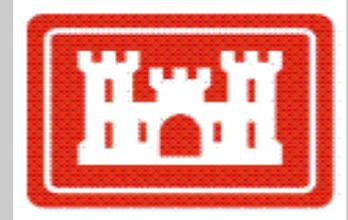


Operational Range Assessment Program (ORAP) Phase II Overview For Active Installations

Andrea Graham

USACE, Baltimore District

andrea.a.graham@usace.army.mil



Report Documentation Page

Form Approved
OMB No. 0704-0188

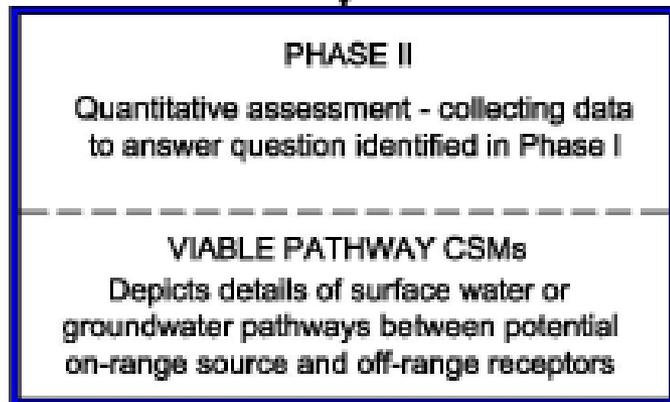
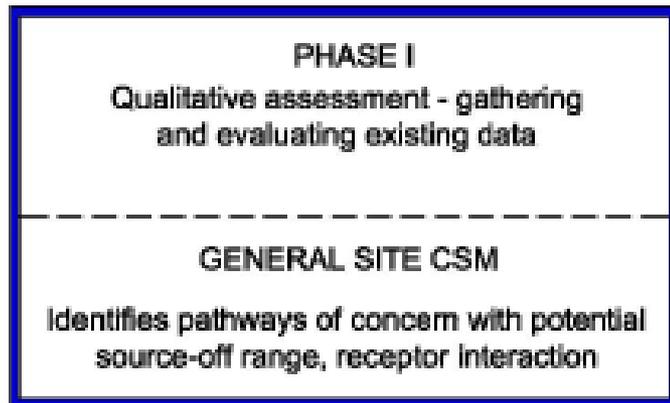
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE MAY 2011	2. REPORT TYPE	3. DATES COVERED 00-00-2011 to 00-00-2011			
4. TITLE AND SUBTITLE Operational Range Assessment Program (ORAP) Phase II Overview For Active Installations		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Army Corps of Engineers, Baltimore District, 10 South Howard Street, Baltimore, MD, 21201		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES Presented at the NDIA Environment, Energy Security & Sustainability (E2S2) Symposium & Exhibition held 9-12 May 2011 in New Orleans, LA.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 31	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Operational Range Assessment Program Background

- Mission
 - Establish “information excellence” to support the Army’s Range Sustainment Program.
- Intent
 - Keep ranges open and available for testing and training.
 - Ensure people on and off Army installations are not drinking water contaminated by explosives.
 - Address regulatory and public concerns.





This leads to sampling in pathway between receptor and potential source to determine if off-range risk is really present

ORAP Assessments use a phased approach and are based on Source – Receptor Interactions

Phase II Quantitative Assessment

- U.S. Army Institute Public Health Phase II Approach
 - Develop installation-specific HSP and APPs
 - Develop DQOs
 - Develop QAPPs using UFP-QAPP
 - Identify and address applicable SW and GW pathways only
 - Develop detailed viable pathway CSMs
 - Incorporate non-range influences and degradation
 - Select effective sample locations
 - GW sampling at/near sources (not on impact areas) or exposure points
 - SW sampling
 - Account for temporal variability (wet/dry seasons, high/low flow events)
 - Use SW decision flow chart



