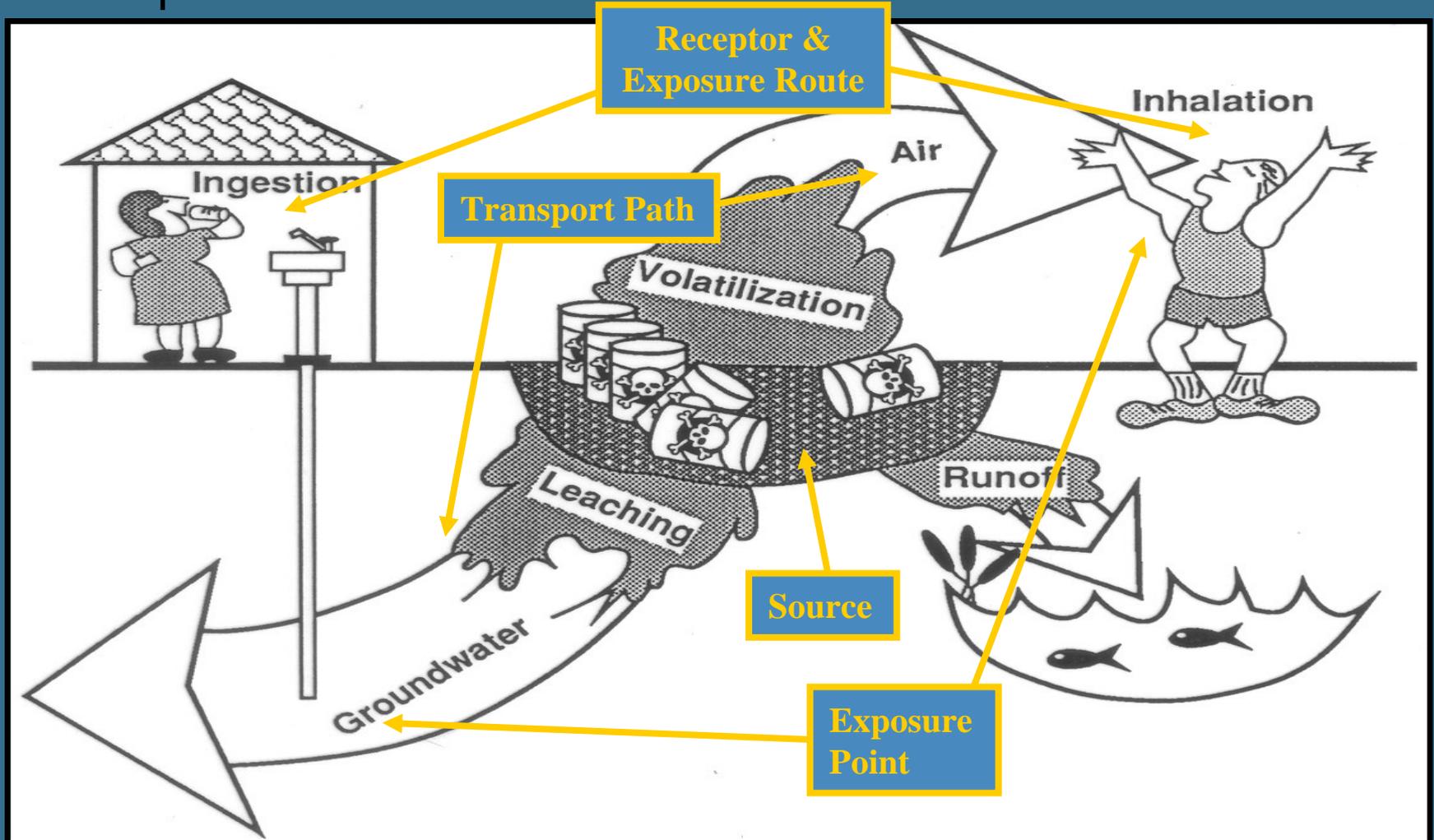
Steps that a chemical takes from the source to an exposed individual (“receptor”):

