United States
Environmental Protection
Agency

Office of Superfund Remediation
and Technology Innovation
Washington, DC 20460

EPA-
OLEM

Superfund

August 2019

# Environmental Unit Leader

**ICS Institute • August 12-16, 2019 • Philadelphia, PA**

ENVL

*In consideration of your fellow students and the instructors, please silence all cell phones*

# Environmental Unit Leader

*August 13-16, 2019*

EPA 1

ENVL

# Unit 0

*Introduction*

EPA 2

ENVL

## Purpose of the Course

Provide training to agency personnel to develop the skills necessary to perform as an Environmental Unit Leader on an Incident Management Team.

EPA 3

## Instructor Introduction

ENVL

- Name / job title / Region / Special Team
- Years of ENVL-related experience?
- Recent or major incident involvement?

EPA 4

## Administration

ENVL

- Student Registration Card
- Student Evaluation Form
- Course Agenda
- Student Manual – available for download
- Student Handouts

EPA 5

## Facility Information

ENVL

- Parking
- Classroom
- Restrooms
- Water fountains, snacks, refreshments
- Lunch
- Emergency telephone numbers
- Alarms and emergency exits

EPA 6

## Student Introductions

ENVL

- State your name
- Provide a brief explanation of what do you normally do (title)
- Tell us where you are from (region, office, etc.)
- Describe previous ICS experience, if any (for example, were you a participant in the WTC, BP Spill Response, California Wildfires, Hurricane Maria or others?)

EPA 7

## Course Objectives

ENVL

1. Understand the management and leadership function of the Environmental Unit Leader (ENVL)
2. Define the interactions of the ENVL with other functional positions in the Incident Management Team (IMT)
3. Understand how and when to incorporate multiple agency expertise into the ENV of the Planning Section

EPA 8

## Course Objectives (continued)

ENVL

4. Understand how environmental data from an incident is managed by the ENV and Situation Unit of an EPA IMT
5. Understand the many aspects of the response the ENVL provides input on, and the tools available to assist with this.

EPA 9

## Course Certificate

ENVL

- Attendance is mandatory
- Must participate satisfactorily in final exercise

EPA 10

## Resources

ENVL

- https://response.epa.gov/envunit
- https://response.epa.gov/institute
- https://response.epa.gov/ICS_FORMS
- https://response.epa.gov/NIMSIntegrationTeam
- https://response.epa.gov/site/site_profile.aspx?site_id=11640
- ENVL NIT Liaison – Joe Schaefer, ERT

EPA 11

ENVL

# Exercise One

*ICS 214 – UNIT LOG*

EPA 12

ENVL

# Unit 1
# Environmental Unit Leader

*Mission, Key Responsibilities and Management of Unit*

EPA United States Environmental Protection Agency 1

## Unit Objectives

ENVL

- State the mission of the EPA Environmental Unit (EU)
- Discuss the primary responsibilities of the EU and the Environmental Unit Leader (ENVL)
- Understand the role of the EU in the IMT and the Planning Cycle
- Understand how to effectively mobilize, and then integrate into the IMT

EPA United States Environmental Protection Agency 2

## Unit Objectives

ENVL

- Know what information the ENVL should obtain from incoming briefings
- Know what and where resources are available and the ordering process
- Understand the organization of the EU
- Understand the role of the EU in data management

EPA United States Environmental Protection Agency 3

## Unit Objectives

ENVL

- Know the function of a Technical Working Group (TWG) and an Environmental Clearance Committee (ECC)
- Understand the guidelines for successful operation of the EU
- Understand the content of the EPA ENVL Job Aid and how to apply it to a future assignment as an ENVL

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## EPA ENVL

ENVL

- Incident Management Handbook (IMH)
- EPA ENVL Job Aid


EPA United States Environmental Protection Agency 5

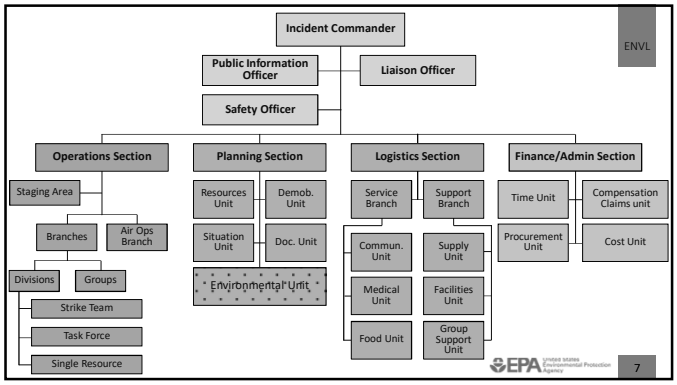
## Environmental Unit Mission Statement

ENVL

- The Environmental Unit of the Planning Section is established to promote the use of science and engineering principles to support response decisions

**Source: EPA ENVL Job Aid Jan 2011*

EPA United States Environmental Protection Agency 6




## Environmental **Unit** Responsibilities

ENVL

- The Environmental Unit is responsible for scientific support associated with a response, including the following:
  - Support for response approaches including technologies;
  - Modeling and data interpretation;
  - Natural resources and ecological issues;
  - Establishment of standard methods and permitting issues;
  - Sampling and Analysis Plans; and
  - Quality Assurance and Control Plans.

**IMH p 6-2*

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## Additional Responsibilities of the EU

ENVL

- Recommendations regarding the protection of public health, welfare, and the environment
- Developing plans to assess conditions and impacts
- Evaluating data for usability
- Using models relevant to the incident
- Performing risk assessments
- Assessing the environmental conditions and impacts

**IMH p 6-4*

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ENVL

# ENVL Position Duties

EPA 10

ENVL

## Common Responsibilities

- There are many responsibilities that are common to all personnel.

*See page 3-1 of EPA IMH*

EPA 11

ENVL

## Common Unit Leader Responsibilities

- There are many responsibilities that are common to all Unit Leaders.

*See page 3-3 of EPA IMH*

EPA 12

## Environmental Unit Leader Duties

ENVL

- Environmental Matters
  - Assessment
  - Environmental monitoring
  - Site characterization
  - Waste characterization
  - Sample data
  - Site clearance
- Coordination with other offices on permitting

**EPA IMH p 9-10*

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## ENVL Duties cont.

ENVL

- Determine staffing requirements – organize unit
- Conduct EU staff meetings
- Make recommendations regarding the protection of public health, welfare, and the environment
- Coordinate with HQ and regional EUs
- Coordinate with SSC and TWG

**PP 9-11 & 12 of 2016 of EPA IMH*

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## ENVL Duties cont.

ENVL

- Coordinate with LNO on Natural, Cultural and Historical resources
- Provide technical advice and consultation
- Prepare Environmental Data presentations & packages
- Coordinate with PIO on drafting public messages
- Document activities
- Monitor Unit status - order and demob resources as needed
- Keep PSC apprised of work status

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## Role of ENVL in Planning Cycle

ENVL

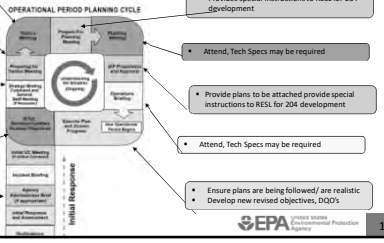
- Attend Tactics Meeting
- Ensure proposed tactics can be supported by current plans.
- Determine new plan needed for future tactics
- Coordinate with PSC and OPS during Tactics meeting: provide key info to OPS/PSC to help develop 204s (Treatment Recommendations, Safety Constraints, and Sampling Methods. Etc..

- Plan development
- Data interpretation
- Coordinate with SCAT, OPS and PSC

- Attend as an observer if requested
- Determine any relevant/new information or shift in Objectives/Priorities/action items that might affect the Unit

- Prepare PSC with draft objectives on sampling/data to present
- Prepare DQO's based on objectives set by IC/UC

- Briefings
- Resource needs
- Organizational Structure




- Provides special instructions to RESL for 204 development
- Attend, Tech Specs may be required
- Provide plans to be attached provide special instructions to RESL for 204 development
- Attend, Tech Specs may be required
- Ensure plans are being followed/ are realistic
- Develop new revised objectives, DQO's

EPA

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## Role of ENVL in Planning Cycle

ENVL

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EPA

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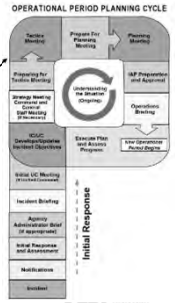


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## Role of ENVL in Planning Cycle

ENVL


- Provides special instructions to RESL for 204 development
- Attend, Tech Specs may be required
- Provide plans to be attached, provide special instructions to RESL for 204 development

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## Role of ENVL in Planning Cycle

ENVL


- Attend, Tech Specs may be required
- Ensure plans are being followed/ are realistic
- Develop new revised objectives, DQO's

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## ENVL - Arrival On Site

ENVL

- Check-in with Resources
- Meet with Planning Section Chief
- If rotation, meet with current ENVL
- Meet with ENV personnel
- Meet with SIT, OPS, TWG etc.
- Survey current incident status
- Survey anticipated scientific needs

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## Check-In

ENVL

- With Check-in Status Recorder or Resource Unit Leader
- Get assignment
- Get information on other steps in check-in process
- Housing & Meals
- Safety
- Facilities & Supplies


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## Initial Briefing From PSC

ENVL

- Incident size, scope & potential
- Political & Public interest
- Expectations and Assignments
- Assigned resources

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## Initial Briefing From PSC

ENVL

- Plans- In Place and To be developed
- Timelines & priorities
- ENV role in Data Management Plan
- TWGs/ECCs and Stakeholder Groups
- Logistical considerations/facilities

Obtain copies of Incident Action Plan (IAP), 201s, and SITREPs. Review Unit's daily logs.

EPA 25

## Briefing from existing ENVL

ENVL

- Review ongoing ENV Responsibilities
- Discuss ENV Personnel roles
- Discuss ENV Staffing & Organization
- Review Schedules
- Obtain a list of Assignments & Products
- Interactions – Internal & External

EPA 26

## Meet with ENV personnel

ENVL

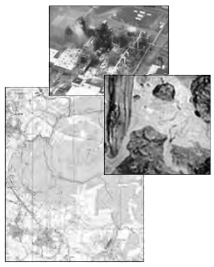
- Ongoing projects
- Projections
- Skills
- Roles & Responsibilities
- Is organization working?
- Workload/Burnout
- Demob plans
- H&S certification

EPA 27

## Survey Current Incident Status

ENVL

- Size/Scope
- Current Activities
- Contaminants of Concern
- Threats
- Sensitive Areas



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## Survey Anticipated Scientific Needs

ENVL

- Modeling
- Interpretation
- Threats/Risks to human health and environment
- Sampling
- Response

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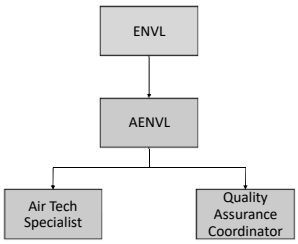
## Organizing the ENV

ENVL

- Span of control
- Based on function
- Can expand and contract based on:
  - Size of response
  - Nature of response
  - Stage of response

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## Sample ENV Organization

ENVL

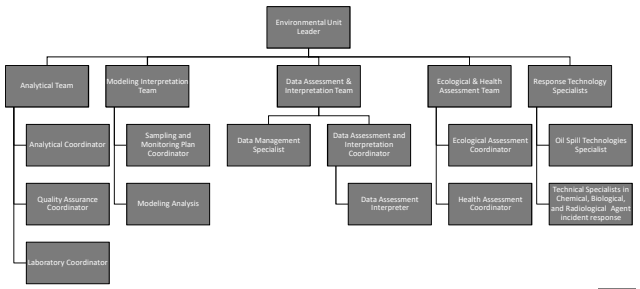


**figure 6.1 from 2016 IMH*

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## Data Flow

ENVL

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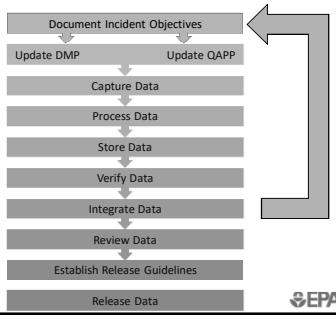
## Emergency Response Data Management Sub-Functions

ENVL

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## Possible Data positions in ENVL

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- Analytical Coordinator
- Sampling and Monitoring Plan Coordinator
- Quality Assurance Coordinator
- Data Assessment and Interpretation Coordinator

EPA 34

## ENV Role in Data Flow

ENVL

- Decision Making – provide technical advice as requested
- Data Planning –Develop and update QAPP and DQOs
- Data Gathering- serve as a coordination point for analytical & monitoring data
- Data Analysis – verify & review
- Data Distribution – assist PIO in messaging based on data

EPA 35

## Headquarters EU

ENVL

- Established during a Nationally Significant Incident
- Provides additional data quality control, review, interpretation & release
- Conducts external coordination with national political leadership and other agencies
- Conducts internal coordination with other EPA offices, including Public Affairs

EPA 36

## ENV Role in Crisis Communication Plan(CCP)

ENVL

- CCP mainly for large events will affect HQ ENV
- CCP has key communication considerations – Environmental Data
- Environmental Data disseminated to public in an understandable, timely, accurate, and consistent manner
- ENV work with PIO to ensure public messages meet these criteria

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## Technical Working Group

ENVL

- A TWG is a highly recommended group of individuals with specific needed expertise from various agencies/stakeholders that work on topics of importance determined by IC/UC in consultation with the Operations Section Chief, and/or Planning Section Chief

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## TWG Primary Goals

ENVL

- Provide advisory subject-matter expert (SME) input to the IC/UC to minimize risk while protecting human health and the environment
- Assist by providing technical information needed by IC/UC to explain human health and welfare or environmental impacts to the public, stakeholders, and the media
- ***A TWG is a technical advisory group, not a decision-making body***

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## TWG Structure and Process

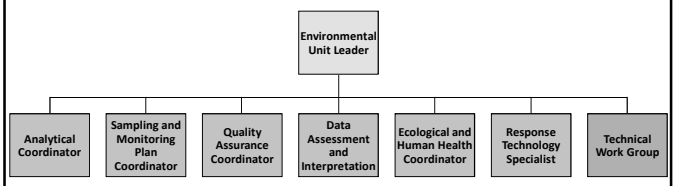
ENVL

- TWG may consist of multiple subgroups, each having a particular focus area:
  - Sampling (Sampling and Analysis Plans)
  - Decontamination
  - Waste management
  - Interpretation of analytical data, etc.
- When possible, personnel should not be involved in any other role in the IC/UC, including field operations

EPA 40

## Example of a TWG in Incident Command

ENVL




EPA 41

## Environmental Clearance Committee

ENVL

The ECC is a recommended, but optional, **independent, objective and unbiased** scientific peer review body that exists to evaluate the effectiveness of response activities in order to make recommendations to the IC/UC on re-occupancy of properties.

- ***NONE*** *of the ECC members should be working elsewhere in the ICS Structure*
- *ECC members should represent their individual scientific disciplines or areas of expertise, <u>not</u> their agencies*

EPA 42

## ECC

ENVL

- Coordinated group of scientists with expertise in disciplines relevant to the assessment and cleanup of the facilities to serve on a committee charged with evaluating the effectiveness of the facility decontamination measures
- Provide additional credibility/confidence to the IC/UC by making a determination that clearance goals have/have not been achieved in a response
- ECC is not a decision-making entity, nor will ECC advise on public policy and management issues

EPA 43

## ECC

ENVL

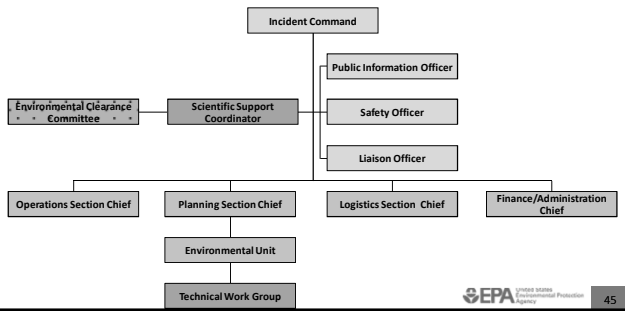
(Continued)

- For each incident, the ECC makes a recommendation on the appropriateness of reopening the affected facilities for re-occupancy (i.e., clearance)
- *The lead local department of public health will have the final decision-making authority on re-occupancy of the properties in the affected region within its jurisdiction*

EPA 44

## Example of an Environmental Clearance Committee in Incident Command

ENVL




EPA 45

## Resources

ENVL

- Regional Response Center (RRC)
- EPA Response Support Corps (RSC)
- Other Regions
- Other Offices
  - Office of Water
  - Office of Indoor Air & Radiation
  - Office of Research & Development

EPA 46

## Resources Cont.

ENVL

- EPA Special Teams
  - ERT/CMAT/RERT/NCERT
- HQ
- State/Local
- Other federal agencies
  - ATSDR/NOAA/U.S. Coast Guard
- Private/Academia

EPA 47

## Resource Consideration

ENVL

- Lag/Travel time
- Shifts and hours
- Number of tours of duty
- Contractors/COR responsibilities
- Reach back vs. onsite
- H&S requirements

EPA 48

## Care & Feeding of Tech Resources

ENVL

- Many are not accustomed to emergency operations & pressures
- Know if they are H&S certified
- Inquire about their required or preferred support and explain your limitations
- A good briefing required!

EPA

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## Ordering/Demobilization

ENVL

- Ensure that resources are ordered
- Re-evaluate staffing load of Unit
- Balance technical needs of incident with staff needs of Unit
- Develop demobilization strategy early

EPA

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## Requesting Resources

ENVL

- ICS 213 RR Resource Request
  - List Item/Position
  - Time needed
  - Location
- PSC approval
- Check with RESL
- Submit request to Ordering Manager (LOGS)
- FOLLOW UP on request!

EPA

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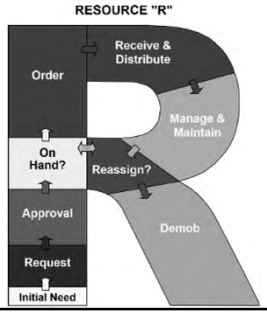
## Resource R

ENVL




EPA

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## Incoming Personnel

ENVL

- Assign personnel based on
  - Expertise
  - Training
  - Experience
- Briefing
  - Incident Status & Objectives
  - IAP & IMT Organization
  - Role of ENV

EPA

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## Managing the EU

ENVL

- Define priorities, goals and objectives
- Establish realistic timelines
- Reinforce the incident objectives
- Ensure everyone understands their responsibilities
- Monitor Unit personnel and performance

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## Managing the Unit

ENVL

- Get the appropriate Technical Specialists
- Thoroughly brief personnel
- Schedule incoming personnel
- Demobilize personnel
- Solicit feedback
- Keep everyone informed

COMMUNICATE!

EPA

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## Guidelines for Successful Unit Operations

ENVL

- Consider working conditions
- Coordinate with Operations
  - Eliminate duplication of effort
- Advise personnel on what requires Environmental Unit Leader approval
- Get the right resource, in the right place, at the right time

EPA

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## Communicate with IMT

ENVL

It is key to have
Open Communication
with all members of the IMT

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ENVL

# Review Job Aid

EPA 58

ENVL

## Summary

- Know your role
- Get the right expertise
- Delegate
- Set priorities & time lines
- Brief incoming personnel
- Demobilize personnel

COMMUNICATE!

EPA 59

ENVL

# Unit 2

*The Role of the ENVL at the Enbridge/ Marshal Oil Spill A Case Study*

EPA 1

## Objectives

ENVL

- Provide a real life example of the role of the Environmental Unit Leader.
- Demonstrate that the role of the ENVL can be multifaceted even on one event.
- Demonstrate how the role of the ENVL can change over time at an event.

EPA 2

## The Event

ENVL

- July 25, 2010 – a release from the Enbridge Pipeline at Marshall, MI
- 819,000 gallons reported spilled
- Heavy crude oil/tar sands blended with diluents
- Occurred during a flood event
- Unreported for over 17 hours
- Into Talmadge Creek then into the Kalamzoo River

EPA 3

## Immediate Effects

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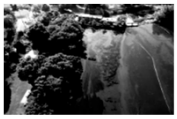
- Diluent volatilized – resulting in evacuation of residents
- All downstream 2.2 miles of Talmadge creek
- Oil migrated down 40 miles of Kalamazoo river
- Oil trapped in overbank, wetlands and flood plains when flood receded
- Oil eventually submerged and settled in Kalamazoo river



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## Initial Response

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- Hindered by flooding conditions
- Focused on Benzene in air/public health
  - > 200 residents evacuated
  - >97,000 monitoring data points
  - >6,500 samples
- Containment and Recovery
  - Excavation
  - Vacuum removal
  - Absorbent Materials

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## Overall Response

ENVL

- On the top of ongoing Deep Water Horizon (BP) response
- July 26, 2010 – November 18, 2014
- 40 miles of contaminated riverine and overbank environments
- 766,228 gallons of oil recovered from surface water
- 435,000 gallons of oil recovered from other sources
- Several science-based studies
  - Counter measures
  - Geomorphology of river
  - Re-suspension and biodegradation of submerged oil

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## Purpose of Environmental Unit

ENVL

The purpose of the Environmental Unit within the Planning Section was to provide scientific support to the FOSC throughout the response .