Phase II Quantitative Assessment

- USAIPH Phase II Approach (continued)
 - Ecological Risk Assessments – aquatic receptors only
 - Background and 95% UCL of mean results vs. screening levels comparison
 - Benthic macroinvertebrate surveys – false Positive / Negative
 - Human Health Risk Evaluations
 - Initial data screening – direct comparison to screening levels
 - Quantitative data screening – determine need for HHRA
 - Referred categorization must be based on Risk Assessment results – not just on Phase II data

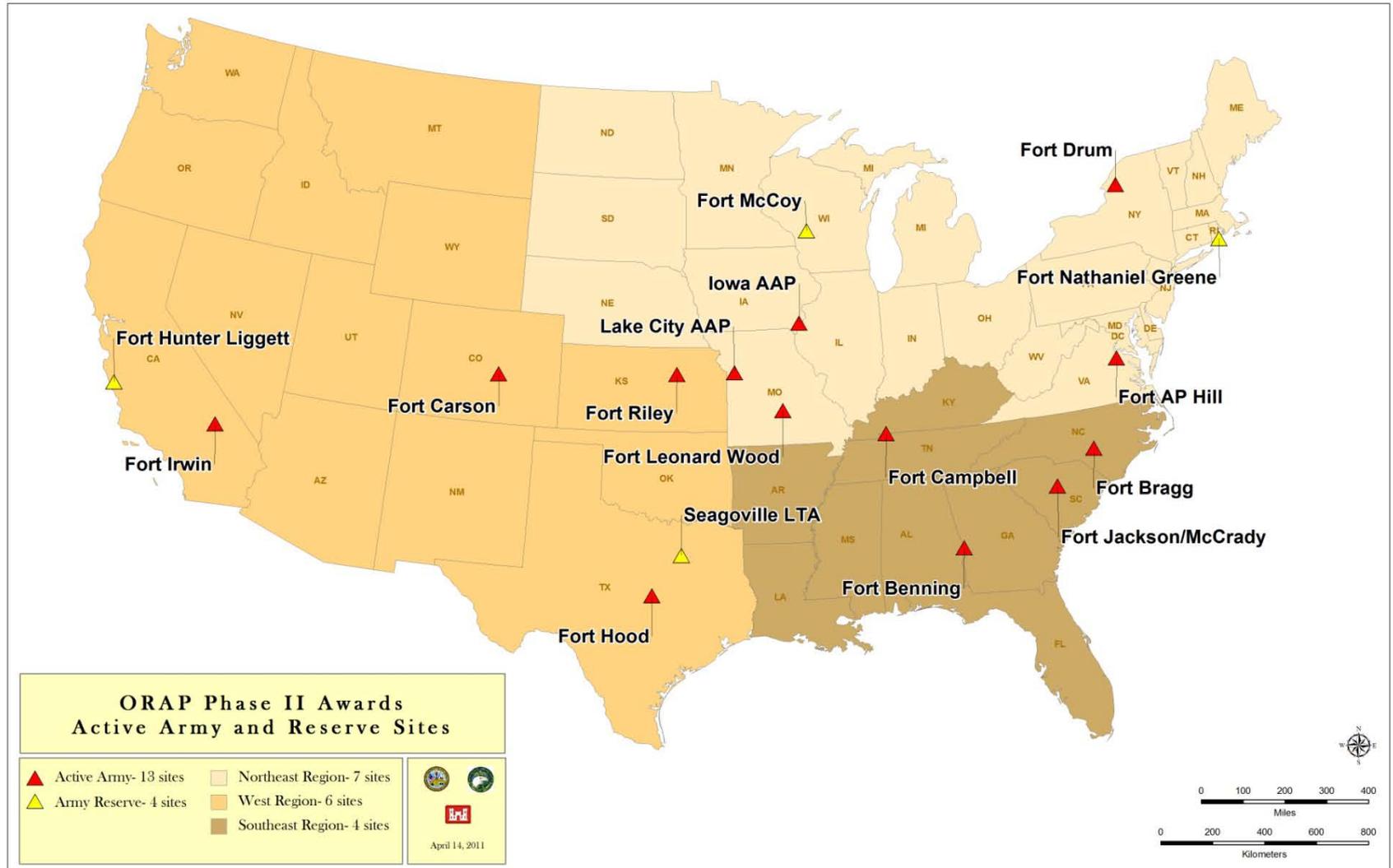


Phase II ORAP

- ACSIM has overall Army responsibility for Operational Range Assessment Program including funding and guidance.
- G3 provides HQDA level operator input.
- AEC and NGB are the Program Managers for Phase II Assessments.
- USAIPH will provide technical oversight and QA.
- Contract mechanism for Phase II Assessments will consist of AE IDQ, Multiple Award Military Munitions, and Multiple Award Environmental Service contracts.
- Total number of Active and Reserve installations requiring a Phase II is 45 including the seven (7) pilot studies.
- Phase II completion date is 2014.



Current Active Army and Army Reserve ORAP Phase II Investigations



MALCOLM
PIRNIE

Solutions for Life™