- Source & release
- Transport media & pathway
- Exposure point
- Receptor and intake (exposure) route



Individual must have **contact** with chemical for it to cause a health effect

Exposure Pathway



Exposure Pathways

All exposure pathways are not obvious

➤ Ingestion of contaminated soil

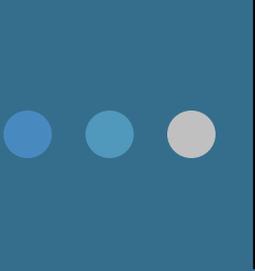
- Children during play (200 mg soil /day)
- Incidental ingestion by adults (100 mg soil/day)



➤ Inhalation of chemical vapors

- Vapor migration into homes from contaminated soil or groundwater under homes





Exposure Equation

$$\text{Dose} = C \times \frac{\text{CR} \times \text{EFD}}{\text{BW}}$$

- C = concentration in contaminated media
- CR = contact rate with contaminated media
- EFD = exposure frequency and duration
- BW = body weight

Exposure Variables

Five Basic Variables Used to Estimate Intake

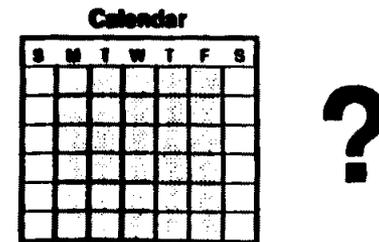
- Exposure Point Concentrations:



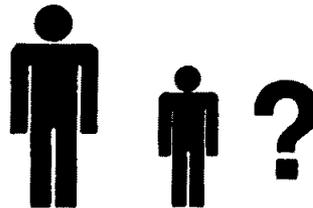
- Contact Rate:



- Exposure Frequency/Duration:



- Body Weight:



- Exposure Averaging Time:



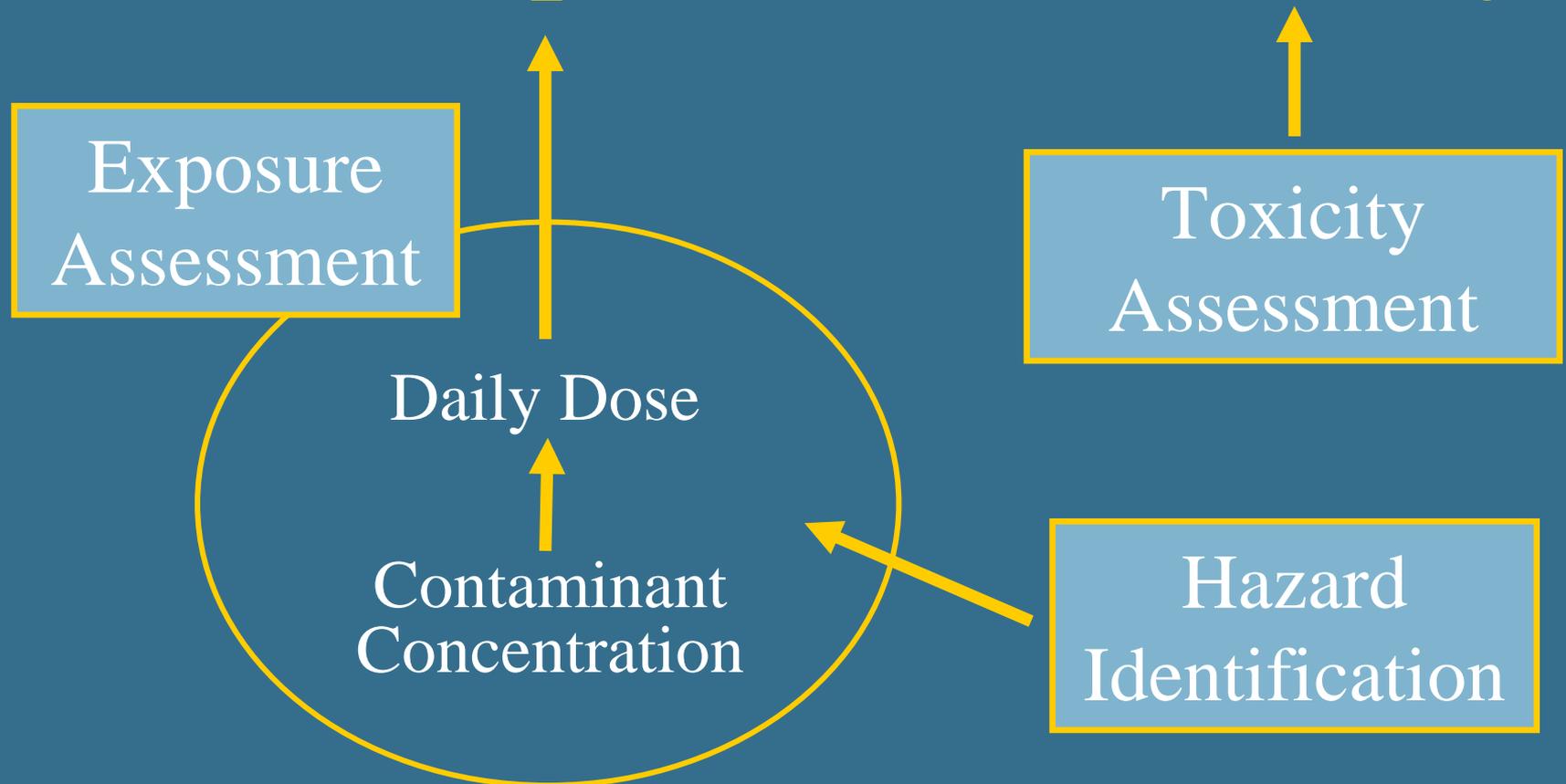


Step 4: Risk Characterization

- Goal: Determine the potential for health effects to occur in the most highly exposed people
- Daily exposure for the most highly exposed is compared to the contaminant's toxicity:
 - If exposure is low – risk is low
 - If exposure is high – risk is high

Solve the Risk Assessment Equation - Risk Characterization

$$\text{Risk} = \text{Exposure} \times \text{Toxicity}$$

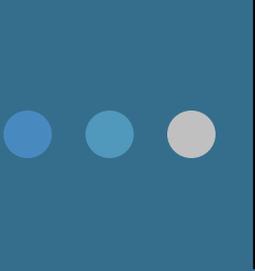


Solve the Risk Assessment Equation - Carcinogens

$$\text{Risk} = \text{Dose} \times \text{Cancer Potency}$$

- Sum cancer risks across all carcinogens and across all exposure pathways

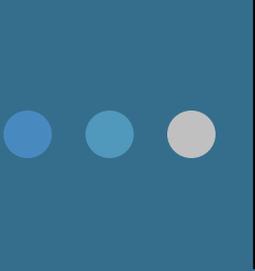
	<u>Risk</u>
Benzene: soil to air	2×10^{-6}
Benzene: soil ingestion	7×10^{-7}
TCE: soil to air	5×10^{-7}
Total risk:	3.2×10^{-6}



Solve the Risk Assessment Equation – Non-Cancer Toxicity

$$\text{Hazard Quotient} = \text{Dose} / \text{RfD}$$

- RfD (Reference Dose) – daily exposure level that will not cause an adverse effect
 - even in sensitive subgroups
- Sum exposures across all pathways
- Segregate contaminants by mechanism of action and target organ
- Decision criteria: $\text{HQ} > 1$?



Superfund Risks

➤ Additive

- Multiple contaminants at the site
- Multiple exposure pathways to each

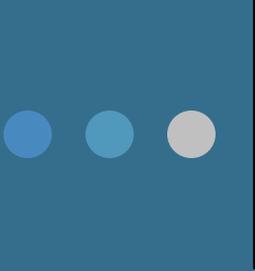
➤ ‘Reasonable Maximum Exposure’

➤ Risks +/- background exposure

- How do site-related risks compare to background risks?