Source: FOSC report

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## Role of EU and ENVL

ENVL

- Varied over time based on needs of response and issues and events that occurred
- Strong association with Operations
- Included a counter measures group
- Liaison with multiple agencies – Environmental Advisory Group
- Eventually Environmental Advisory Group expanded into "Scientific Support Coordination Group" which replaced the EU
- Three General Phases

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## ENV in Initial Response Phase

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July/Aug 2010

- Air/Public Health Issues
- Special Projects – Liaison with Ops
- Environmental Advisory Group established (EAG)
- SCAT/ENV coordination to set up process and Shoreland Treatment Recommendations (STRs)
- Began evaluating Countermeasures
- Establish Data Flow
- OIL migration assessment
- QAPPs and data review

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## ENV in Intermediate Phase

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- Fall of 2010
- SCAT and data evaluation continues
- Clean up of Overbank areas, pooled and stranded oil
- Counter measures evaluations continue
- Evaluation of Submerged Oil and Sensitive Ecosystems – with OPS
- Liaison between OPS and EAG
- Special Projects

EPA 10

## ENV in Long Term phase

ENVL

- Winter of 2010/11 through November 2014
- Environmental Advisory Group → Scientific Support coordination Group - More like multiple research Projects
- "Micro cleanups"

EPA 11

## Initial Response Phase

ENVL

EPA

## Air/Public Health Issues

ENVL

- Health agencies from County, State and Federal
  - Ultimately became the Public Health Unit
- Identify chemicals of concern
- Establish air monitoring program for work zones and community
  - Secondary release points
- Develop action levels/decision criteria
  - Evolved as response moved from Initial -> Intermediate -> Long-term Phase
    - ✓ 9,000 ppb to 3 ppb
  - Account for limitations on instrumentation
- ID & mobilize appropriate resources & instrumentation

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## Instrumentation

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UltraRAE Benzene Monitor Real Time Detection Limit = 50 ppb

Tedlar Bag Grab Sample Detection Limit = 1 ppb

SUMMA Canister Grab or Time-Weighted Sample Up to 24 Hours Detection Limit = 1-5 ppb

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## Total VOC Concentrations Using Real-Time Monitors

ENVL

| Time Frame | Area | Number of Measurements | Range of Detections (ppb) |
|---|---|---|---|
| Initial Response (July 26-28, 2010) | Voluntary Evacuation Area | 92 | ND to 120,000 |
| | Squaw Creek Subdivision | 30 | ND to 71,600 |
| | Ceresco Area | 8 | ND to 6,000 |
| | Baker Estates Neighborhood | 2 | ND |
| Evacuation Period (July 29 to August 17, 2010) | Voluntary Evacuation Area | 2,164 | ND to 568,000 |
| | Squaw Creek Subdivision | 623 | ND to 2,600 |
| | Ceresco Area | 431 | ND to 3,000 |
| | Baker Estates Neighborhood | 511 | ND to 266,000 |
| Post Evacuation Period (August 18 to December 31, 2010) | Voluntary Evacuation Area | 4,278 | ND to 9,000 |
| | Squaw Creek Subdivision | 1,058 | ND to 1,200 |
| | Ceresco Area | 5,148 | ND to 2,800 |
| | Baker Estates Neighborhood | 767 | ND to 1,200 |
| 2011 | Voluntary Evacuation Area | 1,377 | ND |
| | Squaw Creek Subdivision | 508 | ND |
| | Ceresco Area | 785 | ND |
| | Baker Estates Neighborhood | 465 | ND |

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## Benzene Colorimetric Tube Measurements

ENVL

| Time Frame | Area | Number of Measurements | Range of Detections (ppb) |
|---|---|---|---|
| Initial Response | Voluntary Evacuation Area | 16 | ND to 10,000 |
| | Squaw Creek Subdivision | 6 | ND to 500 |
| | Ceresco Area | 3 | ND to 250 |
| | Baker Estates Neighborhood | 2 | ND |
| Evacuation Period | Voluntary Evacuation Area | 57 | ND to 500 |
| | Squaw Creek Subdivision | 10 | ND |
| | Ceresco Area | 26 | ND to 100 |
| | Baker Estates Neighborhood | 15 | ND |
| Post Evacuation Period | Voluntary Evacuation Area | 28 | ND |
| | Squaw Creek Subdivision | 10 | ND |
| | Ceresco Area | 30 | ND |
| | Baker Estates Neighborhood | 21 | ND |
| 2011 | Voluntary Evacuation Area | 40 | ND |
| | Squaw Creek Subdivision | 5 | ND |
| | Ceresco Area | 7 | ND |
| | Baker Estates Neighborhood | 1 | ND |

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ENVL

| Time Frame and Area | Screening Level (ppb) | Number of UltraRAE Monitor Readings | Number of UltraRAE Readings Above the Screening Level | Range of Detections with UltraRAE Monitors (ppb) | Number of HAPSITE Monitor Readings | Number of HAPSITE Readings Above the Screening Level | Range of Detections with HAPSITE Monitors (ppb) |
|---|---|---|---|---|---|---|---|
| **Initial Response (July 26-28, 2010)** | | | | | | | |
| Voluntary Evacuation Area | 60 | 13 | 8 | ND to 6,250 | 4 | 0 | 1.2 to 27.3 |
| Squaw Creek Subdivision | | 4 | 0 | ND | 0 | NA | NA |
| Ceresco Area | | 4 | 2 | ND to 500 | 0 | NA | NA |
| Baker Estates Neighborhood | | 1 | 0 | ND | 0 | NA | NA |
| **Evacuation Period (July 29 to August 17, 2010)** | | | | | | | |
| Voluntary Evacuation Area | 60 | 1,619 | 62 | ND to 2,200 | 24 | 0 | ND to 17.6 |
| Squaw Creek Subdivision | | 437 | 0 | ND to 50 | 7 | 0 | ND to 2.2 |
| Ceresco Area | | 271 | 1 | ND to 200 | 2 | 0 | ND to 0.2 |
| Baker Estates Neighborhood | | 264 | 1 | ND to 250 | 3 | 0 | ND |
| **Post Evacuation Period (August 18 to December 31, 2010)** | | | | | | | |
| Voluntary Evacuation Area | 6 | 3,005 | 17 | ND to 9,450 | NA | NA | NA |
| Squaw Creek Subdivision | | 274 | 0 | ND | NA | NA | NA |
| Ceresco Area | | 3,704 | 10 | ND to 4,500 | NA | NA | NA |
| Baker Estates Neighborhood | | 304 | 0 | ND | NA | NA | NA |
| **2011** | | | | | | | |
| Voluntary Evacuation Area | 3 | 1,010 | 0 | ND | NA | NA | NA |
| Squaw Creek Subdivision | | 465 | 0 | ND | NA | NA | NA |
| Ceresco Area | | 704 | 0 | ND | NA | NA | NA |
| Baker Estates Neighborhood | | 414 | 0 | ND | NA | NA | NA |

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17

## Health-Based and Worker Screening Levels

ENVL

- 9,000 ppb 8-Hour AEGL (1-Hour AEGL = 52 ppm)
- 1,000 ppb OSHA Permissible Exposure Limit
- 500 ppb MIOSHA Permissible Exposure Limit
- 9 ppb ATSDR Acute MRL
- 6 ppb ATSDR Intermediate MRL
- 3 ppb ATSDR Chronic MRL

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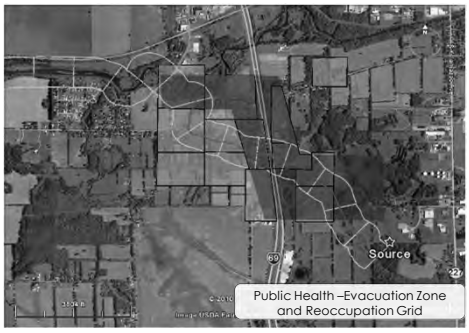
18

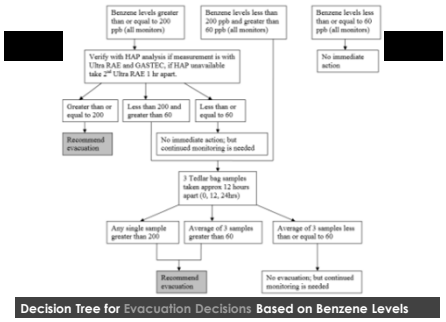
ENVL




Public Health –Evacuation Zone and Reoccupation Grid

EPA 19

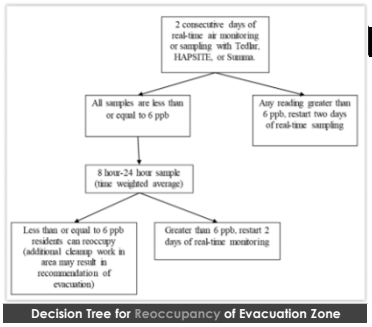
ENVL




Decision Tree for Evacuation Decisions Based on Benzene Levels

EPA 20

ENVL




Decision Tree for Reoccupancy of Evacuation Zone

EPA 21

## Special Projects – Liaison with Ops

ENVL

- Contingency planning for loss of containment to downstream
  - Special consideration of impacts on PCB contaminated sediments downstream
- Containment, recovery and assessment strategies
  - Submerged oil
- Modeling migration (Gabion Baskets)
- Sensitive, Historic and Tribal area identification
- Coordination with
  - Environment Canada
  - NOAA
  - USGS
  - Each brought in for various expertise

EPA 22

## Environmental Advisory Group

ENVL

- To provide scientific and technical support to IC
- Multi-agency
- Multi-disciplines
- Within Environmental Unit
- Reviewed Plans
- Inspected and evaluated overbank area
- Developed Cleanup Instruction Document for OPS
- Assisted in establishing consistent SCAT procedures

EPA 23

## SCAT/ENV coordination to set up process and Shoreland Treatment Recommendations (STRs)

ENVL

- Coordinated with Natural Resource Damage assessment (NRDA) trustees
- Standardized terminology used to document shoreline oiling conditions
- Utilized GPS enabled PDAs – Point Locations
- 5 –Step iterative process
- Addressed visible oil with standard methods

EPA 24

## Began evaluating Countermeasures

ENVL

- Multiple forms of oil to consider
  - Free flowing
  - Viscous and semi-solid
  - submerged
- Need for multiple recovery techniques
  - Gabion baskets
  - Boom
  - Aeration
  - In-situ burning
  - Recovery and removal of oil and vegetation
  - dispersants

EPA 25

## Establish Data Flow

ENVL

- Data Management Unit was established
- SCRIBE was utilized
- Mainly run by START
- Coordinated with EU and SIT

EPA 26

## Intermediate Phase

ENVL

EPA 27

## SCAT continues

ENVL

- Addressed oil-saturated soil
- Development of Phase 2 cleanup methods
- Habitat types identified
- Habitat-specific Phase 2 cleanup recommendations made
- Hot shot teams for spot clean ups during re-eval

EPA 28

## Clean up of Overbank areas, pooled and stranded oil

ENVL

- Portable vacuum
- Absorption techniques
- Manual removal
- Vegetation removal
- Water washes

EPA 29

## Counter measures

ENVL

- Studies continued

EPA 30

## Evaluation of Submerged Oil and Sensitive Ecosystems – with OPS

ENVL

- Qualitative assessment
- Quantitative assessment
- Ecological Habitat assessment
- Cleanup Recommendations

EPA 31

## Liaison between OPS and EAG

ENVL

- EAG meet biweekly
- Reviewed/revised plans
- Provided input on daily basis via ENVL and daily OPS Report out meeting

EPA 32

## Special Projects

ENVL

- Unknown vapors on islands
- Lab venting into warehouse

EPA 33

## Typical Daily Routine - Intermediate phase

ENVL

- Attend Ops Briefing
- Attend Command & General Staff – non active participant
- Coordinate with OPS & PRP counterparts on plans
- Attend OPS report out meeting
  - Mainly in regards to identifying and addressing sensitive environments
  - Liaison for Science Team
- Prepare items for IAP
- Evaluate and interpret Data as received
- Special Projects

EPA 34

## Long term Phase

ENVL

EPA 35

## Environmental Advisory Group → Scientific Support coordination Group

ENVL

- Established in 2011
- Government, academia and consulting fields
- Charged with providing technical expertise on several topics including
  - Detecting submerged oil
  - Submerged oil quantification (SOQ)
  - Oil chemistry
  - Hydrodynamic modelling
  - Effects of temperature
  - Biodegradation of submerged oil

EPA 36

## "Micro cleanups"

ENVL

- Final SCAT phase (check up and acceptance of remaining "hot spots")
- Disposal of remaining "oiled/oil contaminated debris"
- Response to reemerging sheens

EPA

37

## Questions

ENVL

EPA

38

ENVL

# Environmental Unit Leader
# Unit 3
*Risk Information*

EPA 1

ENVL

## Objectives for this Training Unit:

- Obtain a working knowledge of what action levels are and where one can find action levels for different potentially exposed populations

EPA 2

ENVL

## Risk Management

- Hazard Identification
- Dose-response Assessment
- Exposure Assessment
- Risk Characterization
- Risk Management Decisions

Source: EPA Office of Research and Development.

EPA 3

## Indoor Screening / Clearance Goals

ENVL

- Chemicals
  - Agency method under continuous refinement and expansion
- Radiologicals
  - Based on **dose** measurement
- Biologicals
  - Based on detection of viable organisms through culture

EPA 4

## Indoor Screening / Clearance Goals

ENVL

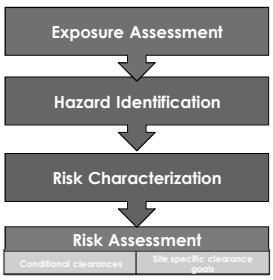
- **Chemicals**
  - **Agency method under continuous refinement and expansion**
- Radiologicals
  - Based on **dose** measurement
- Biologicals
  - Based on detection of viable organisms through culture

EPA 5

## Chemical Benchmarks and Criteria

ENVL

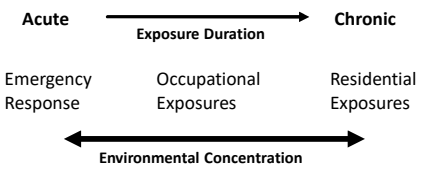
- **Considerations**
  - **Agent dependent:** Dose response relationship, mechanism of toxicity, individual sensitivity (children, older persons)
  - **Site dependent:** What is the toxic agent? Chem, Bio, or Rad. Site characteristics (inside building, outside, etc.). Fate and transport.
  - **Exposure:** magnitude (how much), duration (how long), and frequency (how often)
- **Risk Assessment**
  - Defines the probability of a harmful effect to a population or individuals after exposure to toxic agent
  - Can NOT assess or include past exposures




EPA 6

## Chemical Exposure Concentration / Time Continuum

ENVL




EPA 7

## Action Levels for Responders

ENVL

**Population:** Responders

- Time frame
  - Minutes (IDLH, AEGL, TEEL)
  - Hours (ERPG, AEGL, EEGL)
  - One day (EEGL, AEGL)
- Effects
  - None
  - Mild
  - Severe or Life Threatening
- Media: Air

**Responder Action levels**

- US EPA Acute Exposure Guideline Levels (AEGLs)
- NIOSH Immediately dangerous to life or health (IDLH)
- AIHA Emergency Response Planning Guides (ERPGs)
- US DOE's Temporary Emergency Exposure Levels (TEELs)
- NRC's Emergency Exposure Guidance Levels (EEGLs)

https://www.epa.gov/sites/production/files/2015-09/documents/appc.pdf

EPA 8

## Action Levels for Workers

ENVL

**Population: Workers**

- Time frame
  - 8 - 10 hours per day (TWA)
  - 15 minute (STEL)
  - Instantaneous (Ceiling)
- Effects
  - None, for most workers
  - Or a specific risk level
- Media: Air

**Occupational Exposure Limits**

- OSHA Permissible Exposure Limits (PELs)
- NIOSH Recommended Exposure Limits (RELs)
- ACGIH Threshold Limit Values (TLVs®)
- AIHA Workplace Environmental Exposure Limits (WEELs)

EPA 9

## Action Levels for Residential

ENVL

**Population: General Public including sensitive individuals**

- Time frame
  - Lifetime (RfC, RfD, MRL)
  - 1 day, 30, 90 and 2 years (PALs)
  - 1-24 hours (SPEGL)
- Effects
  - None,
  - Or a specific risk level
- Media: Contact, Oral, Inhalation

**2003 OSWER Directive 9285.7-53**

- **Tier 1- EPA's Integrated Risk Information System (IRIS)**
- **Tier 2- EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) –** The ORD/NCEA Risk Technical Support Center (STSC)
- **Tier 3- Other Toxicity Values –** Tier 3 includes additional EPA and non-EPA sources of toxicity information.

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## Indoor Screening / Clearance Goals

ENVL

- Chemicals
  - Agency method under continuous refinement and expansion
- **Radiologicals**
  - **Based on dose measurement**
- Biologicals
  - Based on detection of viable organisms through culture

EPA United States Environmental Protection Agency 11

## Protective Action Guides (PAGs) for Radiological Incidents

ENVL

| Phase | Protective Action Recommendation | PAG |
|---|---|---|
| **Early** | | |
| | Sheltering in-place of the public | 1 to 5 rem |
| | Evacuation of the public | 1 to 5 rem |
| | Administration of prophylactic drugs –KI | 5 rem |
| | Limit emergency worker exposure | 5 rem or greater |
| | Life savings | up to 25 rem |
| **Intermediate** | | |
| | Relocation of the public | 2 rem (1st year)<br>500 mrem/year |
| **(later years)** | | |
| | Food Interdiction | 500 mrem/year |
| | Drinking water interdiction | 500 mrem/year |
| | Limit Worker Exposure | 5 rem/year |
| **Late** | | |
| | Final site clean up and restoration Site-specific optimization | |

rem = roentgen equivalent man (relates absorbed human tissue dose to effective biological damage)

http://www.remm.nlm.gov/radmonitor_water_food.htm

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## Radiation Benchmarks and Criteria

ENVL

- **Risk Assessment**
  - Defines the probability of a harmful effect to a population or individuals after exposure to toxic agent
- **Risk Considerations**
  - **Isotope dependent:** Likely radionuclides in an RDD include: Cs-137, Sr-90, Co-60, Am-241, Ra-226, Ir-192, Pu-238 and Pu-239/240
  - **Dose:** is a measure of radiation per mass at the biological target site
  - **Exposure:** is a measure of a radiation present at a point of contact

**RAGS Part A. Ch. 10 Radiation Risk Assessment Guidance**

"There are special hazards associated with handling radioactive waste and EPA ***strongly recommends*** that a health physicist experienced in radiation measurement and protection be consulted prior to initiating any activities at a site suspected of being contaminated with radioactive substances."

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## Radiation Benchmarks and Criteria

ENVL

- There are **existing benchmarks**, in the form of requirements
  - ** Less than ($10^{-4}$ to $10^{-6}$) excess cancer risk, or
  - Less than (100 or 25 or 15 or 4 mrem) dose, or
  - License / owner conditions
- There are also recommendations
  - e.g., screening levels for soil
  - Derived Intervention Levels (DILs) are specific for each radionuclide in soil or food items

** does not consider probability times consequence

EPA United States Environmental Protection Agency 14

## Indoor Screening / Clearance Goals

ENVL

- Chemicals
  - Agency method under continuous refinement and expansion
- Radiologicals
  - Based on **dose** measurement
- **Biologicals**
  - **Based on detection of viable organisms through culture**

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## Biological Benchmarks and Criteria

ENVL

- EPA response to emergency response to Biological Agents is relatively new
- Guidance for cleanup goal determination available for Anthrax
  - EPA and Centers for Disease Control and Prevention (CDC) developed a strategy for evaluating anthrax contamination in building and outdoors. (The effort with CDC was completed a few years ago. The product is still the 2012 doc referenced below.)
    - ✓ Interim Clearance Strategy, February 2012
    - ✓ "no detection of viable spores"
- With no formal guidance for other biologicals, site specific clearance goals will be developed for future incidents.
    - ✓ Recommend the development of an Environmental Clearance Committee (ECC) early in response
    - ✓ ECC can include SMEs and local public health representatives
- ECC can assist with interpretation of laboratory data for extent and clearance

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## Summary of preliminary benchmarks and criteria

ENVL

- What agent (CBR) do you think is there or not there?
- What is your detection limit? You only find what you are looking for!
- What population(s) are you trying to protect?
  - Will target populations change during the event?
- How long are you trying to protect them?
- No number is a 'bright line'
- Please don't say 'safe'

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## Unit Summary

ENVL

**At The Conclusion Of This Unit, Are You Now Able To?:**

- Obtain a working knowledge of what action levels are and where one can find action levels for different potentially exposed populations

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ENVL

QUESTIONS?

EPA United States Environmental Protection Agency

19

ENVL

# Environmental Unit Leader Unit 4

*Quality In Response*

EPA 1

## Quality in Response

ENVL

- What You Do As ENVL
  - Communicate, Coordinate, Cooperate
  - Plan
  - Analyze
  - Make decisions with tight deadlines
  - Assure Quality in the response
- PRESSURE!