Lessons Learned in Proving the Concept

- Early and often installation coordination is key – access, training, available data, local expertise
- Focus of representative elements through CSM
- Range boundary sample locations reduce training interruptions and hazard concerns while approaching point of compliance
- Investigation results create good foundation for evaluating range best management practices
- Customizing the technical approach IAW programmatic guidance creates consistent, defensible results across multiple teams

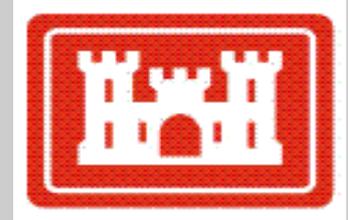


Customizing an ORAP Technical Approach – Planning Success

Dave Mercadante

EA Engineering, Science, and Technology

dmercadante@eaest.com



Program Guidance

Tailor Technical Approach to Site Specific Conditions....

Focus the Phase I Range Complex Conceptual Site Model (CSM) down to specific “Inconclusive” range areas and viable water pathways

Follow USEPA Systematic Planning Data Quality Objective Process to develop and document a detailed approach (UFP-QAPP)

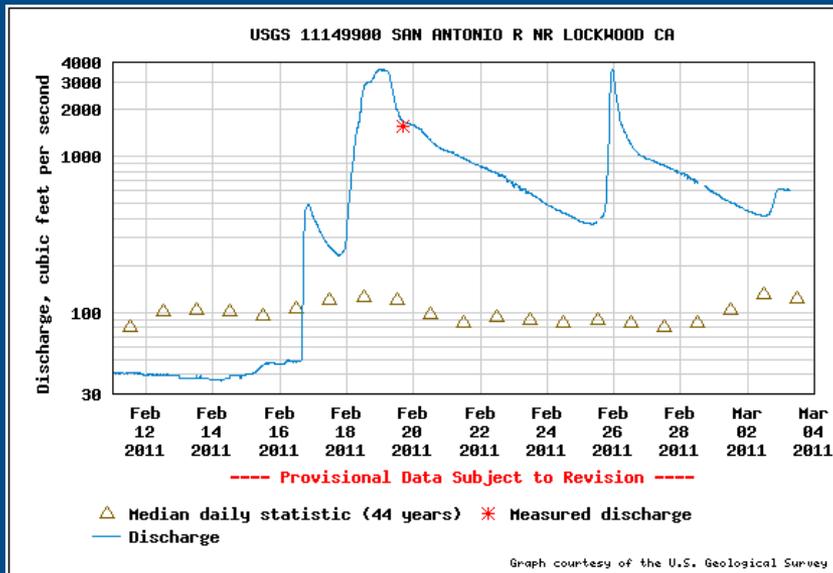
Integrate intent of the investigation structure presented in the USACHPPM ORAP Phase II Investigation Protocol

....to characterize potential risk of off-range migration of MC.