Superfund Risk Goals

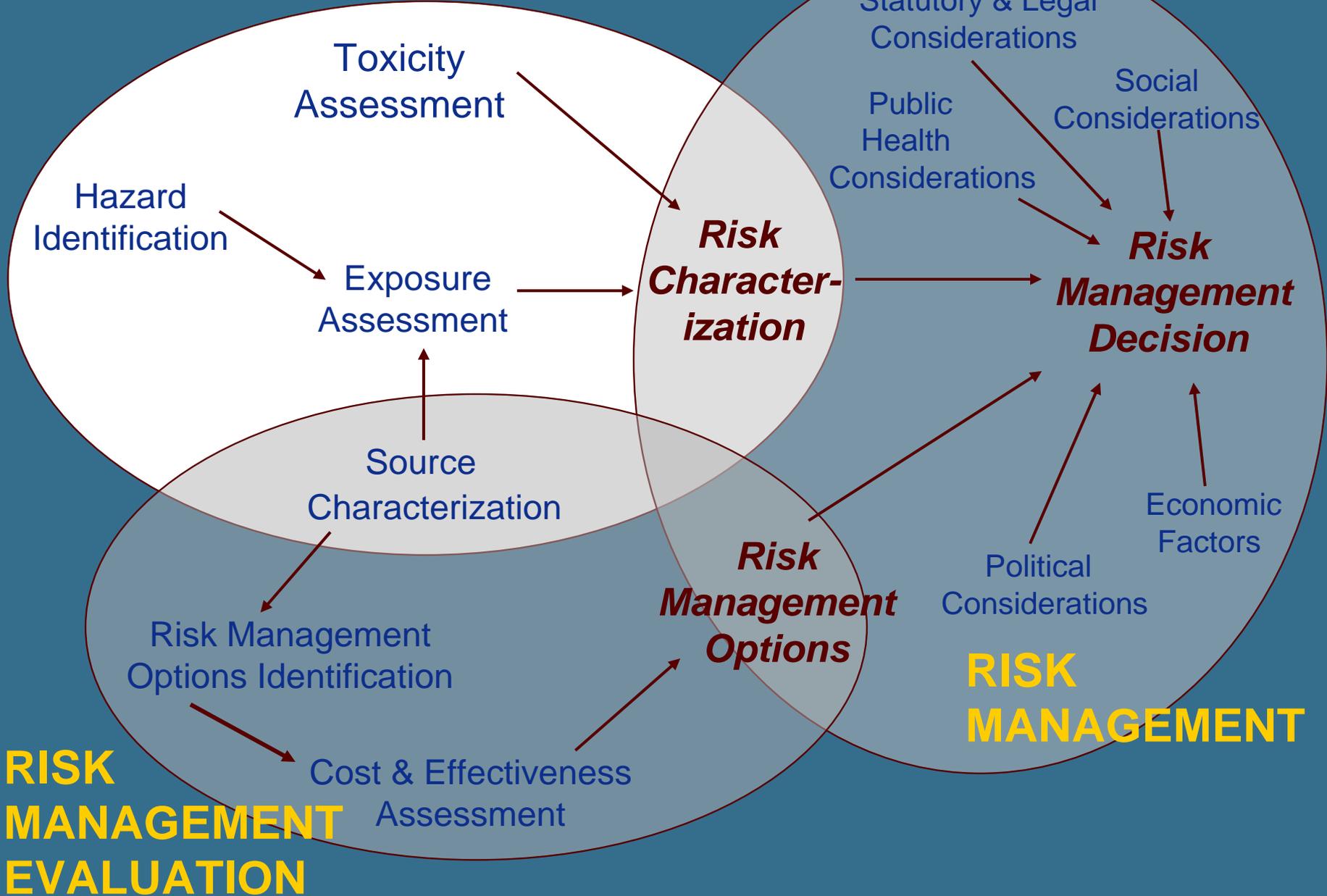
- “Remediation goals shall establish acceptable exposure levels that are protective of human health...”
- “... **acceptable exposure levels** ... represent an excess upperbound lifetime cancer risk to an individual of between **10^{-6} and 10^{-4}** ”
 - 1 to 100 in one million
 - RME exposure