EPA 2

## Quality in Response

ENVL

- Unit # Objectives -
  - Understand the:
  - Need for Quality Assurance in Response
  - Need for Systematic Planning
  - Purpose of a QAPP/sampling plan
  - Development of a QAPP/sampling plan

  Identify useful guidance and templates for QAPP/sampling plan development

EPA 3

## Quality in Response

ENVL

- Quality Assurance -Where the rubber meets the road
  - What is it?
  - How do we do it?
  - Why?

EPA 4

## Quality Assurance

ENVL

a program for the systematic monitoring and evaluation of the various aspects of a project, service, or facility to **ensure that standards of quality are being met**

Merriam Webster – Online Dictionary

EPA 5

## EPA's Quality Program

ENVL

The EPA Quality Program provides requirements for conducting quality management activities for all environmental data collection and environmental technology programs performed by or for the Agency. **The primary goal of the program is to ensure that the Agency's environmental decisions are supported by data of known and documented quality.**

EPA 6

## How did we do it?

ENVL

- Documenting
  - What we plan to do
  - What we did
  - That we did what we planned
  - AND if we didn't, how we are addressing it or fixing it.

EPA 7

## Documenting Quality

ENVL

- Documentation of processes and procedures reduces vulnerabilities and increases:
  - Scientific Integrity
  - Justification of Resource Expenditures
  - Transparency of Activities
  - Reliability of Data
  - Defensible Decisions

EPA 8

## Why do we do it

ENVL

- Legal
- Policy
- Public Trust

EPA 9

## Legal

ENVL

- Information Quality Act - Section 515 of the Consolidated Appropriations Act, 2001 (Pub. L. 106-554)
- Contract Regulation - 48 CFR 46
- Assistance Agreements Regulations
  - 2 CFR 1500.11
  - 40 CFR 35

EPA 10

## EPA Quality Policies

ENVL

- CIO 2105.0 –Policy and Program requirements for the Mandatory Agency-Wide Quality System
- Procedures CIO 2105.P.02
- EPA QA Field Activities Procedure, CIO 2105-P-02.0, 09/23/2014

EPA 11

## What is the QA Process?

ENVL

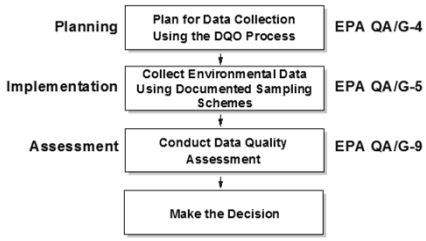
- Planning
- Implementation
- Evaluation/Assessment
  - PIE – Easy to remember and tastes good too.


In this unit we will only be discussing the Planning portion

EPA 12

## QA in the Project Life Cycle

ENVL




EPA 13

## Planning

ENVL

It's the most important component of the quality process.
Remember:
**Proper, Prior, Planning, Prevents, Piss, Poor, Performance**.

EPA 14

## Looking Forward

ENVL

- What decisions are next?
- Start Planning for the next decision NOW!
- Health and Safety vs. Risk

EPA 15

## Exit Strategy

ENVL

- Plan your exit strategy (assuming you ever want to go home…)
- What is the goal (realistic and achievable)?
- What are your objectives?
- Use planning tools (QAPPs/Sampling Plans)
- Get it Done!

EPA 16

## Planning for Emergency Response

ENVL

- Involves:
  - Evaluating the situation.
  - Developing incident objectives.
  - Selecting a strategy.
  - Deciding which resources to use to implement and achieve the objectives in the safest, most efficient and cost-effective manner.
  - Evaluate Progress

EPA 17

## Systematic Planning

ENVL

- Agency policy requires the use of a systematic planning process to develop performance criteria
  - Data Quality Objectives (DQOs)
    - ✓Addresses the decision or study questions (performance criteria)
  - Measurement Performance Criteria
    - ✓Addresses measurements used to support the decision or study question (acceptance criteria)

EPA 18

## Steps in Systematic Planning

ENVL

- Organization
- Project goal
- Schedule
- Data Needs
- Criteria
- Data collection
- Quality assurance
- Analysis

EPA 19

## What are DQOs?

ENVL

- DQOs are quantitative and qualitative criteria that:
  - Clarify study objectives
  - Define appropriate types of data to collect
  - Specify the tolerable levels of potential decision errors
- Designed to answer:
  - What do you need?
  - Why do you need it?
  - How will you use it?
  - What is your tolerance for error?

EPA 20

## DQO Process

ENVL

1. State the problem
2. Identify the goal of the study (decision to be made)
3. Identify the information inputs
4. Define the boundaries of the study
5. Develop the analytical approach
6. Specify performance or acceptance criteria
7. Develop the plan for obtaining data

EPA 21

## DQO Process

ENVL

State the Problem

- Identify leader (you?) and members of the planning team
- Concise description of the problem
- Develop conceptual model of the problem
- Determine resources-budget, personnel and time schedule
- What issues may have an impact on the decision? (Social/political)

EPA 22

## DQO Process

ENVL

Identify the goal of the study
(In the case of Response)

- Develop decision statement
- Organize multiple decisions

EPA 23

## DQO Process

ENVL

Identify Information Inputs

- Identify type and sources of information needed to resolve decisions
- Identify basis of information that will guide or support choices in later DQO process
- Identify the information needed to establish the action levels
- Select sampling and analytical methods for generating information

EPA 24

## DQO Process

ENVL

End user of Data
(Analyses…risk assessor, air modeler, etc..)

Unless you know what they need, how do you make the determination on what to collect

EPA 25

## DQO Process

ENVL

Define Boundaries of the Study

- Define spatial boundaries (populations of interest, geographic, media of concern)
- Specify temporal boundaries (time frame to which results apply and when to collect data)
- Identify physical constraints associated with sample/data collection
- Define a scale of decision making (specify smallest unit on which decisions can be made)

EPA 26

## DQO Process

ENVL

Develop the Analytical Approach

- Specify appropriate population parameters for making decisions
- Choose an Action Level and generate an If….Then…Else/Or decision rule

EPA 27

## DQO Process

ENVL

End User

How will “they” determine if you are meeting the goal/decision?

EPA 28

## DQO Process

ENVL

Specify Performance or Acceptance Criteria

- Specify the decision rule as a statistical hypothesis ( as if/then…)
- Examine consequences of making incorrect decisions from the test
- Place limits on the likelihood of making decision errors

EPA 29

## DQO Process

ENVL

Develop Detailed Plan for Obtaining Data

- Compile information from information inputs
- Use this information to identify sampling and analysis designs appropriate for your use
- Select and document a design that will yield data that will achieve your performance criteria

EPA 30

## Developing the Plan

ENVL

- QAPP – Incorporates all aspects of the project, sampling or monitoring event.
- Sampling Plan – Essentially the content of a sampling plan addresses several elements of a QAPP

EPA 31

## QAPP/Sampling Plan Purpose

ENVL

- To ensure that data are representative of target population
- To ensure that data are defensible for their intended use
- To ensure efficient use of time, money, and resources

EPA 32

## QAPP Elements

ENVL

- **Title & Approval Sheet**
- **Table of Contents**
- **Distribution List**
- **Problem Definition/Background**
- **Project/Task Description**
- **DQOs and Measurement Criteria**
- Special Training Requirements/Certifications
- Documentation and Records

EPA 33

## QAPP Elements

ENVL

- **Sampling Design**
- **Sampling Methods**
- **Sample Handling and Custody**
- **Analytical Methods**
- **Quality Control**
- Instrument/Equipment
  Testing, Inspection, Maintenance, Calibration & Frequency
- Supplies & Consumables

EPA 34

## QAPP Elements

ENVL

- Data Acquisition Requirements
- Data Management
- Assessments
- Reports to Management
- Data Review, Validation and Verification Requirements
- Reconciliation with End Users requirements

QAPP Elements

EPA 35

## QAPP/Sampling Plan Development

ENVL

- QAPP/Sampling Plan Formats Vary
  - From Region to Region or HQ to Region
  - Separate Documents (SAP, FSP and QAP) but covers all elements of a QAPP
  - Documents are Combined into one document called a QAPP
- Not a one size fits all approach
- For the purpose of this section we will use the term “QAPP”

EPA 36

## Use a Scoping Team

ENVL

- ENV. Leader or ENV. Unit representative
- OPS representative
- SIT Unit representative – maps/charts
- Data Management Coordinator
- Lab coordinator
- Technical specialists

EPA 37

## Systematic Planning & Data Quality Objectives

ENVL

- In the scoping meeting, determine the DQOs:
  - What is the purpose of the sample collection?
  - Who will use the data?
  - What decisions will be based on the data?
  - What detection limits are needed?
  - Are samples evidentiary?

EPA 38

## Sampling Design Process

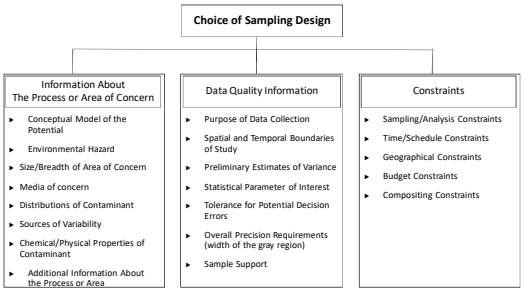
ENVL

- Use the Data Quality Objectives Process
- Factors in Selecting a Sampling Design
  - Information about the Area of Concern
  - Data Quality Information
  - Any Constraints

EPA 39

## Factors to Consider

ENVL




EPA

40

## Sampling Design

ENVL

- What turnaround time is required?
- Are there critical sample locations?
- Are there evidence markers?
- Are there photos?

EPA

41

## Sampling Design

ENVL

- Talk about the overall Sample strategy
- Decide what is the most appropriate design
  - Random (unbiased) sampling design?
  - Judgmental (biased) sampling design?
  - Discrete or composite?
  - Sampling grid or no grid?

Guidance for Choosing a Sampling Design for Environmental Data Collection, QA/G-5s

EPA

42

## Sampling Design/Methodology

ENVL

- Number of samples
- Location of samples
- Timing of samples
- Justification for the number, location and timing
- Type of samples
- Media
- Sampling methodology
- Analytical Methods


EPA 43

## QAPP/Sampling Plan

ENVL

Assign ENV personnel to work with OPS personnel to begin generating a QAPP, in accordance with EPA's QAPP guidance.

http://www.epa.gov/quality

EPA 44

## Guidance For Sample Design & QAPPs

ENVL

- Guidance for Quality Assurance Project Plans, EPA QA/G-5
- Guidance on Choosing a Sampling Design for Environmental Data Collection, EPA QA/G-5s
- Guidance on Systematic Planning using the Data Quality Objectives Process, EPA QA/G-4

http://www.epa.gov/quality

EPA 45

## Sampling Plans in the ICS

ENVL

- Full sampling plan
- Generic to site specific SAP/QAPP
- ICS 204

EPA United States Environmental Protection Agency 46

## Generic Sampling Plans

ENVL

- Initial Generic QAPP already approved
- Site-Specific QAPP Addendum serves as SAP/QAPP

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## ICS 204

ENVL

Note the reference to special instructions on ICS 204

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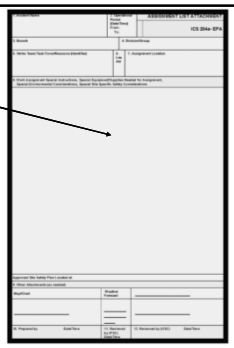
## ICS 204a-EPA

- More specific instructions with regard to sampling protocols
- Identifies key points for samplers
- Sampling plan is made available to sampling teams for more comprehensive communication



ENVL

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49

ENVL

# Sampling Plan Unit 5

*Questions*

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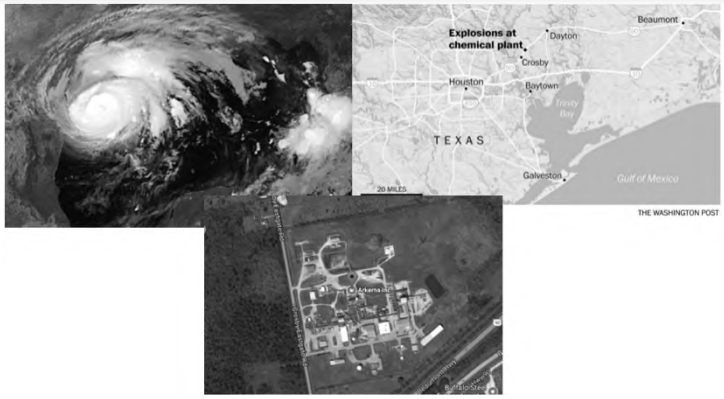
50

# Arkema, TX




N-IMAT deployment to R6; Hurricane Harvey Response;
August 29 – September 4, 2017

https://youtu.be/jtWyBMwRt-A

2

# Modeling Summary

- Known Information: Generators at the Arkema Chemical Plant, Crosby, Texas are no longer providing cooling to stored chemicals as a consequence of Hurricane Harvey. The facility contains Chlorine (~ 300 lb), **sulfur dioxide (~32,000 lb)**, **Organic Peroxide (~ 0.25 million lb), and 38,000 lb isobutylene**.

- Modeling Assumptions:
  1. Sulfur dioxide modeled as a stuck open relief valve.
  2. Fire/explosion of a single or multiple (2) or (6) trailers with organic peroxides, 38,000 lb of peroxide per trailer. Organic peroxides can spontaneously detonate due to SADT (self-accelerating decomposition t) if not kept cool.
     - Peroxide fire modeled as benzoyl peroxide, a confined pool fire of approximately one - two hours and more lofting due to oxygenates.
  3. Isobutylene BLEVE (boiling liquid expanding vapor explosion) was modeled using TNT equivalents. For this to occur, the tank would have to be leaking and extremely hot.
  4. Soot from organic peroxides burning is presented as a 2.5 micron Particular Meter dosage tablets estimates and translates up to 6 km linear radius effects (level C protection and cartridge performance monitoring the closer it gets to burning surface) and up to 1.6 km vertical unhealthy estimates

3

# Day 1: August 29, 2017

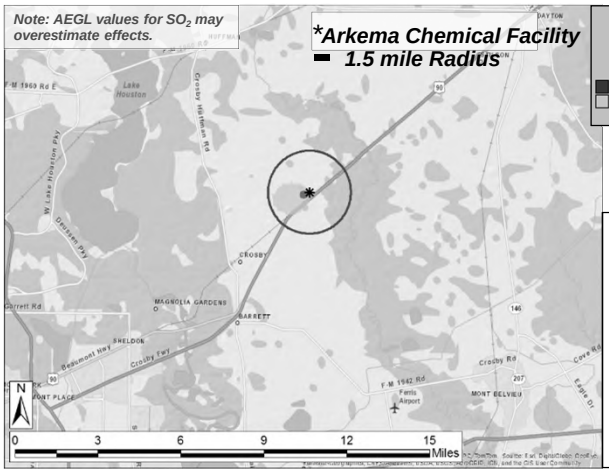
- **1830** – **1835** Initial EPA call for partial IMAAC activation at for Hurricane Harvey support
- **1905** – IMAAC activation via FEMA operations at the request of Federal/Texas State emergency operations
- **1925** – First trailer's fire/explosion and plume product release – evaluation of the possibility of continuous release of

- up to 300 lbs. of Chlorine,
- 12,000lbs. Sulfur Dioxide (later changed to 32,000 lbs. by Arkema)
- 38,000 lbs. Isobutylene BLEVE
- Possibility of fire/explosion of two additional trailers with organic peroxides located near first burning trailer ( 2 x 38,000 lbs. = 200,000 lbs. TNT) - ***initial plumes gives preliminary ideas for feasible locations.***

- **1945** – First teleconference held. Plant workers **e*vacuated; road closures imposed initial plume provided scale of problem/area of concern – confirmed evacuation area size.***
- ***2000 (approx) –*** *Evacuation of 1.1 mile radius order given to locals by Crosby Officials and 1.5 mile by EPA*

4

# $SO_2$ (Release Starting @ 03 SEP 3:00 PM CDT) – Update #8




**FACTS**

Crosby, Texas
Location: 29.9491° N/ 95.0211° W
Event Time: 3:00 PM CDT, 03SEP2017
Type: Sulfur Dioxide
Amount: 32,000 lb (16,000 lbs/hr)
Dissemination: Release over 2 hours
Weather: 3 km NAM
Model: HPAC 6.4
Static Population Estimates: LandScan 2015

5

# Acute Exposure Guideline Levels (AEGL)

| Value | Description |
|---|---|
| AEGL-3 | **Death Possible** - the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death. |
| AEGL-2 | **Injury Possible** - the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. |
| AEGL-1 (May not be displayed or defined) | **Threshold** - the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. |
| 10% AEGL-2 Possible or 10% AEGL-1 Possible | 90% confidence level that exceeding AEGL-2 or AEGL-1 is possible. If **black**, this contour accounts for both atmospheric effects and weather uncertainty. If **blue**, this contour accounts for only atmospheric effects. |

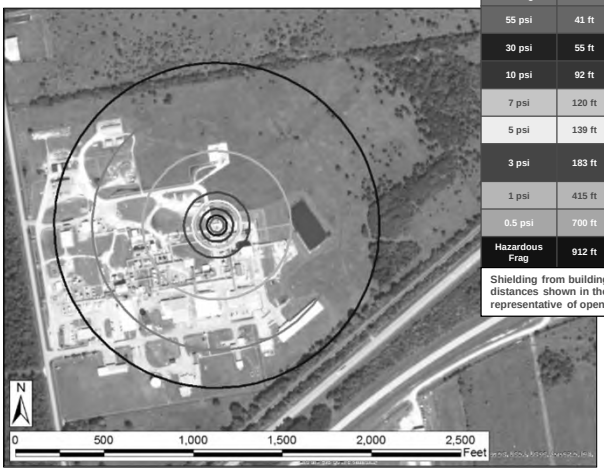
AEGLs represent threshold exposure limits for the general public and are applicable to emergency exposure periods ranging from 10 minutes to 8 hours. It is believed that the recommended exposure levels are applicable to the general population including infants and children, and other individuals who may be susceptible.

**FINAL AEGLs –** may be used on a permanent basis by all federal, state and local agencies, and private organizations. **INTERIM AEGLs –** represents the best efforts of the AEGL Committee to establish exposure limits, and the values are available for use as deemed appropriate on an interim basis by federal and state regulatory agencies and the private sector.

*Notes:* Casualty numerical figures are based upon a population database (LandScan). LandScan is based on the 2010 census for the U.S. (other nations vary), overhead imagery, geo-economic, and other observable data and was updated in 2015. The population numbers next to associated hazard levels are the people contained within the entire contour based **upon average day and night** time LandScan 2015 data. **Also available are the average day or night** time LandScan 2012 data (US only). For planning purposes, estimates are assumed to be accurate within +10/-5%. Validation testing indicates agreement within 20% for select examined areas. The population data will not predict major shifts in personnel such as relocations (i.e.: religious pilgrimages, refuges, evacuations), events (i.e.: inaugurations, Olympics), or other population shifts. In such cases the population database needs to be updated to reflect actual conditions.