Surface Water – Technical Approach

- Potentially Large Assessment Areas
- Use CSM to Focus Investigation Approach
- Focus on Viable Pathways with representative Elements
 - Source - Concentrated Use
 - Pathway – Flow characteristics
 - Receptors – Interaction potential



➤ Get multiple datapoints - weight of evidence

Surface Water – Technical Approach

What source areas most susceptible to migration?

- Types of ranges dictate:
 - Density of Impacts
 - Potential Constituents
- Training tempo and period of use
- Physical profile of range
 - Geology – erosion, permeability, pH
 - Slope
 - Distance
- Fate and Transport Characteristics of MC
- Available sampling data – rare in source areas



Determines Analytical Suite



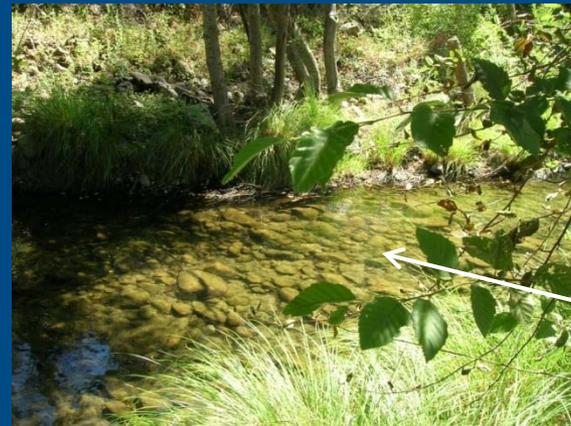
Surface Water – Technical Approach

What surface water pathways are available for migration from these source areas?

- Flow Pattern is primary concern
 - Perennial, Intermittent, Ephemeral, Impounded?
- Determines Sample Collection Schedule
 - Wet season, Dry Season
 - Clear Weather, Storm, Snow Melt
 - Diurnal Variations
- Determines Sample Type
 - 24 hr. Composite
 - 2 hr. Storm
 - Grab
 - Integrated Depth
 - Sediment



Downstream
(Intermittent Flow)



Upstream
(Perennial Flow)

Surface Water - Technical Approach

Establish a sample location representative of MC-receptor interaction

- Determine human and/or ecological receptors
 - Establishes screening levels and sampling methods
 - Pick sample location representing best potential for MC interaction or closest point of compliance
 - On-range
- Other methods to evaluate receptor impact?
 - Benthic and Habitat Surveys
 - SEM/AVS
 - Biotic Ligand Model