Superfund Process – 5 Steps

- **Remedial Investigation** – Which contaminants are present, where are they & at what levels?
 - “Nature & extent” of contamination
- **Risk Assessment** – What are the risks & for whom?
- **Feasibility Study** – What actions can be taken to protect human health & the environment?
 - Proposed plan & alternatives
- **Record of Decision** → Remediation (cleanup)
- **5 Year Review** – Incorporate new information

HEALTH RISK ASSESSMENT



Motorola52 Superfund Site

EXPOSURE PATHWAYS and YOU

Arizona Dept Environmental Quality

September 17, 2009

Jeanene P. Hanley

jph@azdeq.gov



Agencies, Agencies...

EPA (Regional Parent and Support)



ADEQ (Jurisdictional and regulation differences)

- Track releases to environment
- Oversee investigations
- Determine appropriate course(s) of action



ADHS (Public Health)

- Track disease-causing agents
- Respond to community-wide health issues



Surface Soils

- Limited to facilities
- Have been removed, or covered by pavement and buildings
- Not available to the public

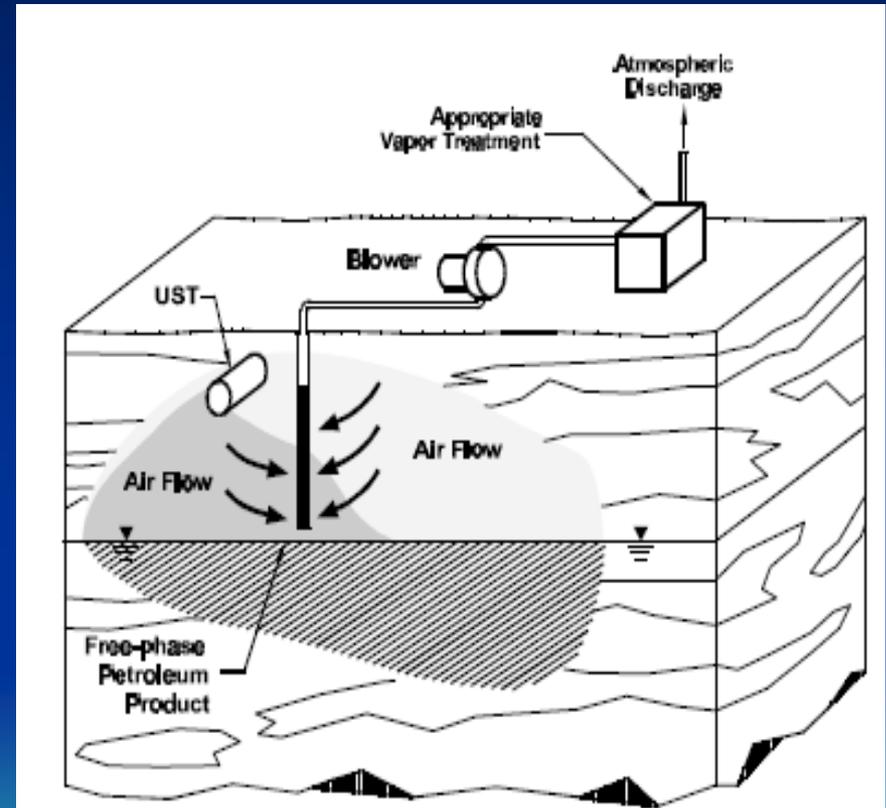


“No contact = no exposure”

Subsurface Soils

- Leaching to groundwater
 - Already has occurred
 - Control and treatment
- Soil gas migration
 - Source control
 - Limited to facility vicinity