6

# Human Injury & Structural Damage Contours – Isobutylene BLEVE




| Overpressure & Frag | Distance | Human Injury/Structural Damage (details on following slides) |
|---|---|---|
| 55 psi | 41 ft | 100% fatalities<br>Complete structure blowout |
| 30 psi | 55 ft | Near 100% fatalities<br>Destruction of primary structural components |
| 10 psi | 92 ft | High fatality rate<br>Severe damage to primary structural components |
| 7 psi | 120 ft | Widespread fatalities, 50% eardrum rupture<br>Damage to primary structural components |
| 5 psi | 139 ft | Universal injuries<br>Severe damage to light structures |
| 3 psi | 183 ft | Serious injuries common<br>Light damage to primary structural components, light structures damaged |
| 1 psi | 415 ft | Light injuries occur<br>Non-structural component severe damage. |
| 0.5 psi | 700 ft | Temporary eardrum damage<br>Glass breaks, non-structural components damage |
| Hazardous Frag | 912 ft | Probability of being struck in the open by primary/hazardous fragmentation is less than 1%. |

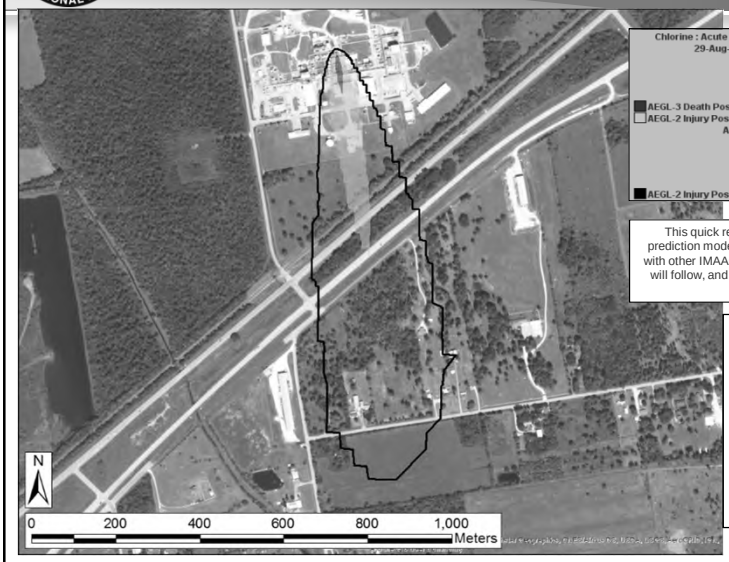
**Shielding from buildings can reduce the hazard-to-effect contour distances shown in the slides. The contours produced are representative of open terrain effects.**

**FACTS**

Crosby, Texas
Location:
29.949° N / 95.022° W
Amount: 780.4 lb TNT-equivalent
Model: BOOM (JIEDDO)

7

# Chlorine (4 Hour) – Initial Response




**Chlorine : Acute Exposure Guideline Levels (FINAL)**
**29-Aug-17 23:30:00Z (60.000 min)**

**Mean Area**

| | Value | In contour population |
|---|---|---|
| AEGL-3 Death Possible | 3.0 | 0 |
| AEGL-2 Injury Possible | 2.0 | 5 |

AEGL-1 not displayed

**Area of Concern**

| | Value | In contour population |
|---|---|---|
| AEGL-2 Injury Possible | 2.0 | 39 |

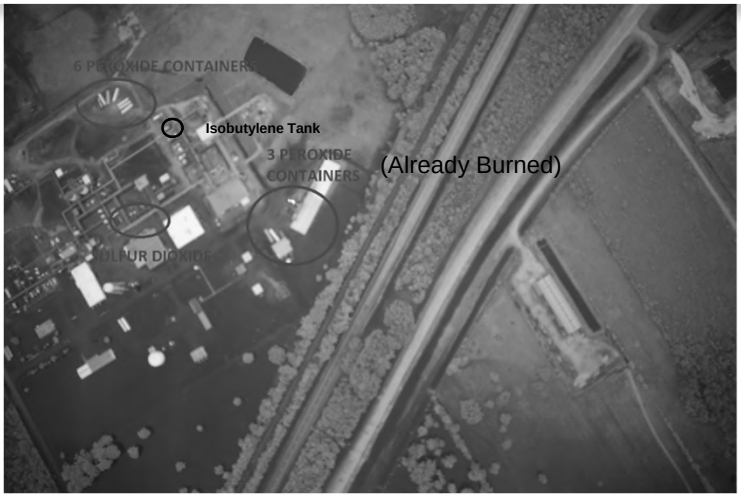
This quick response used a weather prediction model; and was not coordinated with other IMAAC participants. Coordination will follow, and product will be updated as needed.

**FACTS**

Crosby, Texas
Location: 29.949° N/ 95.022° W
Event Time: 1330 PM, 29AUG2017
Type: Chlorine
Amount: 300 lb
Dissemination: Continuous Release
Weather: 3 km NAM
Model: HPAC 6.4
Static Population Estimates:
LandScan 2015

8

# Location Overview – Near View




9

# Day 2 - August 30, 2017

**0030** – IMAAC product updated weather with soot and sulfur dioxide added.
***IMAAC product establishes scale of downwind hazard; hazard does not suggest additional immediate actions.***

**0800 (approx) – fires/explosions of 2 trailers (predicted by N-IMAT) - 15 Deputies hospitalized**

**0930 –** IMAAC product requested by NOAA, JTFCS, NGB, CBIRF, TRANSCCOM, and NORTHCOM

**30 Aug cont' through 03 Sep 2017 activities**

Arkema starts releasing info to N-IMAT (thermo-monitoring graphs, lists of peroxides transferred to trailers with some limited SDSs, self accelerating decomposition temperatures (SADTs), etc.)

Updated products sent out to EPA N-IMAT and than to unified operations every 12 hours:

- IMAAC models updated with in situ observations/data from N-IMAT EUL and weather from NOAA

- updated IMAAC models/products with interpretations and predictions of chemical's behavior send to field ops*

- TRANSCOM imposed no fly zones for day/night flight rescue operations (except ASPECT flights over)

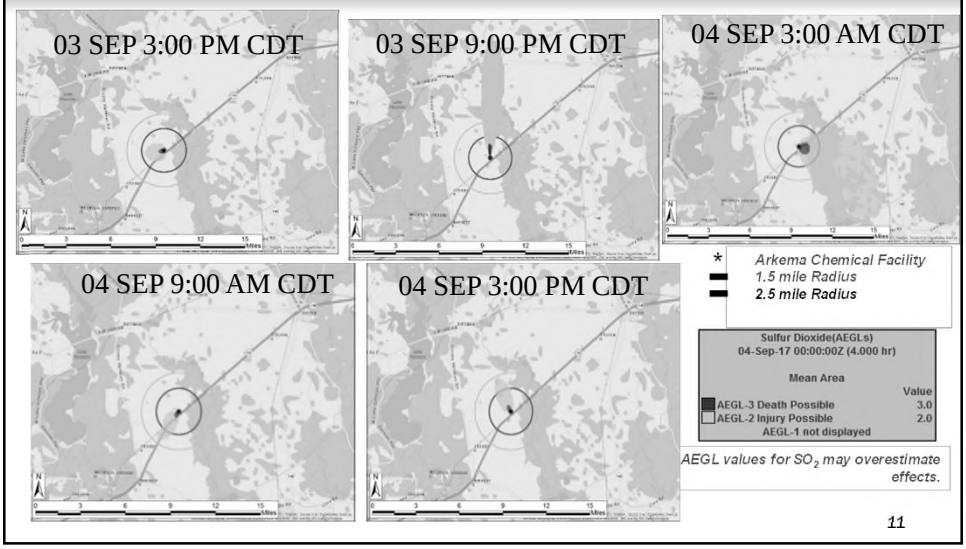
**3 Sep – six** remaining trailers with hydrogen peroxide (up to 38 000 lbs each) were intentionally ignited to avoid predicted explosions (based on EPA's interpretation of trailer's infrared thermo-data, IMAAC models and ASPECT's photos within N-IMAC EUL calculated timeframe)

**4 Sep –** mandatory evacuation lifted; IMAAC deactivated

**Total IMAAC products: 10 Pre-IMAAC: 4**

10

# $SO_2$ (Release Starting @ 03/09 3:00 PM CDT; Ending @ 04/09 3:00 PM CDT)




*AEGL values for $SO_2$ may overestimate effects.*

11

# Soot – Burning Trailers – (Starting @ 03/09 3:00 PM CDT; Ending @ 04/09 3:00 PM CDT T)


**Note**: Hazard is from estimated incidental material burning (e.g. tires, trailer, insulation). The combustion products from organic peroxide constitute minimal atmospheric hazards.

12

# Soot – Concentration

| Value | Description |
|---|---|
| **Hazardous** | Serious risk of (1) respiratory symptoms in children/adults, (2) aggravation of heart or lung disease, and (3) premature mortality in persons with cardiopulmonary disease and the elderly. |
| **Very Unhealthy** | Significant increase of (1) respiratory symptoms in children/adults, (2) aggravation of heart or lung disease, and (3) premature mortality in persons with cardiopulmonary disease and the elderly. |
| **Unhealthy** | Increased (1) respiratory symptoms in children/adults, (2) aggravation of heart or lung disease, and (3) premature mortality in persons with cardiopulmonary disease and the elderly. |

Cumulative dosage values based on exposure to 2.5um particulate matter. Concentration values and descriptions taken from Pollutant-Specific Sub-indices and Health Effects Statements and Cautionary Statements for Guidance on the Air Quality Index tables, in *Guidelines for Reporting of Daily Air Quality – Air Quality Index (AQI)*, USEPA, EPA-454/B-06-001, May 2006.

13

# Summary

- DTRA Technical Reachback synchronized with EPA N-IMAT and National/TX Emergency operations centers schedules
- IMAAC models ( more than 70) provided explosive equivalent and continuous updated toxicological information to EPA's N-IMAT for interpretation and sharing with counterparts and the local first responders and for justified predictions of possible outcomes
- Updated hazard plume analyses and multi source data interpretation used for *real decisions* as the incident evolved over a week period (remote controlled ignition of the 6 remaining trailers with organic peroxides was suggested by N-IMAT EnvUL along with the best implementation scenario (date and time) and it was executed successfully as proposed
- Local, County, State, Regional, Federal coordinated
- 15 deputies admitted, 13 released from the hospital: Respiratory issues, skin irritation, and nausea ( many more casualties were prevented)
- CSB's investigation conducted during January - June 2018 concluded that the EPA N-IMAT suggested evacuation zone was based on justified modeling and was appropriate for the events

14

ENVL SITL

# Unit 6 Situation Unit Leader/ ENVL Unit Leader Joint Session

*Approach to Emergency Response Data Management*

EPA 1

ENVL

## Why are you here?

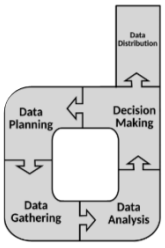
- Understand what's required for a response to have successful data management
- How can you adjust your work to help everyone succeed when it comes to data
- The response will end, but the data always lives on

EPA 2

ENVL

## Managing Emergency Response Data

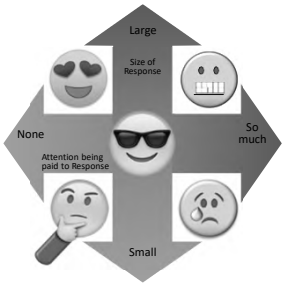
- Objective is to facilitate that problem solving process using information
- Our tools and processes are designed to move that information




EPA 3

## Emergency Response Matrix

ENVL

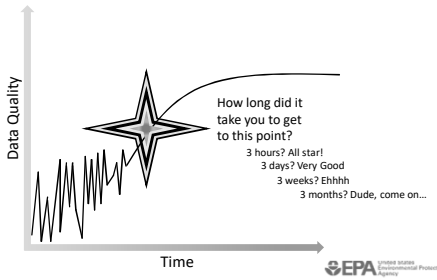



EPA

4

## How do you know if data management on your response is going well?

ENVL




EPA

5

## Main Data Management Issues

ENVL

- Consistency
  - Analyte names (TCE vs. Trichloroethene vs...)
  - Units (ppm vs mg/kg, ug/$m^3$ vs µg/$m^3$)
  - Reporting numbers (# of staff shown on sitrep vs. IAP)
- Deviations from the plan
  - Operations occurring without knowledge of SIT or EU
  - Analysis of data in conflict with reason it was collected
- Starting from scratch
- Only contractors deal with data

EPA

6

## Key Questions

ENVL

- What data exists?
- Why are you collecting it?
- Who is responsible for it?
- Where is it and where is it going?
- How does it look?

EPA 7

## Data Team's Approach to ERs

ENVL

- Prepare
  - Data deliverables required under support contracts
  - Train, train, train
- Assess
  - What problems is the ER trying to solve?
  - What questions are the IC/UC trying to answer?
  - What information do they need in order to solve it

EPA 8

## Data Team's Approach to ERs

(Continued)

ENVL

- Plan
  - Document what you need to do
  - Document the steps you need to take
- Execute
  - Get the proper resources, organization and workflow together to put your plan into action
- Re-Assess
  - It's an Emergency! Prepare to rapidly adjust everything you had planned to do

EPA 9

ENVL SITL

# Data Management Plans

EPA 10

## Plans, Plans, Plans

ENVL

- Work plans
- Sampling and Analysis Plans
- Incident Action Plan
- Health & Safety Plan
- Quality Assurance Plans

**Which of those plans tells us how to collect, process, store and analyze our data?**

EPA 11

## Data Management Plan!!!

ENVL

- Approach to data management
  - Types of data you are dealing with
  - Tools being used to collect, manage and display it
- Requirements
  - Specifics on what things need to be documented and how they should be described

EPA 12

## Data Management Plan!!!
(Continued)

ENVL

- How you are going to use your data
  - Standardized reports
  - GIS viewers
  - Models

EPA 13

## Regional Data Management Plan

ENVL

- Every Region has an Emergency Response Regional Data Management Plan
- Lays out general approach for data management in the Region
- You shouldn't be starting from scratch, instead its adjusting the normal process based on the requirements of the incident

EPA 14

## Site Specific Data Management Plan

ENVL

- Shorter (hopefully) Document
- References the Regional Plan
- Identifies deviations, additions or modifications
- Specific names and organizations responsible for managing the data
- Site specific procedures/checklists/SOPs

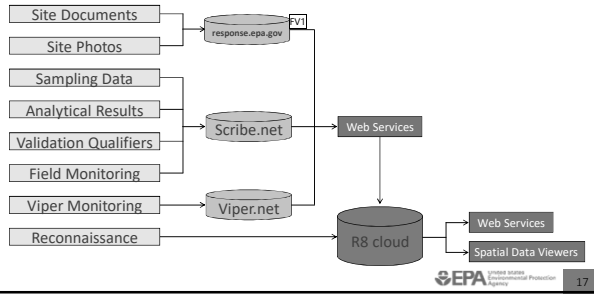
EPA 15

ENVL

EPA 16

ENVL

## Data Workflow




EPA 17

ENVL

## Roles & Responsibility

EPA 18

**Slide 17**

**FV1** Joanns slide has OSC.net and not response.epa.gov
Farmer, Vicky, 8/10/2018

## Data Elements & Valid Values

ENVL

- Core of your site specific plan
- What data you need & what it needs to look like
- Enforce consistency
- Develop feedback loops from your data users to your data managers
- Implement methods to enforce the data requirements established by the site
- Define what values mean!

EPA United States Environmental Protection Agency 19

## Standard Procedures

ENVL

- Consistency requires discipline & documentation
- Any processes or task that can be documented related to how data is collected, stored, or analyzed should be
- Checklists are a huge help

EPA United States Environmental Protection Agency 20

## Decision Making

ENVL

- Work with the data management personnel to determine the best workflows to move and package the data for evaluation and decision making
- Determine if that process needs to happen with each reporting data set or can be established ahead of time (turn any result for this analyte > 10 to red on the map)
- Capture the evaluation of the data and ensure its available for internal and public communication

EPA United States Environmental Protection Agency 21

## Data Reporting

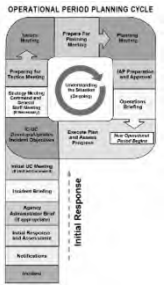
ENVL

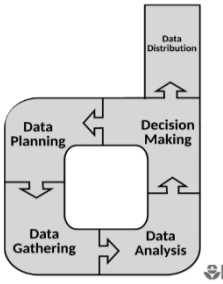
- How are you going to use the data?
- Data streams can be reported many different ways depending on the audience
  - Orphan container recovery
    - ✓SITREP is going to identify the total number of containers collected
    - ✓OPS just needs a report on where their teams went the previous day to plan the next day's collection activities
- Feedback loop needs to exist to inform the project on what data needs to be collected

EPA 22

## Data Management within ICS

ENVL




EPA 23

## Command – IC

ENVL

- Determine incident objectives and coordinate with the Regional Incident Coordinator (RIC) to implement management objectives
- Maintain clear and effective information sharing with the RIC
- Approve the release of information to the news media and public in coordination with the Public Information Officer (PIO), Headquarters PIO (if established) and the Office of Public Affairs (OPA)

EPA 24

## Command – PIO

ENVL

- Release information about the incident to the news media and the public upon approval by the IC and in coordination with the HQs OPA
- Working with data management specialists and GIS analyst to determine best way to post and display data on public website

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25

## Operations is key to data management

ENVL

- Operations collects the samples
- Operations operates the monitoring instruments
- Operations digs up the dirt
- Operations collects the oil
- Operations plays a significant role in data management for a response
- Operations is in the best position to verify the data collected was accurate

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26

## OPS - Single Resource Leader for Field Data Management

ENVL

- Capture, record and/or otherwise collect field data and information
- Process, verify and report field data and information to the Situation Unit
- *Could have multiple depending on geographic distribution and size of response*

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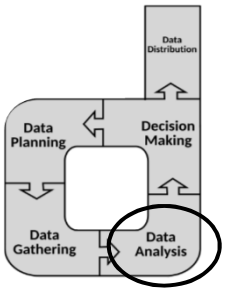
27

## Situation Unit and Environmental Unit are the primary data analysts on a response

ENVL




28

## PLAN/SIT - Data Management Specialist

ENVL

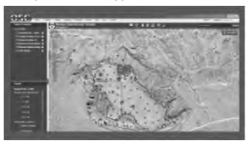
- Administer the incident database(s)
- Provide appropriate information for situational and environmental reporting
- Ideally embedded within Operations
  - Control point for data and for physical samples
  - COC generation

29

## **PLAN/SIT**: Geographic Information Systems Specialist

ENVL

- Gather and compile updated information and provide map products
- GIS Web viewers & spatial analysis
- *May be an off site resource*



30

## PLAN/Environmental Unit: Sampling & Monitoring Plan Coordinator

ENVL

- Develops and maintains a Quality Assurance Project Plan (QAPP)
- Documents the data quality objectives (DQOs)

EPA 31

## PLAN/Environmental Unit: Sampling & Monitoring Plan Coordinator (Continued)

ENVL

- DQOs drive:
  - Data Elements
  - Valid Values
  - Risk analysis
  - Spatial data analysis approach
  - Incident decision making
- Coordination between QAPP & DMP is critical

EPA 32

## PLAN/Environmental Unit: Quality Assurance Coordinator

ENVL

- Perform quality assurance activities and advise response personnel on quality assurance issues and limitations on the use of data
- Facilitate delivery of Validated Electronic Data Deliverables for Analytical Data
- ★NOTE: The responsibilities of the Quality Assurance Coordinator may be performed by HQs during nationally-significant incidents

EPA 33

## PLAN/Analytical Coordinator

ENVL

- Schedule all environmental sample analyses, utilizing EPA and other Federal, academic, and private laboratories as necessary
- Ensure laboratories have capabilities to meet data delivery requirements (Lab EDDs) consistent with the SSDMP
- Track expected receipt of analytical results from laboratories
- Provide Sampling and Monitoring Plans as requested, and review and approve of the procedures developed by the Operations Section

EPA 34

## PLAN/Environmental Unit: Data Assessment & Interpretation Coordinator

ENVL

- Interpret environmental data and identify data gaps
- Prepare data for internal use and public consumption
- Working with Data Management and GIS Specialist to identify data reporting needs, automation opportunities
- ★NOTE: The responsibilities of the Data Assessment and Interpretation Coordinator may be performed by HQs during nationally-significant incidents

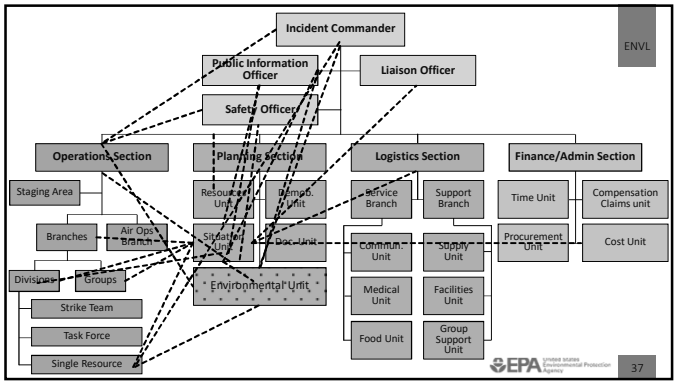
EPA 35

## SITREP

ENVL

- Data driven documents
- Manage and aggregate updates from every part of the organization
- Develop a process to receive metrics covering different areas of the response:
  - Cost
  - Personnel on-site
  - Ops activity summaries
    - ✓ Containers recovered
    - ✓ Samples collected

EPA 36




## Command Staff:
Data Support Coordinator

ENVL

- Evaluate Incident Objectives and develops an incident-specific Data Management Plan
- Establish an appropriate data management organizational structure to achieve incident objectives and assist unit leaders with the tasking of personnel to ensure the effective implementation of the incident-specific Data Management Plan

EPA 38

## Command Staff:
Data Support Coordinator

ENVL

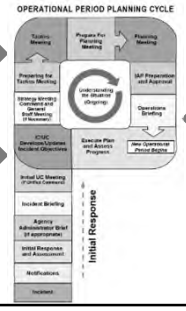
- Ensure that data management activities support data and information transparency across various organizational levels: IMT, EPA Management, Stakeholders, Public, etc.
- Ensure that data summaries and reports support the internal and external release of data and information
- Serve as the primary point of contact for all data management issues and needs for the response

EPA 39

## Data & Planning Process

ENVL

Update DMP




Using information products such as viewers to support briefing

EPA

40

## SIT & Environment Feedback

ENVL

- As the primary data consumers on the response your feedback is critical
- Identification of data consistency issues
- Additional data requirements you need to pass onto the data collection process to assist with your analysis
- Changes and additions to strategic plans like the QAPP that will have an impact on data collection