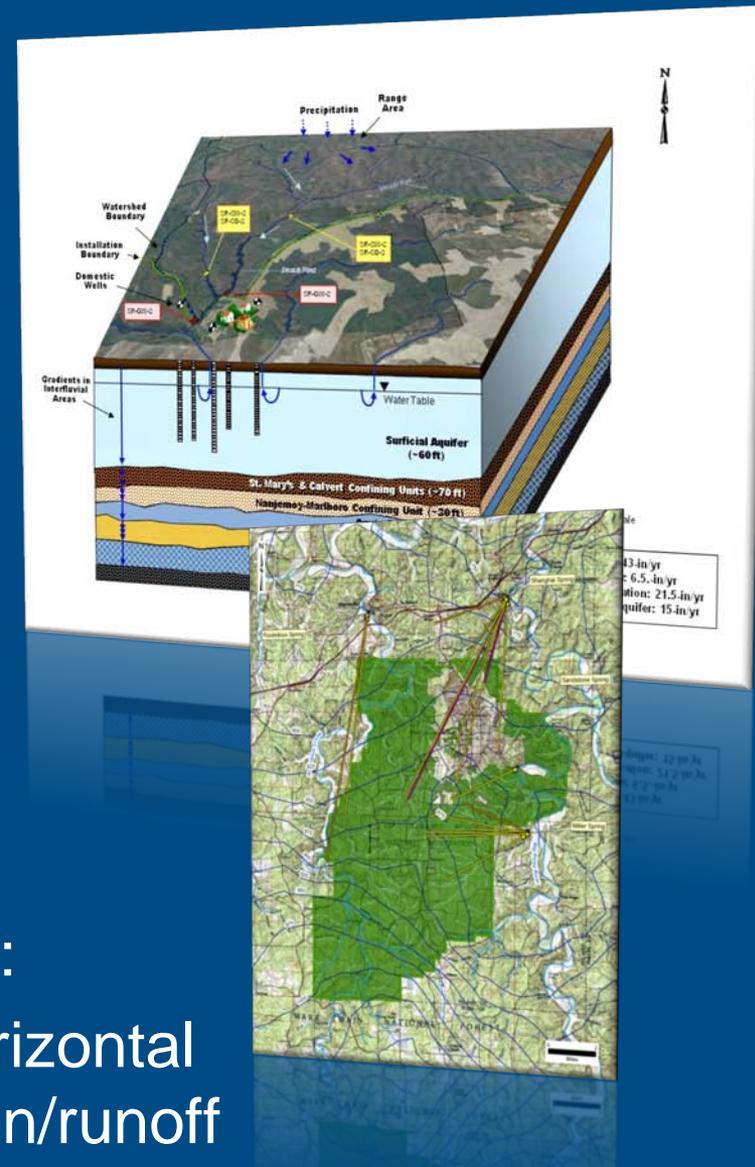
Groundwater Technical Approach

Review and Update Existing Data:

- Geologic and hydrogeologic data (e.g, confining units, flow, recharge zones)
- Previous investigations (e.g., dye tracer studies) and maps
- Receptor well data (e.g., depth, screened intervals, use, etc.)

Limited Data Options:

- Initial phase of work to define:
 - Flow direction, vertical/horizontal gradients, and/or infiltration/runoff



Choosing Well Locations for Sampling

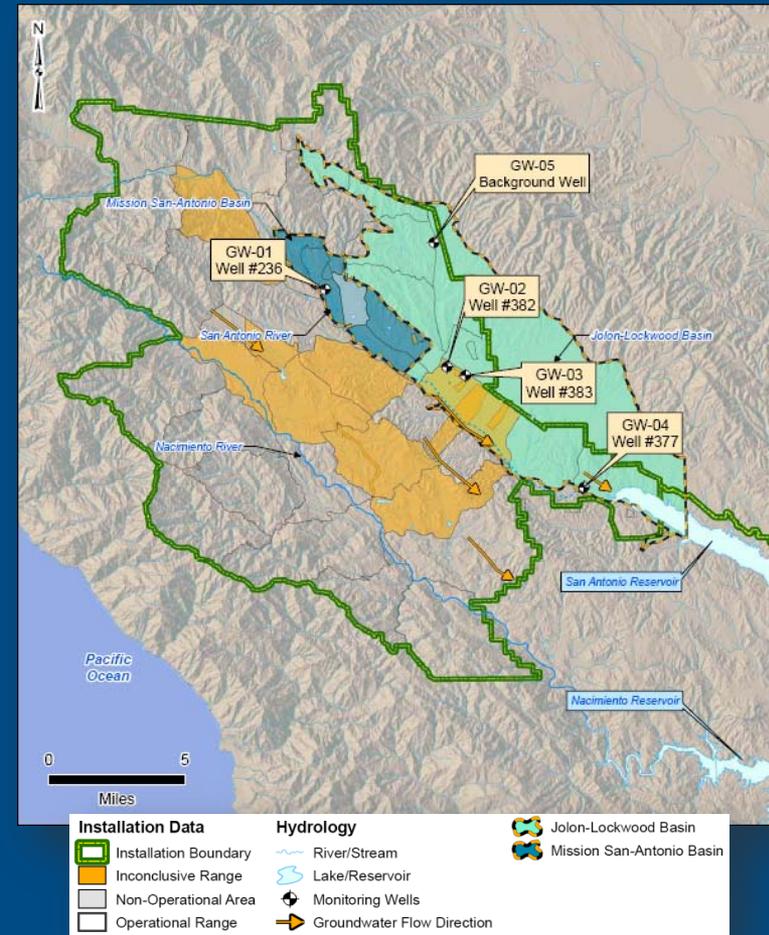
Where can we get the best data:

- Stay close to source area (better pathway interception)

or

Closer to point of compliance?