“No current exposures”



Groundwater

- Municipal Supply
 - Early 1960's
 - Continuously monitored by City of Phoenix
- Private Wells
 - Survey by ADHS
 - Off line and placed on municipal supply



“No current exposures”

Free Product

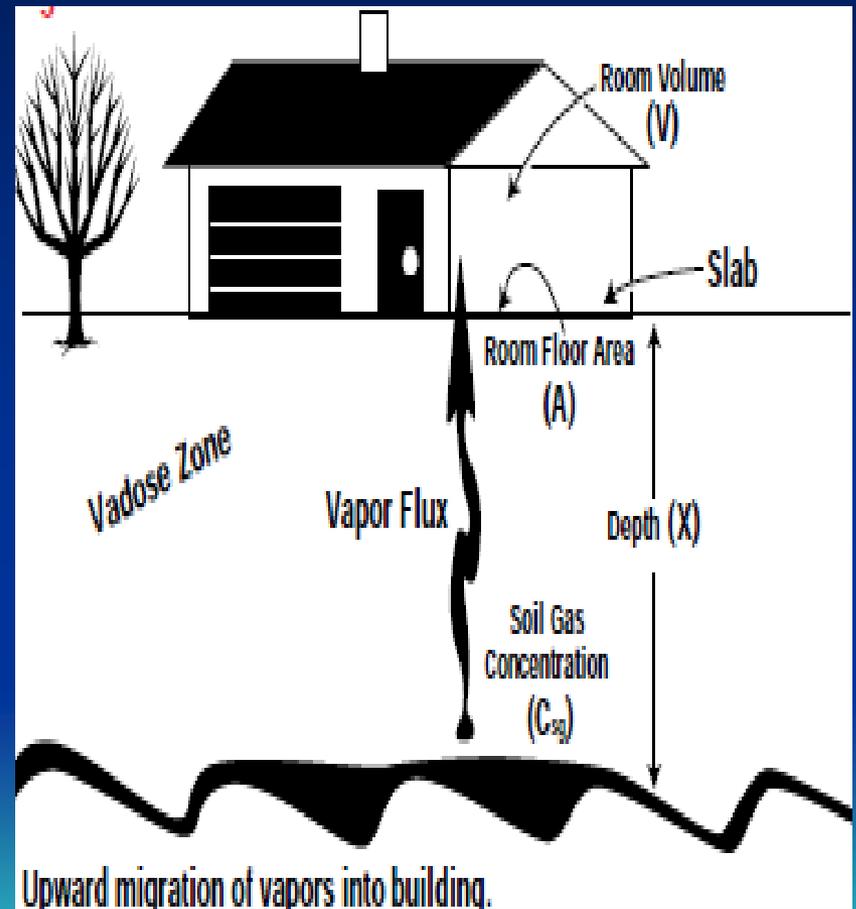
No Possible Direct Exposure

- Is a source for continued groundwater contamination
- OU1 treatment system is containing FP
- Transient, bedrock fractures
- Continued monitoring



Vapors from Groundwater

- Not likely at off-site areas
- In order to assure this is the case:
 - Monitor groundwater concentrations
 - Future vapor sampling



Past, Present, Future

Quantity of Exposures in Urban Areas

Air > Potable Water > Food > Other*

(*Lotions, detergents, cigarettes, M52)

“Past can not be controlled, but guessed”

“Present is controlled and monitored”

“Future is what we are protecting”



SOUTHWEST ENVIRONMENTAL HEALTH SCIENCES CENTER

University of Arizona , Tucson

Dr. Walt Klimecki



SOUTHWEST ENVIRONMENTAL HEALTH SCIENCES CENTER

Where are we?

Local! (Sort of)

Who are we?

Scientists and Teachers who study poisons and the people whose lives are affected by them.

What kinds of things do we do?