EPA

41

ENVL
SITL

# EPA Field Data Management Tools

EPA

42

## Objectives

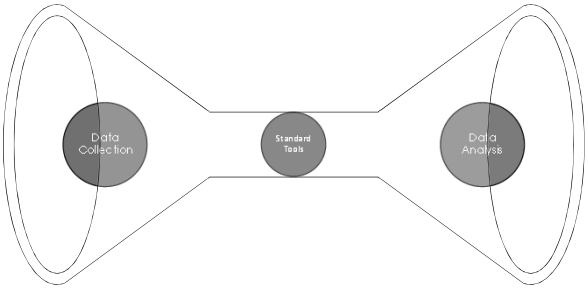
ENVL

- Translate all field work into electronic data
- Match the data we are collecting to our Data Quality Objectives
- Be able to describe your process and your requirements so that other stakeholders can use your data and hopefully share data with you
- Prepared to the move the data as fast as possible
  - Collection to display
  - From EPA to response partners

EPA

43

## Complex Problems, Complex Solutions, Standard Approach




ENVL

**Spill Notification**

**WebEOC- Hotline Log**
- Over 250,000 spill reports processed since 2004

**Resource Deployment**

**WebEOC- Significant Events**

**Response Action**

**Response.EPA.gov**
- Over 7,000 Removal/ER project sites since 2001
- Approaching 20,000 Pollution reports published through the site

**Field Work**

**Sampling & Analytical**
- Scribe Field Database
- Over 1,000 projects and 16,000 versions published to Scribe.NET

**Cost Tracking**
- RCMS
- Used daily on removal sites since 1989

**Sensor Data**
- VIPER
- 130 deployments since 2011
- Over 1 billion sensor values recorded

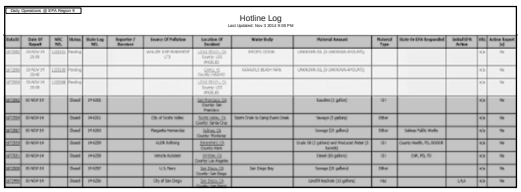
EPA

45

## Incident Notification – WebEOC

ENVL

- Documents EPA's initial response to notifications from NRC
- Significant events – deployment of an EPA asset




EPA United States Environmental Protection Agency

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## Site Information – Response.EPA.Gov

ENVL

- Content management system controlled by OSCs for Removals and ERs
- Hosts SITREPs, Images, Documents
- Access to the site is and content is controlled by the OSCs
- Evolved from a field tool into the data source for the Removal Program on progress metrics


EPA United States Environmental Protection Agency

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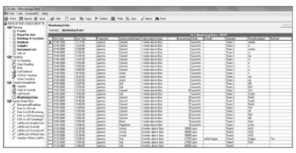
## Sampling and Analytical Data – Scribe

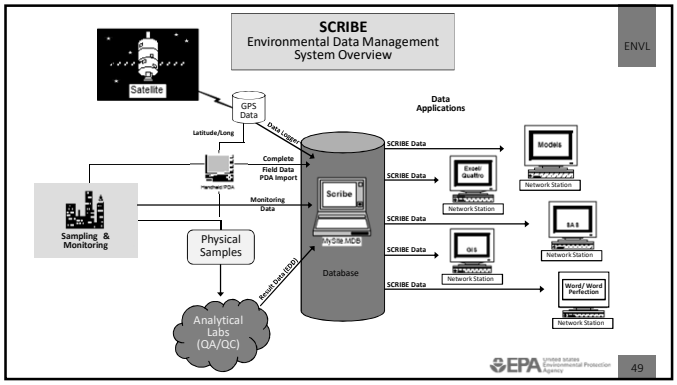
ENVL

- Field data management workhorse
- Sample documentation
  - Labels
  - Chain of Custodies
- Local database allows complete customization and control by the field project managers
- Program wide implementation



EPA United States Environmental Protection Agency

48




## Data Auditor

ENVL

- Create custom auditing rules for one or more sites
- Allows you to check your project against defined valid values

Environmental Response Team

EPA 50

## Visualization

ENVL

- Turn the results of your query into a quick map with one-click
- Exports a KML file which you can view in Google Earth and ARC GIS
- Set symbology & height based on the values of a field

Environmental Response Team

EPA 51

## Scribe.NET

ENVL

- Allows us to move Scribe data while maintaining benefits of local ownership of the site project
- Scales – ownership is compartmentalized
- Delivers data to the enterprise
- Allows for intricate data management workflow without complicating the field project owners job
  - Manage the data in front of you

EPA 52

## Multiple Project Scribe Subscription

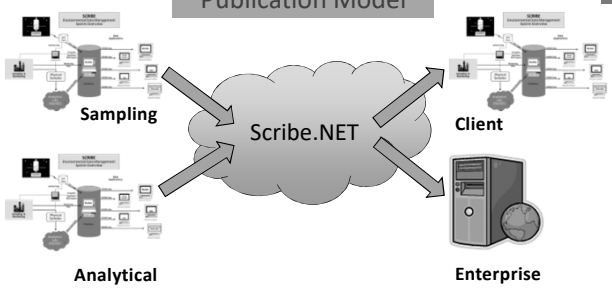
ENVL

- User enters subscription ID/Password into Scribe
- Must be manually refreshed
- Downloads all the versions for each of the projects and processes them one at a time to "build" the combined projects
- Scribe interface filters based on Site Number
- Conflicts can be created if multiple projects have the same primary key values for records
- Download time dependent on the number of versions and data sets

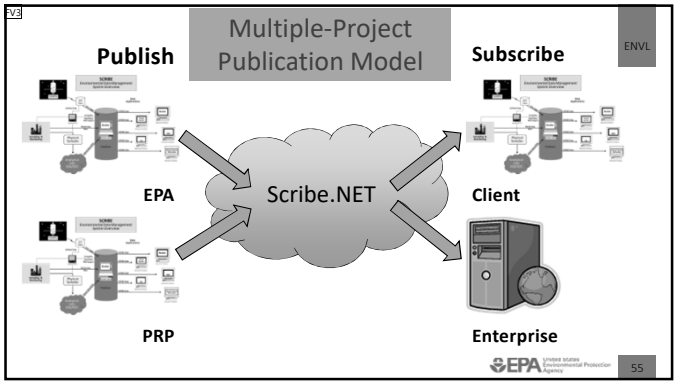
EPA 53

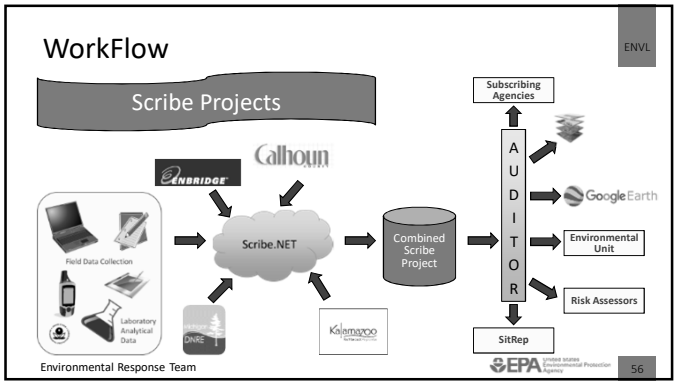
## Multiple-Project Publication Model

ENVL




EPA 54


V3
Multiple-Project Publication Model
ENVL
Publish
Subscribe
EPA
Scribe.NET
Client
PRP
Enterprise
55


WorkFlow
ENVL
Scribe Projects
Calhoun
ENBRIDGE
Field Data Collection
Laboratory Analytical Data
Scribe.NET
Combined Scribe Project
Subscribing Agencies
AUDITOR
Google Earth
Environmental Unit
Risk Assessors
SitRep
Kalamazoo
Environmental Response Team
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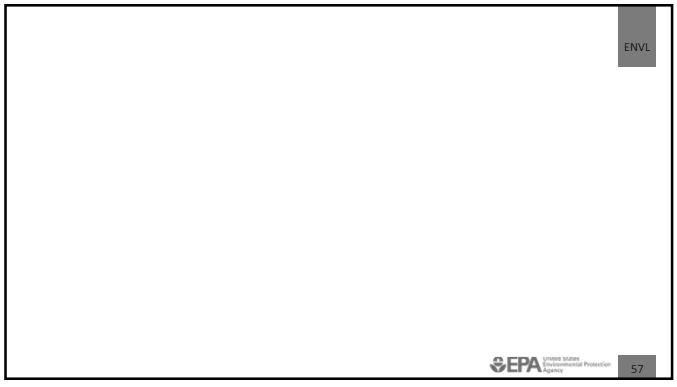

ENVL
57

**Slide 55**

**FV3** slides 55 and 56 are exactly the same..??
Farmer, Vicky, 8/10/2018

## Sensor Data Issues for Superfund

ENVL

- Volume of data
- Real-time doesn't always mean "real-time"
  - Data from PRP-operated sensors is delivered to EPA using the same report-based approach delays delivery
- Raw data doesn't correspond to our evaluation criteria
  - Instantaneous readings versus action levels based on periods of time (AEGL, PELs, etc.)

EPA United States Environmental Protection Agency 58

## Sensor Data Issues for Superfund

(Continued)

ENVL

- Time required to acquire, store, transform and re-format for dissemination
  - Increases contractor cost
  - Delay in sharing information with the public can pose challenges to most effective communication

EPA United States Environmental Protection Agency 59

## VIPER

ENVL

- System was built to handle the unique volume and real time utilization requirements inherent to sensors
- Based on federal data standards
- Adding new types of sensors requires no core system modifications
- Secure live view of the data via the web
- System monitors the data and determines exceedances, sending out notifications in real-time

EPA United States Environmental Protection Agency 60

## ENVL Interaction With Viper

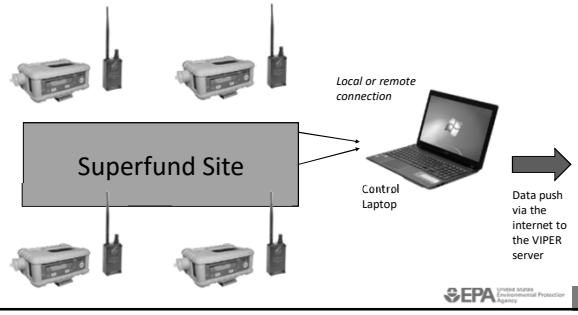
ENVL

- Scoping
  - Input on instrument selection related to detection levels
  - TWAs, Alarms, Correction Factors should come from the QAPP
- Analysis
  - Using Deployment Manager to evaluate alarms in real-time.
  - Working with OPS to determine courses of action related to each alarm

EPA 61

## Workflow

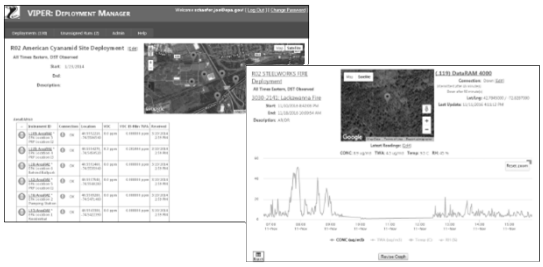
ENVL




EPA 62

## Web view

ENVL




EPA 63

## Unified Command – Unified Sensor Data

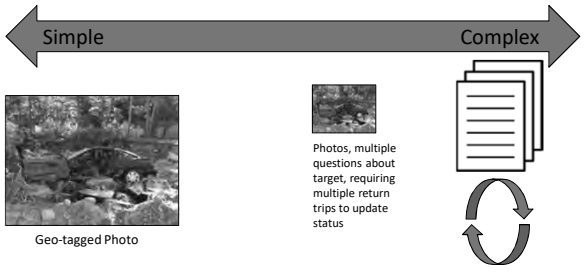
ENVL

- There is the potential for non-EPA sensor data to be brought into Viper
- Allows a single look at all deployed sensors for the response
- USCG Strike Teams, Civil Support Teams, PRP contractors using ProRAE Guardian are easy to bring into Viper
- Groups using custom sensor data acquisition systems can also deliver data to Viper using the generic CAP XML option
- Kilauea Volcano response at one point had 7 different agencies/organizations submitting sensor data to Viper

EPA 64

## Recon Data

ENVL




EPA 65

## Keeping Recon Approach Flexible

ENVL

- If using forms, have a system that allows rapid generation and distribution
- Be able to work local or connected depending on resources that are available
- Be willing to scale down if the approach calls for it
- Current popular mobile forms
  - Survery123
  - ESRI Collector
  - Filemaker Pro

EPA 66

## Bringing It All Together

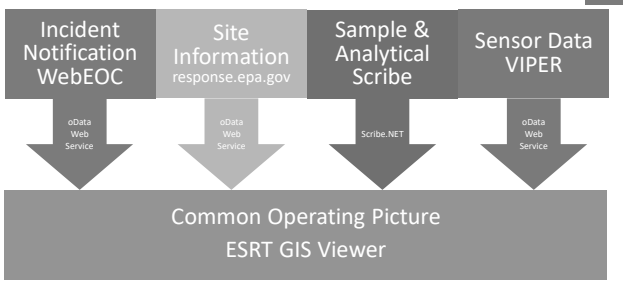
ENVL

- Each system is capable of delivering data both to an end user and other applications
- These live data feeds enable the EPA Region to easily bring that data into a GIS environment in real-time

EPA 67

V4

ENVL




EPA 68

## Common Operating Picture

ENVL

- Information flow is too dynamic to only rely on printed maps
- Need an interactive map that is capable of incorporating multiple data streams with live updates
- Needs to be hosted somewhere where all response partners can view the information
- Process needs to exist to rapidly develop and deploy COPs for incidents
- Each Region is provided hosting space on Amazon as part of the ER Cloud to support their COPs

EPA 69

**Slide 68**

**FV4** joann's says epaosc.org not response.epa.gov
Farmer, Vicky, 8/10/2018

## Data Management Support Resources

ENVL

- ERT Software Support
  - 1-800-999-6990
  - ertsupport@epa.gov

EPA United States Environmental Protection Agency

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ENVL

# Unit 7
# Environmental Unit Leader

*Analysis*

EPA 1

## Goals

ENVL

To leave with a general understanding of the analysis support available to Incident Command during response activities including:

- Field Support
- Fixed Lab Support
- Specialty Support

EPA 2

## Analysis – Field Support

ENVL

Screening

- Immediate life-threatening or severe health and safety conditions
  - Hand-held detectors
    - ✓Chemical
    - ✓Radiochemical
    - ✓Biological – not much available at this time ????

EPA 3

## Analysis – Field Support (Continued)

ENVL

Screening

- Specialized screening when chemical warfare agents (CWA) involved
  - Screen to determine if fixed laboratory will accept sample
    - ✓ All Hazard Receipt Facility Protocols (AHRF)
      - https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=199346
      - CWA
      - Radiochemical
    - ✓ AHRF available at Region 1 and Region 10 lab
    - ✓ Other Regions working with Civil Support Teams (CST) to provide screening

EPA 4

## Analysis – Field Support (Continued)

ENVL

Screening

- Site characterization – decision making (e.g. what/where do I do/go next) **
  - Hand-held detectors
    - ✓ Radiochemical
  - Hand-held/Portable Detectors
    - ✓ X-Ray Fluorescence (XRF)
    - ✓ GC-various detectors
    - ✓ Raman
    - ✓ Ion Mobility Spectrometers (e.g. ADP 2000)
    - ✓ MultiRAE and AreaRAE Detectors

EPA 5

## Analysis – Field Support (Continued)

ENVL

Screening

- ** Must be consistent with Data Quality Objectives (DQO) and Quality Assurance Project Plan (QAPP)
  - Screening efforts may (should) require confirmatory analyses through fixed laboratory analysis

EPA 6

## Analysis – Field Support

ENVL

Monitoring

- Continuous evaluation of conditions at a site
- Personal Protection
  - Indicator badges
  - Absorption tubes with air pumps

EPA 7

## Analysis – Field Support (Continued)

ENVL

Monitoring

- Site Evaluation during a site incident
  - Particulate Matter (PM)
  - Filters (e.g. asbestos) – low and high volume air pumps
  - Mini-Chemical-Agent-Monitor (MiniCams)
    - ✓Near-real time monitor
    - ✓Gas Chromatograph with attached air sampling device

EPA 8

## Analysis – Field Support (Continued)

ENVL

Monitoring

- Data Management
  - VIPER -wireless network based communications system designed to enable real time transmission of data from field sensors to a local computer, remote computer, or enterprise server and provide data management, analysis, and visualization
  - https://response.epa.gov/site/site_profile.aspx?site_id=5033

EPA 9

## Analysis – Field Support

ENVL

- Quality Assurance Field Activities Procedures (QAFAP)
  - EPA Classification No.: CIO 2105-P-02.0
  - Intended to be applied by all organizations within the Agency that collect environmental data, regardless of its intended use
  - Includes guidance for personnel and training, document control, records management, sampling and environmental data management, field documentation, field equipment, field inspections and investigation, reports, internal audits, and corrective action

EPA 10

## Analysis – Fixed Laboratory Support

ENVL

- START – Superfund Technical Assessment and Response Team
  - Full support to the OSC - sampling ⇨ lab analysis ⇨ data management
- START most commonly used but many other options available

EPA 11

## Analysis – Fixed Laboratory Support

(Continued)

ENVL

- Regional Labs
  - Dedicated to Regional applications, but support all Regions as needed
  - Specialized capabilities (e.g. Regions 1,3,6,9 and 10 have CWA capability)
  - Some Regions support mobile laboratory assets

EPA 12

## Analysis – Fixed Laboratory Support

ENVL

(Continued)

- Environmental Response Team (ERT)
  - Scientific, Engineering, Response and Analytical Services (SERAS)
  - Monitoring and Analytical support to all Regions (fixed lab and mobile lab)

EPA 13

## Analysis – Fixed Laboratory Support

ENVL

(Continued)

- Contract Laboratory Program (CLP)
  - Office of Superfund Remediation and Technology Innovation (OSRTI)/Analytical Services Branch (ASB)
  - Organic and metals laboratory support
  - Predominantly support for remedial program, but also supports removal program
- Regional support contracts
  - Varies within the Regions

EPA 14

## Analysis – Fixed Laboratory Support

ENVL

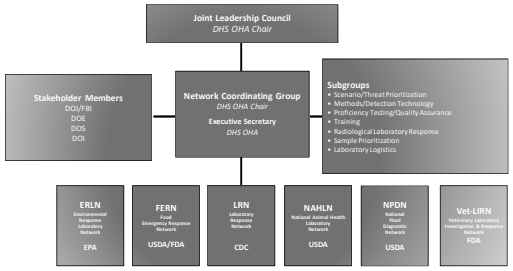
(Continued)

- Environmental Response Laboratory Network (ERLN)
  - Administered through Office of Emergency Management (OEM)
  - Began as a response to World Trade Center disaster
  - Integral member to Federal, DHS-chaired Integrated Consortium of Laboratory Network (ICLN)
  - ** Not Just For Homeland Security Issues or Emergencies – but for any Regional analytical need
  - → **ICLN**

EPA 15

## ICLN Organizational Structure

ENVL



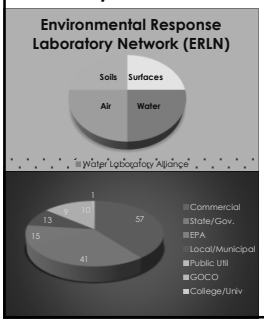

More than 450 distinct labs represented in member response networks.