- Any existing data points?
 - Representative existing wells
 - Receptor on-post supply wells
- Access (range restrictions, rig access, and authorization)



Well Options and Sampling Strategy

Existing Wells Vs. New Wells

- Existing – latrine points, production wells, SWMU monitoring wells
- New – multiple well depths, screened intervals, emulate receptor wells, recharge areas

Sampling Strategy

- Grab sample – GW chemistry is typically more stable than SW
- Dry season sampling – Less recharge and less dilution of constituents in groundwater



Karst Terrane Sampling Strategy

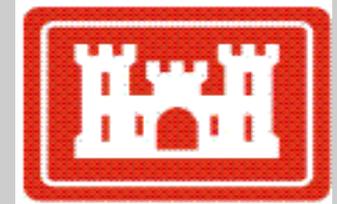
How can karst terrane be incorporated into GW approach?

- Sample local springs and SW with defined hydraulic connection to range-area.
- Best Option – Dye Tracer Study
 - Consisting of:
 - Background Monitoring
 - Dye Introduction
 - Monitoring
- Spring Sampling
 - Sample Design
 - Clear weather
 - Storm event



ORAP Phase II Pilot USAG Fort Riley and Iowa AAP

Rhonda Stone
Malcolm Pirnie, Inc.
rstone@pirnie.com

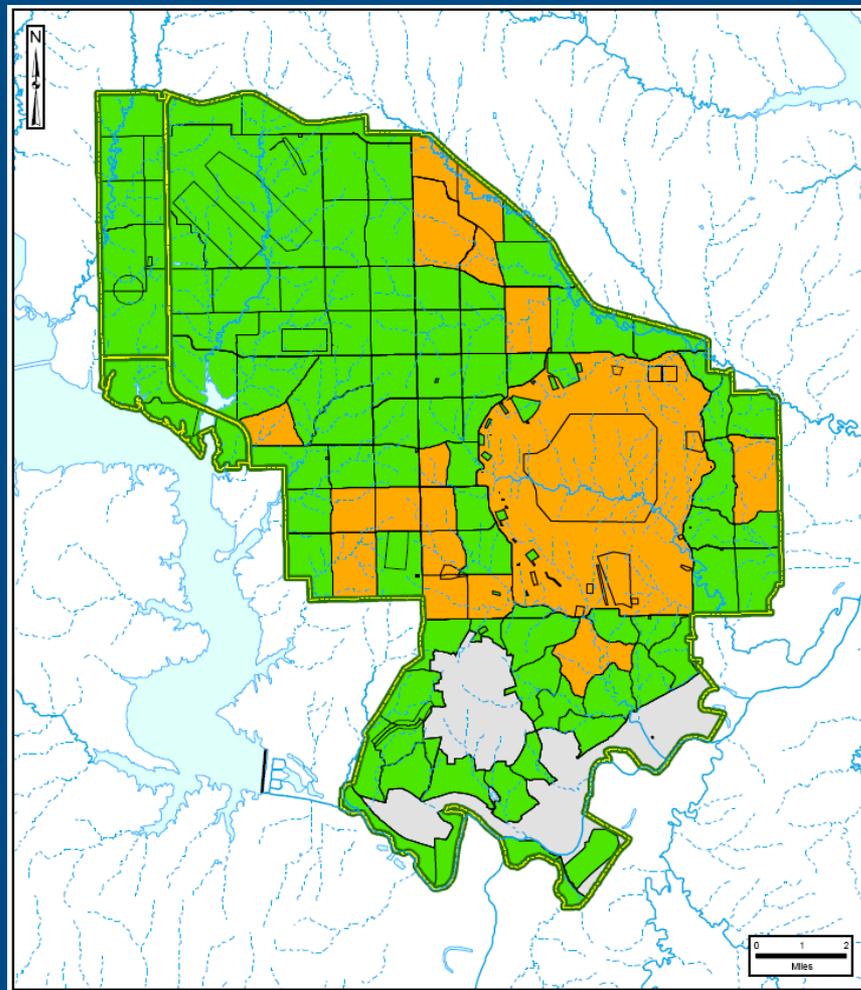


Installation Overview / Fast Facts

Fort Riley

- Army owned/operated approximately 101,732 acres
- 148 operational ranges / 26,660 operational acres categorized as Unlikely during Phase I
- 45 operational ranges / 65,946 acres categorized as Inconclusive* during Phase I

- *Inconclusive – Existing information is either insufficient to make a source-receptor interaction determination or indicates a potential for such interaction to be occurring.*