SOUTHWEST ENVIRONMENTAL HEALTH SCIENCES CENTER

- Basic Science Research
Small Pieces of Complex Problems
(Including TCE!)
- Epidemiology
Health of Real-World Communities
- Community Learning and Teaching



SOUTHWEST ENVIRONMENTAL HEALTH SCIENCES CENTER

We are here if you think we could help

- Workshops on basics of poisons, health of communities
- Discuss our own research!
- Be available for questions

Based on what you ask for

If we can help, contact

Monica Ramirez

Wendy Flood

Leah Butler



Motorola 52nd Street Superfund Site

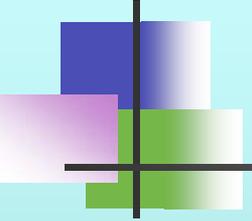
Public Meeting
September 17, 2009



Arizona Department of
Environmental Quality

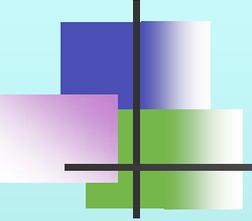


U.S. Environmental
Protection Agency, Region 9



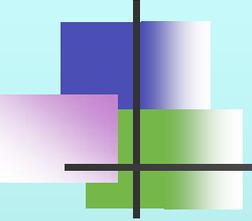
Agenda

- Introductions
- Risk Assessments – EPA
- Exposure Pathways - ADEQ
- Health Assessments – ADHS
- Operable Unit 2 Consent Decree



Introductions – ADEQ

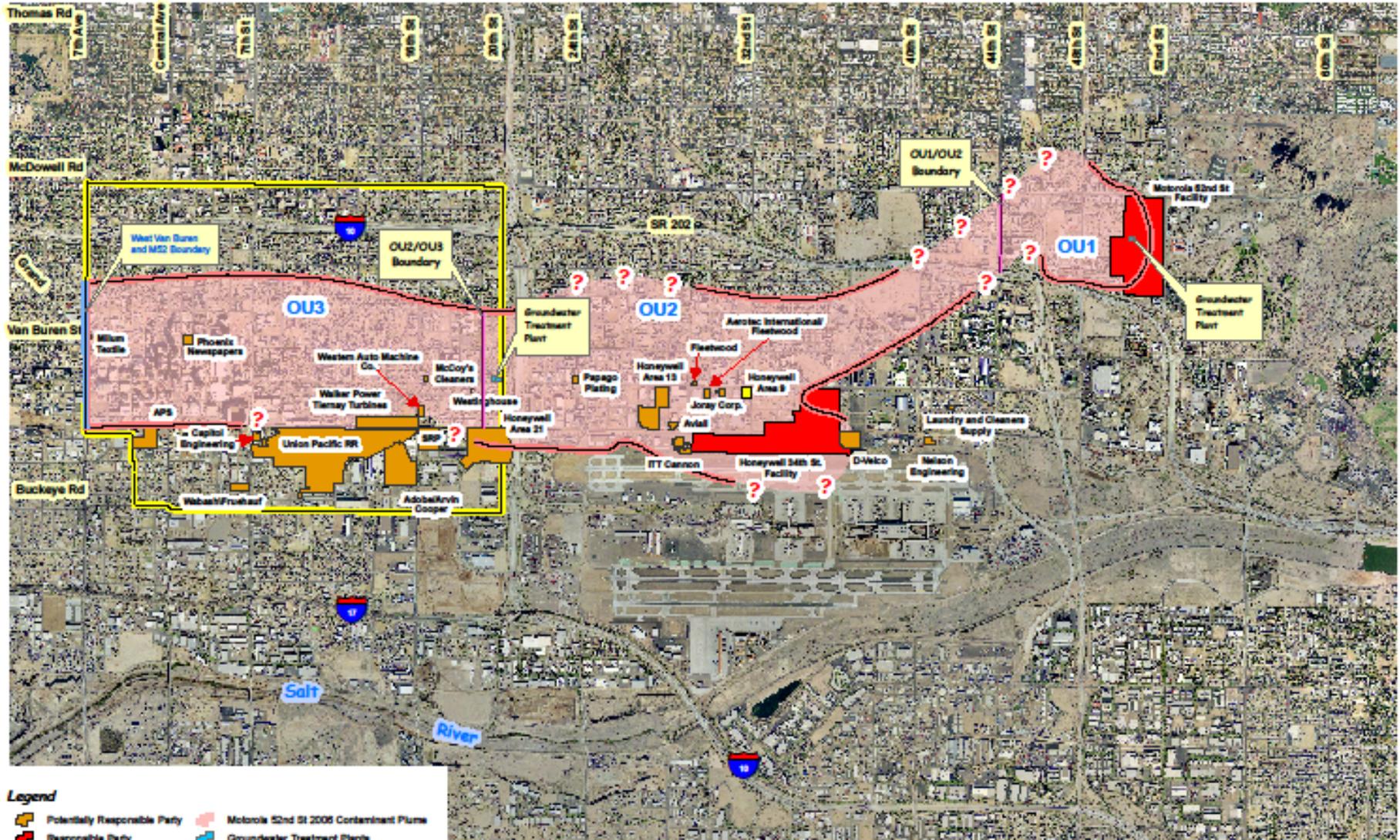
- Sherri Zendri - OU1/OU2 Project Manager
- Joellen Meitl - OU3 Project Manager
- Wayne Miller - Sitewide Project Hydrologist
- Wendy Flood - Sitewide Community Involvement Coordinator