EPA

16

## Analysis – Fixed Laboratory Support ERLN

ENVL







- An all hazards/all environmental media laboratory network for chemical (including CWA), biological and radiological Agents supporting the needs of the response community
- Allow for day-to-day use supporting incidents of any scale during preparedness, response, remediation.
- Coordinated Partnership with National Homeland Security Research Center (NHSRC) and Office of Resource Conservation and Recovery (ORCR) for methods and method development
- Partnership with Office of Water's Water Laboratory Alliance (WLA) and ORIA Radiological Laboratory program

EPA

17

## Analysis – Fixed Laboratory Support Accessing the ERLN

ENVL

- https://www.epa.gov/emergency-response/who-should-join-environmental-response-laboratory-network
- Register in the EPA Laboratory Compendium


EPA

18

## Analysis – Fixed Laboratory Support
## What I Can Do With The ERLN

ENVL

- Search Laboratory Locations and Capabilities
  - Access to Chemical, Biological and Radiological Capabilities

EPA 19

## Analysis – Fixed Laboratory Support
## What I Can Do With The ERLN
(Continued)

ENVL

- Procure Laboratory Services
  - Region → Develop Needs and Data Quality Objectives
  - Region → Contact OEM
  - OEM → Contacts ERLN Labs for Quotes
  - OEM → Presents Lab Options to Region
  - Region → Approves Laboratory
  - OEM → Submits Quotes to Contract Officer (CO)
  - CO → Submits "Contract" to Lab
  - Region → Provides Funding Through Purchase Requisition(PR)

EPA 20

## Analysis – Specialty Analytical Support

ENVL

- **TAGA: Trace Atmospheric Gas Analyzer**
- Self-contained mobile laboratory to monitor air quality
- Real-time sampling and analysis
- Detects chemicals at very low levels
- Specialized sampling equipment to use at remote locations

EPA 21

## Analysis – Specialty Analytical Support

ENVL

- **ASPECT: Airborne Spectral Photometric Environmental Collection Technology**
- Detects and gathers chemical and radiological data to assist response agencies in the US
- Uses a variety of sensors and cameras that can quickly collect data and information and provide it to emergency response teams
  - Gamma Spectrometer, Infrared Line Camera, Fourier Transform Infrared Spectrometer

EPA 22

## Analysis – Specialty Analytical Support

ENVL

- **National Analytical Radiation Environmental Laboratory (NAREL)**
- Comprehensive environmental laboratory managed by EPA's Office of Radiation and Indoor Air (ORIA)
- Incorporates state-of-the-art laboratory technology and equipment and include the latest health and safety techniques

EPA 23

## Analysis – Specialty Analytical Support

ENVL

(Continued)

- **National Center for Radiation Field Operations (NCRFO)**
- Essential component of EPA's Radiological Emergency Response Team (RERT) and is key to EPA's response to radiological emergencies and accidents nationwide

EPA 24

## Analysis – Specialty Analytical Support Portable

Portable High-Throughput-Integrated Laboratory Identification System (PHILIS)

- Mobile laboratories operated by OEM/CBRN Consequence Management Advisory Division (CMAD)
- Standardized under the EPA's Environmental Response Laboratory Network (ERLN)
- Accredited through National Environmental Laboratory Program (NELAP)

## Analysis – Specialty Analytical Support Portable

Portable High-Throughput-Integrated Laboratory Identification System (PHILIS)

(Continued)

- ** All analyses are confirmatory
- VOCs, SVOCs, PCBs, Pesticides, Air (absorbent tubes) (canisters)
- ** Chemical Warfare Agents (CWA) and Toxic Industrial Chemicals (TIC)
- On-board LIMS for multiple data deliverables including SCRIBE compatible deliverables

## Analysis – Specialty Analytical Support Portable

Portable High-Throughput-Integrated Laboratory Identification System (PHILIS)

- Six separate mobile analytical vehicles for sample preparation and analyses
- 19 separate GC/MS analyzers
- 2 GC/Electron Capture analyzers for PCBs/Pesticides



## Analysis – Specialty Analytical Support Portable

High-Throughput-Integrated Laboratory Identification System (PHILIS)
(Continued)

- Basically fixed laboratory on wheels
- Stationed in Edison, NJ, and Castle Rock, CO, and can be deployed within 24 to 48 hours to support emergency response and clean-up actions
- Offers Regions cost savings advantages



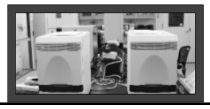

## Analysis – Specialty Analytical Support Enhanced BSL-2 Biological Laboratory

- Laboratory operated by OEM/CBRN Consequence Management Advisory Division (CMAD)
- Originally developed for analysis of environmental samples potentially contaminated with Anthrax
- Currently developing capability for analysis of environmental samples potentially contaminated with ricin



## Analysis – Specialty Analytical Support Enhanced BSL-2 Biological Laboratory
(Continued)

- Gearing up for method validation for analysis of Anthrax using Rapid Viability Polymerase Chain Reaction protocol (RV-PCR)
  - Determines viable Anthrax spores in a day instead of a week
- Other methods being developed for non-routine analytes (e.g. select agents)

## Analysis – What You Need To Do

ENVL

- Ensure there is a QAPP with specific DQOs
  - Know and understand the analytes of concern
    - ✓Don't just ask for the analytes that are listed in a certain method – if you just need lead, don't ask for 23 metals
- Know and understand which analytical method you need
    - ✓There are many – so make sure the method is applicable to your specific needs

EPA 31

## Analysis – What You Need To Do

(Continued)

ENVL

- Ensure there is a QAPP with specific DQOs
  - Know your required detection limit needs.
    - ✓Don't just tell the lab to give you the lowest detection limits they can – be specific
    - ✓Understand what the detection limit really means

EPA 32

## Analysis – What You Need To Do

(Continued)

ENVL

- Use a lab that is accredited through a Nationally recognized accreditation program (NELAP, ISO, EPA Drinking Water, etc.)
- Ensure the lab can deliver data in acceptable electronic deliverable format
  - As per policy – SCRIBE compatible deliverables for emergency response activities

EPA 33

## Analysis – What You Need To Do

ENVL

(Continued)

- Ensure lab can meet your turnaround needs, especially if you need analysis over the weekends
- Ensure lab can meet your capacity needs
- Audit lab if you have time (you can work with OEM/CMAD to audit labs under the ERLN umbrella)
- Determine if lab can provide sample containers

EPA 34

## Analysis – Points of Contact

ENVL

- Field operations and QAFAP:
  - ERT: Dennisses Valdes, Valdes.Dennisses@epa.gov
- Scribe and VIPER:
  - ERT: Joe Schaefer, Schaefer.Joe@epa.gov
- Contract Lab Program (CLP)
  - ASB: Shari Myer, Myer.Shari@epa.gov
- ERLN/ICLN
  - CMAD: Ahmed Hafez, Hafez.Ahmed@epa.gov

EPA 35

## Analysis – Points of Contact

ENVL

(Continued)

- TAGA:
  - ERT: Dave Mickunas, Mickunas.Dave@epa.gov
- ASPECT:
  - EPA's Emergency Operations Center at 202-564-3850
  - NAREL:
  - ORIA/NAREL: John Griggs, Director, Griggs.John@epa.gov

EPA 36

## Analysis – Points of Contact
(Continued)

ENVL

- NCRFO:
  - ORIA/NCRFO: Edward Wilds, acting Director, Wilds.Edward@epa.gov
- PHILIS
  - Emergency Operations Center at 202-564-3850

EPA United States Environmental Protection Agency 37

## Summary
**At The Conclusion Of This Unit, Are You Now Able?:**

ENVL

To leave with a general understanding of the analysis support available to Incident Command during response activities including:

- Field Support
- Fixed Lab Support
- Specialty Support

EPA United States Environmental Protection Agency 38

ENVL

# Unit 8
# Environmental Unit Leader

*Headquarters Environmental Unit*

EPA 1

## Goals

ENVL

To leave here with an understanding of the organization and role for a Headquarters (HQ) Environmental Unit (EU)- specifically with respect to:

- Lines of communication with:
  - Regional EUs
  - HQ Public Information Office (PIO)
  - HQ Data Management Coordinator (new position to HQ)
  - HQ Senior Management
- Specific Duties

EPA 2

## Roles of the HQ EU During Various Emergency Responses

ENVL

- Local or multi-regional but small ER
  - No HQ EU role
  - Limited "virtual" HQ EU for regional support and situational awareness (1-2 staff)
  - Limited formal HQ EU (i.e. EOC Desk) to provide technical assistance (1-2 staff)

EPA 3

## Roles of the HQ EU During Various Emergency Responses (Continued)

ENVL

- Larger multi-regional ER and Nationally Significant Incident (NSI)
  - Virtual HQ EU
  - Formal HQ EU (EOC Desk)
    - ✓Technical support to Region EU
    - ✓Coordination with Regional EUs
      - Review of QAPPS, Sampling Plans
      - Daily communication with Regional EUs
      - Data review
      - Data communication
    - ✓Coordination within HQ EOC

EPA United States Environmental Protection Agency 4

## Roles of the HQ EU During Various Emergency Responses (Continued)

ENVL

- NSI – HQ EOC and HQ EU may take on lead roles

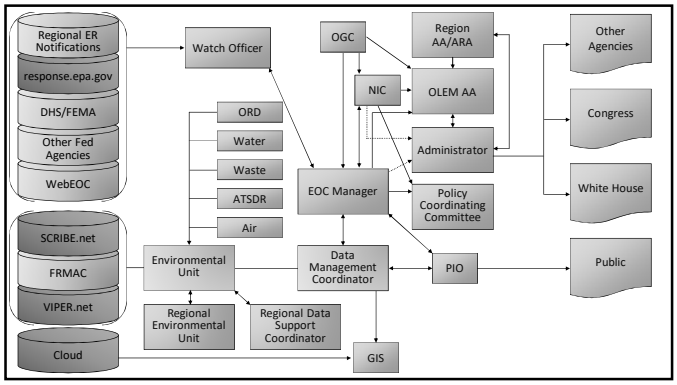
EPA United States Environmental Protection Agency 5

## Organization of the HQ EU

ENVL

- EU Desk in HQ Emergency Operations Center
- Sits under Planning Section in ICS
- May be staffed by single entity (EU Leader) or EU Leader + multiple staff members
- Designed to incorporate Subject Matter Expert(s) relevant to the response needs
- Can expand to include Science Support Coordinator or Science Team/Technical Work Group

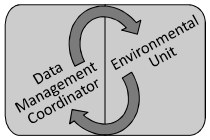
EPA United States Environmental Protection Agency 6




## Organization of the HQ EU

ENVL

- Data Management Coordinator (DMC) is a new position in HQ EOC
- Position not currently defined in the Incident Management Handbook
- Position defined in Data Management Playbook
- DMC lies within the HQ EU and will be the HQ EU Leader during an incident
- DMC will pull in SME as necessary




EPA 8

## Duties of HQ EU Limited Role

ENVL

- Maintain situational awareness
- Provide technical reach-back support to regional EUs
- Review incident related documents
  - Sampling Plans
  - QAPP
  - Site Risk Assessments
  - Media correspondence
  - Etc.

EPA 9

## Duties of HQ EU Limited Role (Continued)

ENVL

- Communicate
  - Regional EU
  - Regional Data Support Coordinator
  - HQ EOC Manager

EPA 10

## Why The Need to Maintain Situational Awareness at HQ

ENVL

- Enables HQ to provide:
  - Quick responses to inquiries from:
    - ✓President and Cabinet
    - ✓Administrator and Deputy Administrator
    - ✓HQ Program Offices
    - ✓National media outlets

EPA 11

## Duties of HQ EU When More Active Role is Necessary

ENVL

- Review Region's Site Specific Data Management Plan (DMP)
  - Align the incident specific OEM ER Data and Information Plan with the Region's Site Specific DMP
  - Questions and inquiries about the DMP should be directed to the Incident Command – Data Support Coordinator
  - If Agency direction and management objectives require changes to the Region's Site Specific DMP, communicate those issues to the RIC

EPA 12

## Duties of HQ EU
## When More Active Role is Necessary

ENVL

- Review the incident QAPP, Data Quality Objectives (DQO), and sample plans.
  - Questions and inquiries about the QAPP or sample planning should be directed to the Incident Command – Data Support Coordinator
  - If Agency direction and management objectives require changes to the QAPP and sample planning, communicate those issues to the RIC so that Data Quality Objectives (DQO) can be aligned

EPA 13

## Duties of HQ EU
## When More Active Role is Necessary

ENVL

- OEM Emergency Response Data and Information Plan
  - Develop incident specific OEM Emergency Response Data and Information Plan. The plan should address:
    - ✓The uses and needs of data and information by the various offices at Headquarters
    - ✓Be aligned with the Region's Site Specific DMP
    - ✓Identify process data review and issue resolution
    - ✓Data package consistency and specific data and information needs from Scribe

EPA 14

## Duties of HQ EU
## When More Active Role is Necessary
(Continued)

ENVL

- OEM Emergency Response Data and Information Plan
  - Develop incident specific OEM Emergency Response Data and Information Plan. The plan should address:
    - ✓Identifying data and information product deliverables to support various work at Headquarters to properly support OEM and the other Headquarters Offices
    - ✓Role and responsibilities of staff working data and information at Headquarters including identifying personnel resource needs to sustain operations

EPA 15

## Duties of HQ EU When More Active Role is Necessary

ENVL

- Receiving Data and Information from the Region(s)
  - Facilitate the reception of data and information from the Region(s) in support of HQ EOC operations
  - The access to data and information involves all the disciplines across each functional positions of the Incident/Unified Command's command and general staff
    - ✓Health and Safety
    - ✓Public Affairs
    - ✓Liaison – Stakeholder information
    - ✓Field observations and recon data and information

EPA United States Environmental Protection Agency 16

## Duties of HQ EU When More Active Role is Necessary (Continued)

ENVL

- The access to data and information involves all the disciplines across each functional position of the Incident/Unified Command's command and general staff
  - ✓Resources
  - ✓Situational Information and Common Operating Picture
  - ✓GIS, viewer, images, documents, and database information
  - ✓Environmental sampling, monitoring, assessment, interpretation, planning.
  - ✓Logistics and Finance

EPA United States Environmental Protection Agency 17

## Duties of HQ EU When More Active Role is Necessary

ENVL

- Review Data and Information
  - Verify that all data entries in Scribe and response.epa.gov meet the requirements of the OEM ER Data and Information Plan
  - Verify that all GIS data and information meet the requirements of the OEM ER Data and Information Plan

EPA United States Environmental Protection Agency 18

## Duties of HQ EU When More Active Role is Necessary (Continued)

ENVL

- Review Data and Information
  - Perform a data usability assessment in conjunction with the QAPP and coordinate quality assurance work Regional Data Support Coordinator
  - Questions and inquiries about the data and information should be directed to the Data Support Coordinator

EPA 19

## Duties of HQ EU When More Active Role is Necessary

ENVL

- Assess Data
  - Provide access to the Scribe database for preliminary and final laboratory analytical results
  - Ensure access to the response.epa.gov website where documentation and incident specific data files including but not limited to reports, chains of custody, laboratory data packages and validation reports will be located

EPA 20

## Duties of HQ EU When More Active Role is Necessary (Continued)

ENVL

- Oversee HQ assessment and interpretation work (if performed at HQ)
  - Risk Assessment
  - Vulnerability Assessment
  - Data Interpretation

EPA 21

## Duties of HQ EU When More Active Role is Necessary

ENVL

- Release Data
  - Provide HQ EOC PIOs with data and information products to support their work and access to epaosc.org and other data and information sources for the incident
  - Data summary reports and specific tables, metrics, and maps needed for messaging, digital work, website and social media implementation should be developed and supported

EPA 22

## Duties of HQ EU When More Active Role is Necessary (Continued)

ENVL

- Release Data
  - Any work products, special formatting, basic information needs identified to support messaging and digital work as part of the planning process with OPA, OLEM. OCIR, and OHS should be included in the OEM ER Data and Information Plan.

EPA 23

## HQ EU Final Thoughts

ENVL

- Roles and Responsibilities are flexible depending upon scale of the event
  - No Role → Virtual Role → Significant Role → Lead Role
- HQ EU may have a lead role during a National Significant Incident

EPA 24

## Summary

ENVL

**At The Conclusion Of This Unit, Are You Now Able?:**

To leave here with an understanding of the organization and role for a Headquarters (HQ) Environmental Unit (EU)- specifically with respect to:

- Lines of communication with:
  - Regional EUs
  - HQ Public Information Office (PIO)
  - HQ Data Management Coordinator (new position to HQ)
  - HQ Senior Management
- Specific Duties

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25

ENVL

# Unit 10
# Environmental Unit Leader

*ENVIRONMENTAL MODELING*

EPA 1

## Objectives

ENVL

- Understand the duties and responsibilities for the ENVL in regards to environmental modeling
- Have an awareness level understanding of
  - What a model is
  - The types of products that can be generated by a model
  - The types of Environmental modeling available
- Know when IMAAC is required and how to access them
- Know who to contact for modeling support

EPA 2

## Responsibility of ENVL

ENVL

- Provide appropriate technical advice and consultation to the Planning Section, Operations Section, and the IC in support of the decision making process, which may include….. Environmental Modeling (IMH page 9-12)
- Determine staffing requirements and the need for technical specialists (IMH page 9-11)

EPA 3

## Modeling Technical Specialist

ENVL

- Modeling Analysis Coordinator (IMH p 6-7)
- The major responsibilities of technical specialist may include… Modeling
  - Air, groundwater, surface water
  - Discharge from a point source
  - Oil trajectory
  - Contaminant fate and transport (IMH pp6-7&8)

EPA 4

## Modeling Technical Specialist (Continued)

ENVL

- Provide expertise in air dispersion plume modeling
- Provide expertise in environmental statistical sampling models
- Provide expertise in developing oil spill trajectories
- Provide expertise in groundwater and vadose zone modeling

EPA 5

## Groundwater Modeling: An Introduction

ENVL

- Terrence Johnson- ERT

EPA 6

## What is a Groundwater Model?

ENVL

- Is designed using a computer software to represent a simplified version of a groundwater system
- A model predicts the spatial distribution of unknown variables such as groundwater head or contaminant concentration
- A model is as good as the conceptual model and the accuracy with which it mimics reality (calibration and verification)

EPA United States Environmental Protection Agency 7

## Types of Models

ENVL

- Mathematical Solution Types:
  - Analytical solutions: simplifying assumptions, simplified boundary conditions (BC), limited data needs, screening applications
  - Numerical solution: highly complex, high data needs, handle complex boundaries, need expert modeler, output more reliable

EPA United States Environmental Protection Agency 8

## Types of Models (Continued)

ENVL

- Dimensionality: we live in a three dimensional world, but modes may be
  - 1-, 2- or 3-dimensional
- Dimension dispends on site conditions, objectives, data availability, and resources
- Time Component: Models may either be steady state—no change in variables with time—or transient (time variant)

EPA United States Environmental Protection Agency 9

## Generic Modeling Applications

ENVL

- Reconnaissance or Screening: uses regional (as oppose to site specific) model parameters, and data; typically used to evaluate field conditions prior to field investigation, or other screening applications
- Interpretive: uses site data bill a robust model of the interactions of geology, groundwater and contaminant transport to understand the system and identify data gaps

EPA 10

## Generic Modeling Applications (Continued)

ENVL

- Predictive: uses a sound model to predict groundwater system behavior, e.g., will a benzene plume from a gasoline spill impact a nearby well, and if so, how long will it take; or to aid the design of a well field to intercept the plume.
  - Often times interpretive and predictive modeling are done sequentially

EPA 11

## Contaminant Transport Typical in Environmental Applications

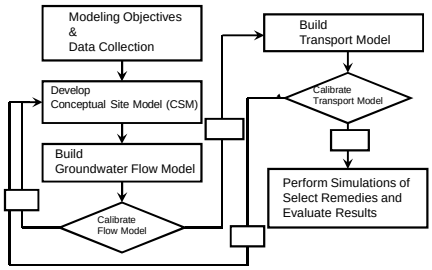
ENVL

- Groundwater flow and contaminant transport equations solved sequentially
  - First: Groundwater Flow Model
  - Second: Contaminant Transport

EPA 12

## Modeling Flow Chart

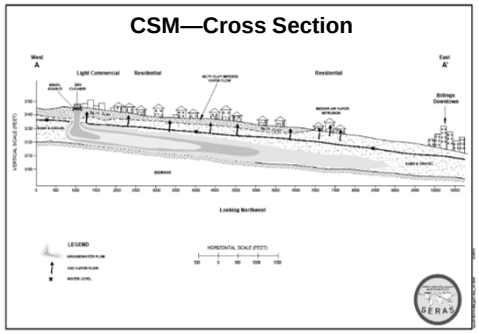
ENVL




EPA 13

## CSM—Cross Section

ENVL




EPA 14

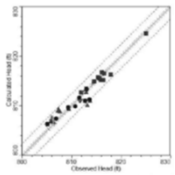
## Flow Model Calibration

ENVL

- Compare model variable of interest ( groundwater elevation, or concentration) to field data
- Build model credibility: qualitative and quantitative model calibration are generally used
  - Qualitative: model result should reproduce observed real-world features (groundwater divides, mounds/depressions, plume shape, etc.)
  - Quantitative: predicted and observed should meet predefined statistical criteria—normalized root mean square error, and coefficient of correlation thresholds

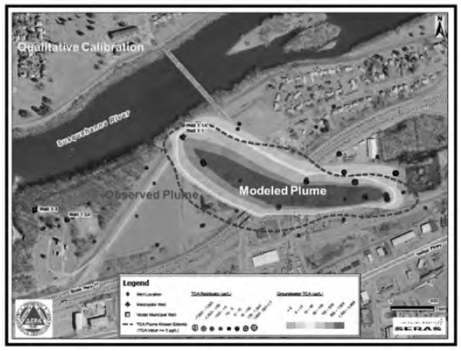
EPA 15

**Quantitative**
Modeled versus Observed heads



ENVL

EPA 16




Calibrated and Observed TCA Plume at 35 yrs

ENVL

EPA 17

## Model Validation

- Further builds model credibility
- The calibrated models are used to predict an independent set conditions/stresses from the calibration set
  - For example, if the model was calibrated under a no pumping scenario, validation could be done under a pumping scenario
- Compares observed and simulated results quantitatively and qualitatively as with calibration
- Often times, an independent data set is unavailable; hence validation not done

ENVL

EPA 18

## Actual Model Development Information

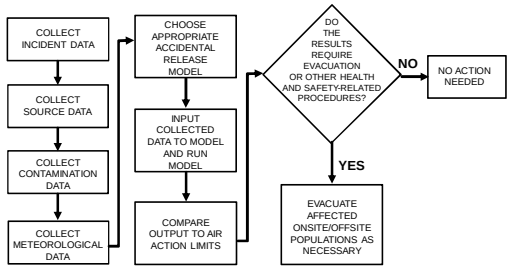
ENVL

- Contact: Terrence Johnson, ERT
- Telephone: (702)-419-5409 (o); 702-496-0703(c)
- Email: Johnson.Terrence@epa.gov

EPA 19

## Dispersion Modeling During an Emergency

ENVL




EPA 20

ENVL

IMAAC

Interagency Modeling and Atmospheric Assessment Center

Distribution Statement A
Approved for public release; distribution is unlimited

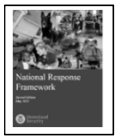
EPA 21

## IMAAC Mission

ENVL

Provide a single point for the coordination and dissemination of Federal dispersion modeling and hazard prediction products that represent the Federal position during actual or potential incidents involving hazardous atmospheric releases.