Installation

-  Installation Boundary
-  Other than Operational Area

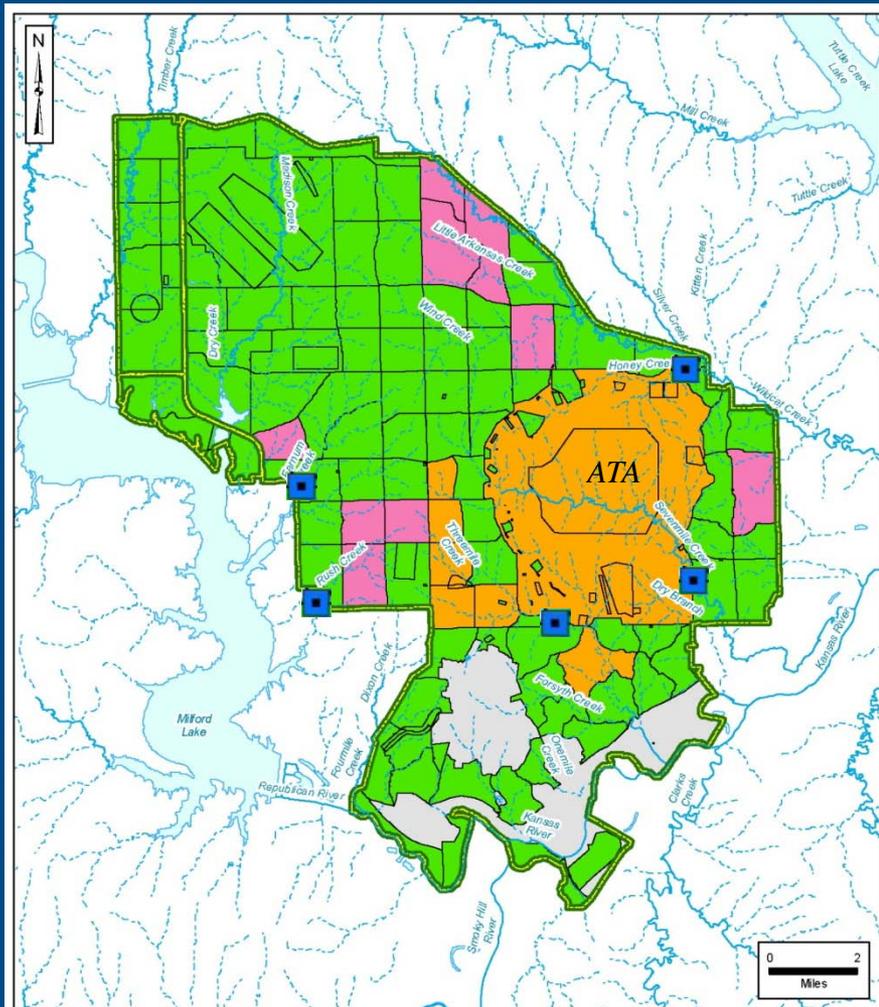
Military Range Category

-  Inconclusive
-  Unlikely

Hydrology

-  River/Stream (Perennial)
-  Stream (Intermittent)
-  Water Body

Technical Approach Development Modifications



- **Source Area Revisions**
 - Phase II Site visit range control interview.
 - Pink ranges impact in ATA.
 - Result 1: Only MCOC sources on the pink ranges are diffuse firing points
 - Result 2: Removed these ranges as a SW and GW source.

- **New SW Sampling Data**
 - Fort Riley and the USGS – 2007 and 2008 data: SW and sediment.
 - Analyses: explosives, perchlorate, and metals.
 - Result: Only metals MCOC in surface water (*i.e.*, lead and copper) require additional investigation.