Introductions - EPA

- Leah Butler - OU1 Project Manager
- Andria Benner- OU2/OU3 Project Manager
- Janet Rosati - OU3 Remedial Project Manager
- Leana Rosetti - Sitewide Community Involvement Coordinator

MOTOROLA 52ND STREET SUPERFUND SITE PHOENIX, ARIZONA

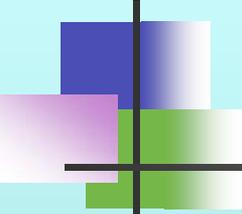


- Legend**
-  Potentially Responsible Party
 -  Responsible Party
 -  No Further Action
 -  Motorola 52nd St 2006 Contaminant Plume
 -  Groundwater Treatment Plants
 -  OUS Study Area

Contour represents area of volatile organic compounds in alluvial and bedrock groundwater that exceed the Aquifer Water Quality Standards.

? = Insufficient Data

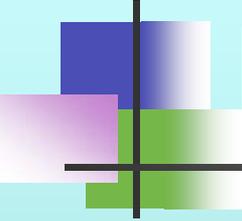




ADEQ & EPA

Announcements

- **Please fill out a feedback form**
- **Please sign up for the Site Mailing List**
- **Site Information is available online**
 - www.epa.gov/region09/Motorola52ndSt
 - <http://www.azdeq.gov/environ/waste/sps/phxsites.html#mot52a>
- **Document Repository Locations**
 - **ADEQ Records Center (M-F 8:30am-4:30pm)**
1110 W. Washington St. Phoenix, AZ 85007 (602) 771-4154
 - **Phoenix Public Library, Saguaro Branch**
2802 North 46th St. Phoenix, AZ (602) 262-4636
 - **Burton Barr Central Library**
1221 N. Central Ave. Phoenix, AZ 85004 (602) 262-4636



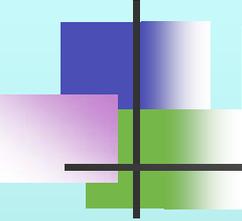
Next Open House

A joint event with Honeywell
to provide the public an up-close look
at the Honeywell 34th St. Facility
BSVE System.

Saturday, November 14, 2009

Honeywell 34th Facility

TIME TBA



How to Contact ADEQ

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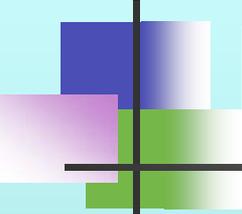
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