**Homeland Security Council Memorandum 2004**

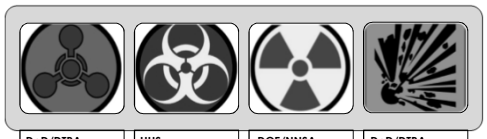



**Memorandum of Understanding between all IMAAC member agencies**

EPA 22

## IMAAC Modeling Tools

ENVL



| | | | |
|---|---|---|---|
| **DoD/DTRA**<br>• HPAC<br>**EPA**<br>• CAMEO/ALOHA<br>**NOAA**<br>• CAMEO/ALOHA<br>• HYSPLIT | **HHS**<br>• Population modeling<br>**DoD/DTRA**<br>• HPAC | **DOE/NNSA**<br>• NARAC<br>**DoD/DTRA**<br>• HPAC<br>**EPA**<br>**NOAA**<br>**NRC**<br>• RASCAL | **DoD/DTRA**<br>• HPAC<br>• VAPO |

EPA 23

## IMACC Support & Training

ENVL

- The IMAAC provides atmospheric modeling support for:
  - Real-world events
    - Emergencies
    - National Special Security Events (NSSEs)

EPA 24

## IMACC Support & Training (Continued)

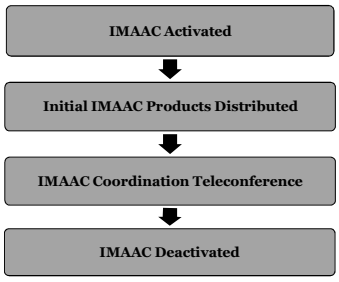
ENVL

- Exercises
  - Vibrant response- 10 kt IND scenario
  - Southern Exposure- NPP
- Training
  - Webinars
  - On-site
  - Classroom (HPAC)

EPA 25

## IMAAC Activation Sequence

ENVL

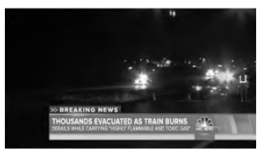



EPA 26

## Real World IMAAC Activation

ENVL

- Incident: July 2, 2015 CSX Rail Accident in Maryville, TN
- Activated by: FEMA National Watch Center at the request of the Tennessee Emergency Management Agency




EPA 27

## Real World IMAAC Activation (Continued)

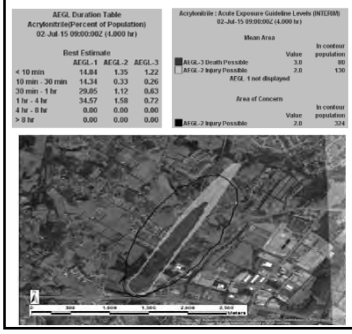
ENVL

- Interagency participation: FEMA (IMAAC Dir., National Watch, Region 4), 45th CST, EPA (Region 4 and HQ), State of TN (TEMA East, TDOT Rail, Dept. of Health), NOAA (SDM, Emer. Response Div.), MARNORTH CBRNE, U.S. Dept H&HS (including ASPR, CDC, ATSDR)

EPA 28

## Acrylonitrile– Far View – Initial Response

ENVL




This quick response used a weather prediction model; and was not coordinated with other IMAAC participants. Coordination will follow, and product will be updated as needed.

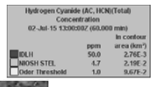
**Maryville, TN**

- Location: 35°45'27.56" N / 84°01'44.97"W
- Event Time: 0100 EDT, 02JUL2015
- Type: Acrylonitrile
- Amount: Single Tank Car
- Dissemination: Rail Accident
- Weather: 12 km NAM
- Model: HPAC 5.3
- Static Population Estimates: LandScan 2012

EPA 29

## HCN Concentration – 0900 Local 2 July 2015
Updated product

ENVL





**Maryville, TN**

- Location: 35°45'27.56" N / 84°01'44.97"W
- Event Time: 0100 EDT, 02JUL2015
- Type: Acrylonitrile (combusting to HCN)
- Amount: Single Tank Car
- Dissemination: accident (10 gal/min leak)
- Weather: 12 km NAM
- Model: HPAC 5.3
- Static Population Estimates: LandScan 2012

EPA 30

## How To Activate the IMACC

ENVL

- The IMAAC is activated for current or potential real-world emergencies involving significant hazardous atmospheric releases. Contact information is listed below
- ANY Federal, State, Tribal, Territorial, or Local official can request the activation of IMAAC

**For Emergencies**

**IMAAC Operations: (703) 767-2003**
Email: IMAAC@FEMA.DHS.GOV

For general inquiries and exercise support requests, please send an email to IMAACINQUIRIES@FEMA.DHS.GOV

Public website: https://www.dhs.gov/imaac

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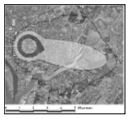
## Other Modeling Options

ENVL

- Surface Water
  - https://www.epa.gov/exposure-assessment-models/surface-water-models
- Oil Spills
  - http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools
- Air Screening
  - https://www.epa.gov/cameo/aloha-software



EPA United States Environmental Protection Agency 32

ENVL

# Unit 11
# Environmental Unit Leader

*Assessment & Cleanup*

EPA 1

## Unit Objectives

ENVL

- To understand the role of the EU in assessing impacts of the event
- Understand the role of EU in evaluating cleanup methods
- Understand the role of the EU in developing plans and notices
- Understand what SCAT is and hot it fits into the EU

EPA 2

## Assessing Conditions

ENVL

- Impact - Traditional Extent of Contamination
- Impacted –
  - Receptors
  - Special Environmental Conditions

EPA 3

## Assessing impacts

ENVL

- Assess Impacts by
  - Visual Inspections
  - Sampling and monitoring
  - SCAT for oil
  - Modeling
- Short and long term human health and/or ecological risk assessments

EPA 4

## Assessing who/what has been impacted

ENVL

- Identify receptors including sensitive populations/areas
  - ✓ Human
  - ✓ Environmental
- Consult with Natural Resource Trustees
  - ✓ Natural
  - ✓ Cultural
  - ✓ Historical

EPA 5

## Developing Endpoints

ENVL

- EU Role – Identify & recommend preliminary:
  - Endpoints for cleanup
  - Based on regulation, risk, & balancing factors
  - Coordinate with TWGs and EECs
- Final decision to be made by IC/UC, or Regional management

EPA 6

## Developing Cleanup Strategies

ENVL

- Identify reasonable options
  - Include No Action
  - Use your experience and the experience of other experts
  - Use internet/lit sources such as Clu-In.org
  - Will it achieve criteria without doing other harm


EPA 7

## Evaluating & Selecting Cleanup Strategies

ENVL

- Evaluate based on:
  - Endpoints/effectiveness
  - Containment vs remediation
  - Implementability
  - Cost
  - Impact – Sensitive populations/areas, workers
  - Political/community/stakeholder concerns
- Recommend

EPA 8

## Monitor Consequences

ENVL

Monitor consequences as treatment is implemented

- Balance
  - Acute/chronic
  - Short term/long term
- Best Management Practices (BMP)
- Make adjustments if needed

EPA 9

## Plans & Notices

ENVL

- Plans
  - Work with Ops
  - Assessment
  - Cleanup
  - Disposal
- Issue special notices/advisories
  example: how to deal with mold after a flood
  - Work with PIO

EPA 10

## Disposal Plans

ENVL

- Develop Disposal Plans to deal with contaminated materials, generated debris, process residuals, etc..
- Must consider:
  - Staging/safe handling
  - Transportation
  - Regulations such as RCRA

EPA 11

## Shoreline Cleanup Assessment Technique (SCAT)

ENVL

- A process to:
  - Evaluate oiling conditions
  - Factor in shoreline types
  - Identify sensitive resources
  - Determine need for clean up
  - Recommend clean up methods & endpoints
  - Place constraints on clean up due to ecological, economic, or cultural concerns

EPA 12

## SCAT – ENVL Duties

ENVL

- Develop Approved Treatment Methods (ATM)
- Develop General Guidelines & SCAT Plan
- Conduct Initial Briefing of SCAT Teams

- Reference https://response.epa.gov/site/site_profile.aspx?site_id=7876

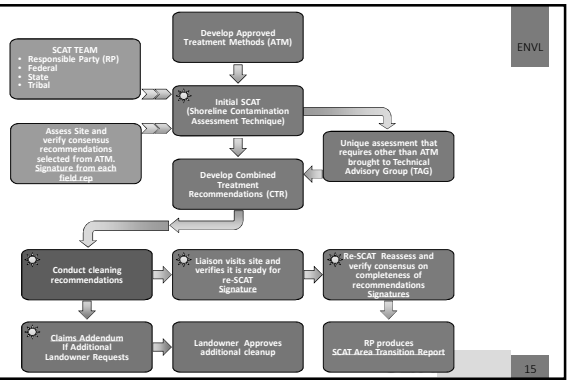
EPA 13

## SCAT Process

ENVL

1. Initial SCAT survey/ cleanup
2. Combined treatment recommendation
3. Operations/cleanup
4. Inspection
5. SCAT reassessment
6. EPA Division sign off

EPA 14



## Organization
## Where does SCAT fit?

ENVL

**Operations**

- All field personnel are in Ops
- Ops is dependent on SCAT
- Ops Chief needs to make many of the "scattish" decisions

**Planning**

- In EU to develop SCAT plan and ATMS
- EU needs to vet SCAT products
- EU needs info for long term planning

EPA United States Environmental Protection Agency

16

ENVL

# Questions

EPA United States Environmental Protection Agency

17

ENVL

# Unit 12
# Environmental Unit Leader

*Resource Trustees*

EPA 1

## Objectives

ENVL

- Understand the Role and Duties of the ENVL in regards to Resource Trustees
- Know who the Trustees are
- Know how to access Resource Trustees

EPA 2

## Regulatory Requirement

ENVL

Under CERCLA, EPA's NRD role is one of notification and coordination.

EPA is required to:

- Notify Trustees of potential injuries to natural resources at sites where releases or threats of releases are under investigation
- Coordinate assessments, investigations and planning with Trustees [CERCLA §104(b)(2)]

EPA 3

## Regulatory Requirement (Continued)

ENVL

EPA is required to:

- Notify Federal Natural Resource Trustees of negotiations with potentially responsible parties (PRPs) and to encourage their participation in negotiations if the release under investigation may potentially injure Trust Resources
- Under OPA, EPA is the lead agency in responding to oil spills in inland waters

EPA 4

## Natural Resources & Ecological Issues

ENVL

- Environmental impacts (e.g. , seafood tainting, wildlife impacts
- Identification of natural resources ( e.g. wildlife, habitats, sanctuaries, and refuge areas)
- Historic and cultural resources
- Wildlife protection strategies
- In addition to regulatory notification, Trustees can assist in the identification and assessment

EPA 5

## Types of Trustees

ENVL

- Federal
- State
- Tribal
- Other
  - https://www.epa.gov/superfund/natural-resource-damages-trustees#other

EPA 6

## Federal Trustees

ENVL

- Department of Agriculture (USDA)
- Department of Commerce (DOC)
  - National Oceanic and Atmospheric Administration (NOAA)
- Department of Defense (DOD)
- Department of Energy (DOE)
- Department of the Interior (DOI)
  - Fish and Wildlife Service

EPA 7

## State Trustees

ENVL

- Examples of resources under the trusteeship of individual State officials include:
  - State forest lands
  - State-owned minerals
  - State parks and monuments
  - State rare, threatened, and endangered species
  - State wildlife refuges and fish hatcheries

EPA 8

## Tribal Trustees

ENVL

- Examples of resources under the trusteeship of Tribal groups include:
  - Tribal-owned minerals
  - Ground and surface water resources on Tribal lands
  - Any other natural resources found on Tribal land

EPA 9

## Other Trustees

ENVL

- Under OPA, foreign officials can also act as Natural Resource Trustees
- The head of a foreign nation must pick the official to act as Trustee [OPA §1006(b)]
- The foreign Trustee can act on behalf of the foreign government only for natural resources "belonging to, managed by, controlled by, or appertaining to such foreign government" [OPA §§1006(a)(4), (b)(5)]

EPA 10

## Trustee Notification

ENVL

- EPA's Trustee notification and coordination efforts focus on achieving three goals:
  - Providing Trustees with the information needed to meet their legal obligations for action
  - Sharing information to better protect public health and the environment
  - Reducing the time for settlement of all liabilities

EPA 11

## Trustee Consultation

ENVL

- Endangered Species Act (ESA) directs all Federal agencies to work to conserve threatened and endangered (T&E) species
- ESA Section 7 assures that actions taken by Federal agencies don't jeopardize T&E species through a consolation process
- Section 7 recognizes that may require an expedited consultation and recognizes that response actions must be taken to prevent imminent loss of human life and property
  https://www.fws.gov/midwest/endangered/section7/index.html
  https://www.fws.gov/endangered/esa-library/pdf/chapter8.pdf

EPA 12

ENVL

QUESTIONS?

EPA United States Environmental Protection Agency

13

ENVL

# Unit 13
# Environmental Unit Leader

*RISK ASSESSMENT*

EPA 1

## Review of Environmental Unit Responsibilities

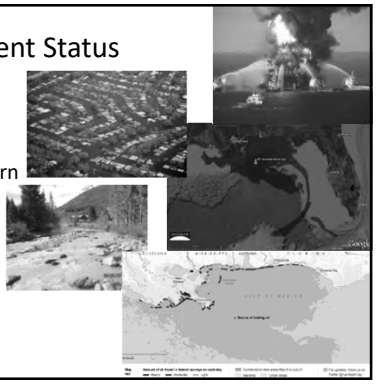
ENVL

- Data Management – processing, Quality Assurance/Control, Interpretation
- Plan Development – Sampling & Analysis, cleanup, disposal
- Environmental modeling & interpretation
- **Human Health and Ecological Risk Assessments**
- Identify Sensitive Areas and Populations
- Communicate Sampling, Toxicity and Risk Results
- Coordinate with similar related entities

EPA 2

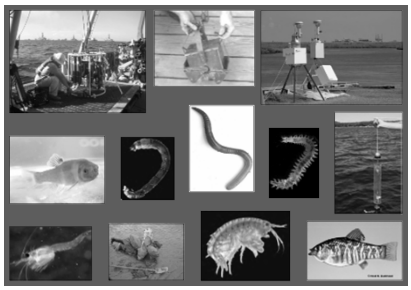
## Survey Current Incident Status

- Size / Scope
- Current Activities
- Contaminants of Concern
- Threats
- Sensitive Areas
- Populations
- Conceptual Site Model



## Survey Anticipated Scientific Needs

- Modeling
- Interpretation
- Threats / risks to human health and environment
- Sampling
- Toxicity testing
- Response



## Objectives for this Training Unit:

ENVL

1. To gain an appreciation of the different components involved in human health (HHRA) and ecological risk assessments (ERA) as summarized in the *ENVL Job Aid*
2. To provide discussion on where an ENVL can obtain information necessary pertaining to HHRA and ERA

EPA 5

## Human Health Risk Assessments

ENVL

The Environmental Unit will perform short- and long-term human health risk assessments, as appropriate, to determine action and cleanup levels. Human health risk assessments activities include the following:

1. Evaluate preliminary benchmarks and criteria , and perform acute and chronic risk assessments, as appropriate, to identify action and cleanup levels
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EPA 6

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ENVL

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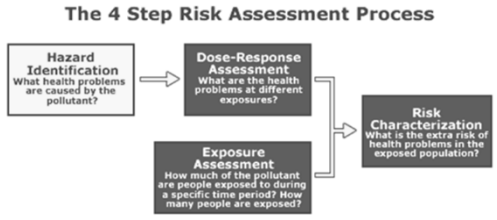
EPA 7

## Risk Paradigm – Step 1

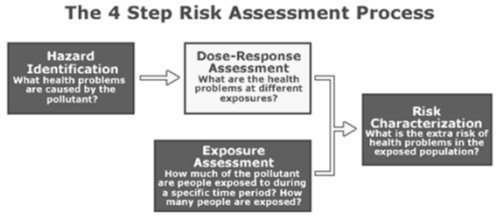
ENVL




EPA 8

## Risk Paradigm – Step 2

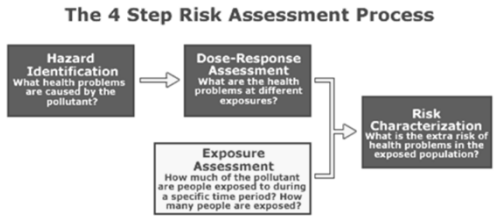
ENVL




EPA 9

## Risk Paradigm – Step 3

ENVL




EPA

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## Risk Paradigm – Step 4

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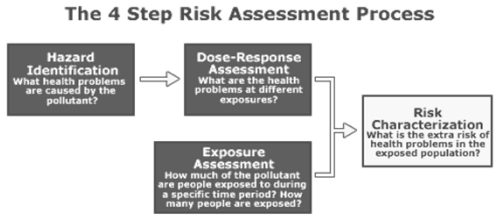


EPA

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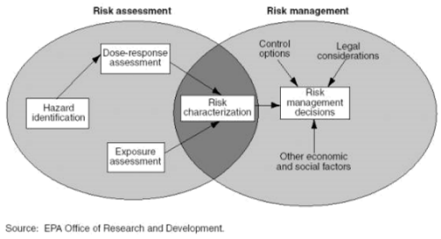
## Risk Management

ENVL




Source: EPA Office of Research and Development.

EPA

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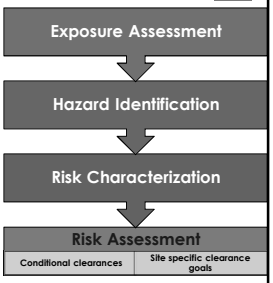
## Chemical Benchmarks and Criteria

ENVL

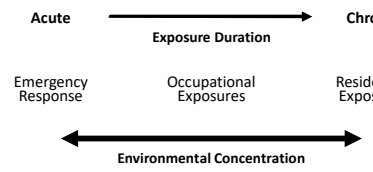
- **Considerations**
  - **Agent dependent:** Dose response relationship, mechanism of toxicity, individual sensitivity (children, older persons)
  - **Site dependent:** What is the toxic agent? Chem, Bio, or Rad. Site characteristics (inside building, outside, etc.). Fate and transport.
  - **Exposure:** magnitude (how much), duration (how long), and frequency (how often)
- **Risk Assessment**
  - Defines the probability of a harmful effect to a population or individuals after exposure to toxic agent
  - Can NOT assess or include past exposures




EPA 13

## Chemical Exposure Concentration / Time Continuum

ENVL




EPA 14

## Human Health Risk Assessments

ENVL

The Environmental Unit will perform short- and long-term human health risk assessments, as appropriate, to determine action and cleanup levels. Human health risk assessments activities include the following:

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2. **Evaluate action levels for the protection of worker health and safety (H&S) in coordination with the safety officer**
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## Action Levels for Responders

ENVL

**Population:** Responders
- Time frame
  - Minutes (IDLH, AEGL, TEEL)
  - Hours (ERPG, AEGL, EEGL)
  - One day (EEGL, AEGL)
- Effects
  - None
  - Mild
  - Severe or life threatening
- Media: Air

**Responder Action levels**
- US EPA Acute Exposure Guideline Levels (AEGLs)
- NIOSH Immediately dangerous to life or health (IDLH)
- AIHA Emergency Response Planning Guides (ERPGs)
- US DOE's Temporary Emergency Exposure Levels (TEELs)
- NRC's Emergency Exposure Guidance Levels (EEGLs)

http://www.epa.gov/oswer/riskassessment/ragsc/pdf/appc.pdf

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## Action Levels for Workers

ENVL

**Population: Workers**
- Time frame
  - 8 - 10 hrs per day (TWA)
  - 15 minute (STEL)
  - Instantaneous (Ceiling)
- Effects
  - None, for most workers
  - Or a specific risk level
- Media: Air

**Occupational Exposure Limits**
- OSHA Permissible Exposure Limits (PELs)
- NIOSH Recommended Exposure Limits (RELs)
- ACGIH Threshold Limit Values (TLVs®)
- AIHA Workplace Environmental Exposure Limits (WEELs)

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## Action Levels for Residential

ENVL

**Population: General Public including sensitive individuals**
- Time frame
  - Lifetime (RfC, RfD, MRL)
  - 1 day, 30, 90 and 2 yrs (PALs)
  - 1-24 hrs (SPEGL)
- Effects
  - None,
  - Or a specific risk level
- Media: Contact Oral, Inhalation

**2003 OSWER Directive 9285.7-53**
- **Tier 1- EPA's Integrated Risk Information System (IRIS)**
- **Tier 2- EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) –** The ORD/NCEA Risk Technical Support Center (STSC)
- **Tier 3- Other Toxicity Values –** Tier 3 includes additional EPA and non-EPA sources of toxicity information.

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## Indoor Screening / Clearance Goals

ENVL

- Chemicals
  - Agency method under continuous refinement and expansion
- Radiologicals
  - Based on **dose** measurement
- Biologicals
  - Based on detection of viable organisms through culture

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## Protective Action Guides (PAGs) for Radiological Incidents

ENVL

| Phase | Protective Action Recommendation | PAG |
|---|---|---|
| **Early** | | |
| | Sheltering in-place of the public | 1 to 5 rem |
| | Evacuation of the public | 1 to 5 rem |
| | Administration of prophylactic drugs –KI | 5 rem |
| | Limit emergency worker exposure | 5 rem or greater |
| | Life savings | up to 25 rem |
| **Intermediate** | | |
| | Relocation of the public | 2 rem (1st year)<br>500 mrem/yr |
| **(later yrs)** | | |
| | Food Interdiction | 500 mrem/yr |
| | Drinking water interdiction | 500 mrem/yr |
| | Limit Worker Exposure | 5 rem/yr |
| **Late** | | |
| | Final site clean up and restoration | Site-specific optimization |

http://www.remm.nlm.gov/radmonitor_water_food.htm

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## Radiation Benchmarks and Criteria

ENVL

- **Risk Assessment**
  - Defines the probability of a harmful effect to a population or individuals after exposure to toxic agent
- **Risk Considerations**
  - **Isotope dependent:** Likely radionuclides in an RDD include: Cs-137, Sr-90, Co-60, Am-241, Ra-226, Ir-192, Pu-238 and Pu-239/240
  - **Dose:** is a measure of the strength of a radiation field at some point
  - **Exposure:** is a measure of the strength of a radiation field at some point

**RAGS Part A. Ch. 10 Radiation Risk Assessment Guidance**

"There are special hazards associated with handling radioactive waste and EPA ***strongly recommends*** that a health physicist experienced in radiation measurement and protection be consulted prior to initiating any activities at a site suspected being contaminated with radioactive substances."

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## Radiation Benchmarks and Criteria

ENVL

- There are **existing benchmarks**, in the form of requirements
  - ** Less than ($10^{-4}$ to $10^{-6}$) risk, or
  - Less than (100 or 25 or 15 or 4 mrem) dose, or
  - License / owner conditions
- There are also recommendations
  - e.g., screening levels for soil
  - Derived Intervention Levels (DILs): are specific for each radionuclide in soil or food items

** does not consider probability times consequence

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## Indoor Screening/Clearance Goals

ENVL

- Chemicals
  - Agency method under continuous refinement and expansion
- Radiologicals
  - Based on dose measurement
- **Biologicals**
  - **Based on detection of viable organisms through culture**

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## Biological Benchmarks and Criteria

ENVL

- EPA response to emergency response to Biological Agents is relatively new
- Guidance for cleanup goal determination available for Anthrax
  - EPA and CDC developed a strategy for evaluating anthrax contamination in building and outdoors. (The effort with CDC was completed a few years ago. The product is still the 2012 doc referenced below.)
    - ✓ Interim Clearance Strategy, February 2012
    - ✓ "No detection of viable spores"
- With no formal guidance for other biologicals, site specific clearance goals will be developed for future incidents.
    - ✓ Recommend the development of an Environmental Clearance Committee (ECC) early in response
    - ✓ ECC can include SMEs and local public health representatives
- ECC can assist with interpretation of laboratory data for extent and clearance

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## Summary of preliminary benchmarks and criteria

ENVL

- What agent (CBR) do you think is there or not there?
- What is your detection limit? You only find what you are looking for!
- What population(s) are you trying to protect?
  - Will target populations change during the event?
- How long are you trying to protect them?
- No number is a 'bright line'
- Please don't say 'safe'

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## Human Health Risk Assessments

ENVL

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## Sensitive Populations, Areas and Response Priorities

ENVL

**EJSCREEN (formerly EJView)**

- A mapping tool that creates maps *and reports* based on geographic areas and data sets chosen
- Includes factors that may affect public and environmental health, including:
  - Demographic
  - Places/landmarks
  - Health
  - Environmental
  - Facility-level data


https://www.epa.gov/ejscreen

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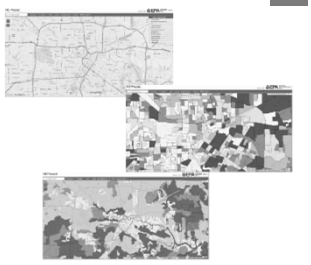
## Sensitive Populations, Areas and Response Priorities

ENVL

**NEPAssist**

- Another mapping tool that creates maps based on geographic areas and data sets chosen
- Also Includes factors that may affect public and environmental health, including:
  - Demographic
  - Places/landmarks
  - Health
  - Environmental
  - Facility-level data



https://nepassisttool.epa.gov/nepassist/nepamap.aspx

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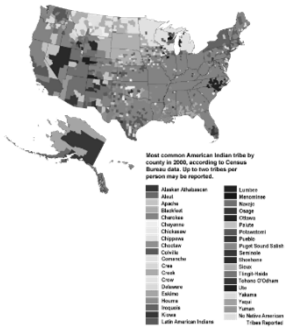
## US Census

ENVL

- Tribes
- Ethnic Groups
- Age
- Etc.

http://www.censusscope.org

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## Human Health Risk Assessments

ENVL

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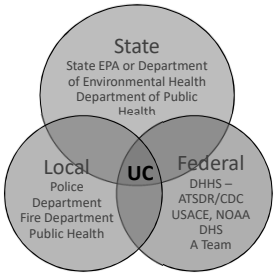
## Under Unified Command EPA Coordinates with Local, State and Federal Agencies

ENVL




*These are just an examples. Reality could be somewhat different with more, fewer, or just totally different players.

EPA 31

## The Advisory Team (A-Team) for Environment, Food and Health

ENVL

- The A-Team was established to assist in international and domestic nuclear emergencies
- Provides coordinated advice and recommendations to the State, Coordinating Agency, and DHS
- Membership is comprised principally of:

USDA CDC FDA

EPA 32

## National Incident Management System (NIMS)

ENVL

- Different phases of a response will require different ICS units under the ENVL
  - Technical Working Group
  - Environmental Clearance committee
  - Decontamination Unit
  - Characterization Unit
  - Subject Matter Experts

- Required by HSPD5
- Provides a common structure and terminology
  - Organizational elements
  - Lines of communication
- HQ EOC
- REOC

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## Human Health Risk Assessments

ENVL

The Environmental Unit will perform short- and long-term human health risk assessments, as appropriate, to determine action and cleanup levels. Human health risk assessments activities include the following:

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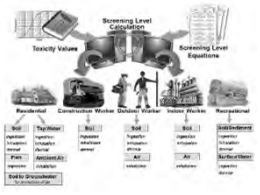
## Resources for Summary Reports:

ENVL

- Regional Screening Levels (RSLs): https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables
- Removal Management Levels (RMLs): https://www.epa.gov/risk/regional-removal-management-levels-chemicals-rmls
- Acute Dose-Response Values for Screening Risk Assessments: https://www.epa.gov/sites/production/files/2014-05/documents/table2.pdf
- Toxicological Profiles: http://www.atsdr.cdc.gov/toxprofiles/index.asp
- Chemical Hazards Emergency Medical Management: http://chemm.nlm.nih.gov/




Wheel illustration by Janet Fong, found on https://www.aic.cuhk.edu.hk

EPA 35

## Information Sources

ENVL

- PEL/REL/IDLH - http://www.cdc.gov/niosh/npg/
- RfC/RfD - http://www.epa.gov/iris/index.html
- MRLs - http://www.atsdr.cdc.gov/mrls/index.asp
- Ca-RELs - http://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary
- NRT Quick Reference Guides - https://www.nrt.org/Main/Resources.aspx?ResourceType=Hazards&ResourceSection=2
- WISER - http://webwiser.nlm.nih.gov/getHomeData.do
- TOXNET - https://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

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## Water Information Sources

ENVL

- Drinking Water Standards (MCLs and HAs) - http://water.epa.gov/drink/standards/hascience.cfm#dw-standards
- Water Quality Standards - https://www.epa.gov/wqs-tech
- Water Quality Criteria - https://www.epa.gov/wqc

EPA 37

## Example Scenario

ENVL

- Residents in community are complaining of odors, headaches, petrochemical type of smell
- What should EPA do?
  - Organic vapor analyzers confirmed presence of VOCs
  - EPA suspected petroleum contamination
  - Field screening equipment wasn't specific to individual compounds
  - Screening value based on most toxic compound believed to possibly be present

EPA 38

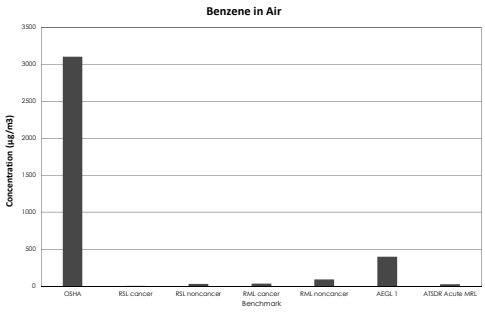
## Various Levels for Benzene in Air

ENVL

- OSHA PEL – 1 ppm (3.1 mg/m$^3$ = 3,100 µg/m$^3$)
- NIOSH REL – 0.1 ppm (310 µg/m$^3$)
  - STEL – 1 ppm, IDLH – 500 ppm
- EPA RSL – 0.36 µg/m$^3$ (1E-06) / 31 µg/m$^3$ (HQ = 1)
- Calculated RML – 36 µg/m$^3$ (c) or 93 µg/m$^3$ (nc)
- ATSDR MRLs
  - Acute – 0.009 ppm = 28 µg/m$^3$
  - Intermediate – 0.006 ppm = 18 µg/m$^3$
  - Chronic – 0.003 ppm = 9.3 µg/m$^3$
- AEGL 1 (no CNS effects)
  - 10-minute: 130 ppm = 438,000 µg/m$^3$
  - 60-minute: 52 ppm = 175,000 µg/m$^3$

This level was used as the Temporary relocation screening value

EPA 39

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## Ecological Risk Assessments

ENVL

The Environmental Unit may also perform short- and long-term ecological risk assessments (ERA), as appropriate, to determine action and cleanup levels. Ecological risk assessments activities are very similar to those for human health and include the following:

1. Evaluate preliminary benchmarks and criteria , and perform risk assessments, as appropriate, to identify action and cleanup levels
2. Evaluate action levels for the protection of ecological receptors
3. Identify sensitive areas and recommend response priorities in close coordination with the PSC
4. Coordinate with local, state and federal health agencies
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## Ecological Risk Assessment is a Process, not a Recipe

ENVL

- Data, methods and models are problem- and site-specific
- This problem- and site-specificity gives ecological risk assessors more flexibility in EcoRA design and approaches than is available in HHRA
  - Can choose which species to assess
  - Can choose how to assess species (e.g. by feeding guilds, by habitat use)
  - Can choose level of biological organization to assess
- EcoRA objective is to provide timely, scientifically-based technical advice to decision makers and the public

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## Ecological Risk Assessment

ENVL

- Ecological Risk Assessment Guidance for Superfund (1997)
  - EPA 540-R-97-006, OSWER Directive # 9285.7-25
  - https://www.epa.gov/risk/ecological-risk-assessment-guidance-superfund-process-designing-and-conducting-ecological-risk
  - 8 step process


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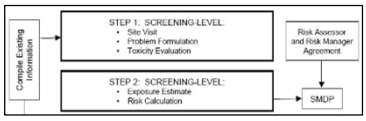
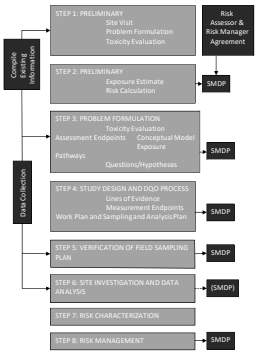
## ERA Paradigm – Steps 1 and 2 - SLERA




- Screening-level ERA (SLERA)
  - Know the site and ecological conditions
  - What contaminants present (potential) danger?
  - What species may be harmed, how, and to what degree?
  - Compare media contaminant concentrations to conservative (i.e. very protective) screening benchmarks

## Scientific Management Decision Point (SMDP)

ENVL

A point during the risk assessment process when the risk assessor communicates results of the assessment at that stage to a risk manager. At this point the risk manager determines whether the information is sufficient to arrive at a decision regarding risk management strategies and/or the need for additional information to characterize risk. SMDP at end of Step 2 is:

1. Adequate info – Acceptable risk. Stop and document SLERA conclusions

-or-

2. Info not adequate – more needed. Continue to Step 3 of 8 step process

-or-

3. Sufficient info – early action warranted based on unacceptable risk

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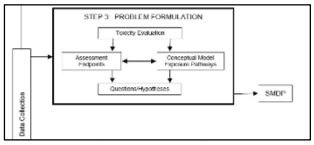
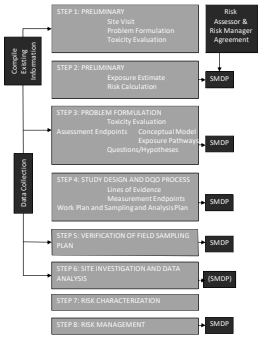
## ERA Paradigm – Step 3
## BERA Problem Formulation




- Baseline ERA (BERA) Problem Formulation
  - An essential planning activity
  - Defines data collection needs and risk assessment approach
  - **A major cause of failure in risk assessments**
    - ✓ Poor planning → poor data → poor decisions

## BERA Problem Formulation includes:

ENVL

- Refinement of potential contaminants of ecological concern
- Characterizing ecological effects of contaminants
- Reviewing and refining information on contaminant fate and transport, complete exposure pathways, and ecosystems potentially at risk
- Selecting assessment endpoints (usually assess survival, reproduction and/or growth of an ecological receptor)
- An ecological receptor can be:
  - A single species
  - A biological community (e.g. benthic macroinvertebrate community)
  - A feeding guild (multiple species that feed the same way, e.g. piscivorous birds)
- Developing a conceptual model with working hypotheses or risk questions that the site investigation will address

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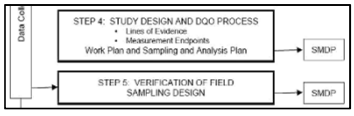
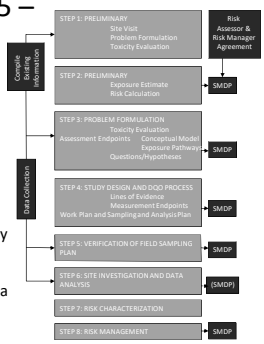
## ERA Paradigm – Steps 4 and 5 – Study design, DQOs




- Baseline ERA (cont)
  - Study design & DQOs
    - ✓ Media chemistry, tissue residue, toxicity tests, bioassessments, etc.
    - ✓ Measurement Endpoint definition
  - How to gather site-specific, site-related data
  - Field verification of data needs – can you actually do it?

## Measurement Endpoint Definition is Critical

ENVL

- **Criteria that any measurement endpoint should meet**
  - Ecological relevance
  - Unambiguous operational definition
  - Accessibility to prediction and measurement
  - Susceptibility to hazardous substances
- **Identify assessment endpoints in terms that can be measured or quantified**
  - An entity (e.g. benthic invertebrate community)
  - An attribute (e.g. species diversity, species richness)
  - A level of effect (e.g. 20% reduction in number of species present)
- **Define data needed to assess status and potential changes in attributes**
  - Media contaminant concentration exceeds a toxicity benchmark
  - Reduced organism survival, reproduction and/or growth in site-specific toxicity test
  - Change in population abundance, population age structure, or a community index

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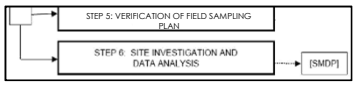
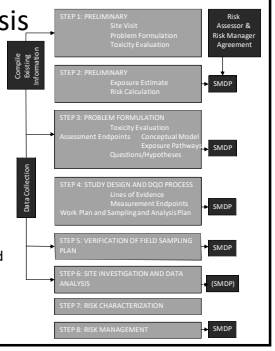
## ERA Paradigm – Step 6 Site investigation, data analysis

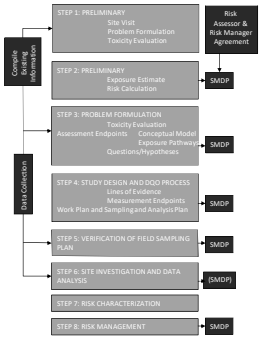



- Baseline ERA (cont)
  - Includes all of the surveys, field sampling and analyses conducted as part of the SLERA and BERA (e.g. media contaminant concentrations, toxicity tests, food web models, etc.)
  - Site investigation and analysis of effects should be straightforward, following procedures defined in work plans and sampling and analysis plans developed in Step 4, verified in Step 5



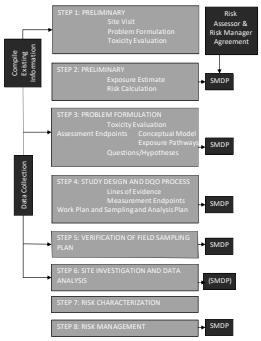

## ERA Paradigm – Step 7 Risk Characterization


- Baseline ERA (cont)
  - Links to Assessment Endpoints
  - Risk Estimation
    - ✓ Integration of exposure and effects analyses
    - ✓ Weight of evidence
  - Risk Description
    - ✓ Spatial distribution of risks, receptors at risk
    - ✓ Probability or magnitude of risk
    - ✓ Which contaminants pose unacceptable risk
    - ✓ Recommend cleanup numbers protective of ecological receptors
  - Uncertainties



## ERA Paradigm – Step 8 – Risk Management


- Baseline ERA (cont)
  - **Performed by risk managers, not risk assessors**
  - Integration of risk assessment and other considerations to make and justify decisions
  - Consider:
    - ✓ Ecological risks / impacts of response actions themselves
    - ✓ Residual risk following response actions
    - ✓ Tradeoff / balance between ecological and human health risks




## A Primary Difference Between Risk Assessment and Risk Management

ENVL

- Risk assessments are informational
- Risk management is decisional

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## Ecological Risk Resources

ENVL

- EPA EcoBox
  - Like the HHRA ExpoBox
  - https://www.epa.gov/ecobox


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## Sources of Toxicity Reference Values (TRVs) and Screening Benchmarks for Multiple Media

ENVL

- EPA Region 4 Ecological Risk Assessment Guidance
  - https://www.epa.gov/sites/production/files/2018-03/documents/era_regional_supplemental_guidance_report-march-2018_update.pdf
- Oak Ridge National Laboratory (ORNL)
  - https://rais.ornl.gov/tools/eco_search.php
- Canadian Environmental Quality Guidelines
  - http://ceqg-rcqe.ccme.ca/en/index.html
- NOAA Screening Quick Reference Tables (SQuiRTs)
  - http://response.restoration.noaa.gov/environmental-restoration/environmental-assessment-tools/squirt-cards.html

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## Toxicity Reference Values (TRVs) and Screening Benchmarks for Single Media

ENVL

- EPA National Recommended Water Quality Criteria

  https://www.epa.gov/wqc
- EPA Equilibrium Partitioning Sediment Quality Benchmarks
  - Metals, PAHs, non-ionic organics, dieldrin, endrin, methods for development of benchmarks for most organics
- Netherlands Target and Intervention Levels (soil)

  http://esdat.net/Environmental%20Standards/Dutch/annexS_I2000Dutch%20Environmental%20Standards.pdf
- Canadian Tissue Residue Guidelines

  http://st-ts.ccme.ca/en/index.html

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## Sources of Toxicity Data Literature to Derive TRVs and Screening Level Benchmarks

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- EPA Ecological Soil Screening Levels (EcoSSLs)
  - Mostly metals, PAHs, DDT, dieldrin, PCP

    http://www.epa.gov/ecotox/ecossl
- EPA EcoTox Database (mostly aquatic life)

  http://www.epa.gov/ecotox
- US Army Corp of Engineers and EPA, Environmental Residue Effects Database (aquatic life tissue residues)

  https://ered.el.erdc.dren.mil/
- Spiked Sediment Toxicity Database

  http://data.sccwrp.org/sedag/

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## Other Ecological Risk Resources

ENVL

- EPA ECO Updates
  - http://www.epa.gov/oswer/riskassessment/ecoup/
- EPA ORD Ecological Risk Assessment Support Center
  - https://cfpub.epa.gov/ncea/erasc/recordisplay.cfm?deid=154348
- California OEHHA Ecotox database and exposure factors
  https://oehha.ca.gov/ecotoxicology/general-info/calecotox-database
- Los Alamos National Laboratory (LANL) EcoRisk Database
  http://www.lanl.gov/environment/protection/eco-risk-assessment.php

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## ERA in the ENV bottom line

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- Ecological risk assessment is highly diverse
  - numerous species
  - numerous scenarios
  - an endless list of resources
- Ecological risk assessments are highly site-specific
- Make sure the ENV utilizes experienced ecological risk assessors
- Make sure the ENV consults local and state officials on ecological matters

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## Summary

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- The mission of EPA is to protect human health and the environment.
  - ENVL will work closely with different units under the ENV, other units of the ICS (e.g., situation unit), different agencies, HQ, and others as needed.

**QUESTONS?**

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