Installation	Military Range Category	Hydrology
Installation Boundary	Inconclusive	River/Stream (Perennial)
Range Boundary	Unlikely	Stream (Ephemeral/ Intermittent)
Other than Operational Area	Unlikely - Limited MCOC Source Based on 2010 Site Reconnaissance	Water Body
2007 – 2008 Sample Location		

Surface Water Technical Approach



■ Sample Locations

- Sevenmile Creek
- Honey Creek
- Timber Creek

■ Sampling Events

- Wet Season (April)
- Dry Season Storm

■ Sampling Events

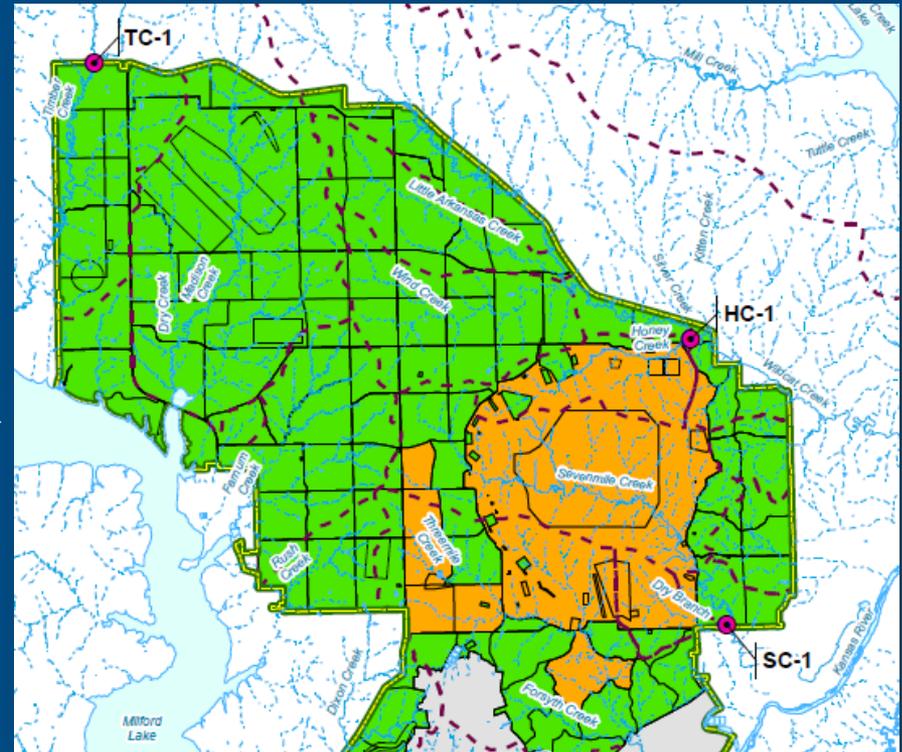
- Total Metals by EPA 1638M
- Dissolved Metals by EPA 1638M
- Isotopic Uranium by EML A-01-R Mod

■ Sediment Analysis

- None

■ Benthic Macroinvertebrates

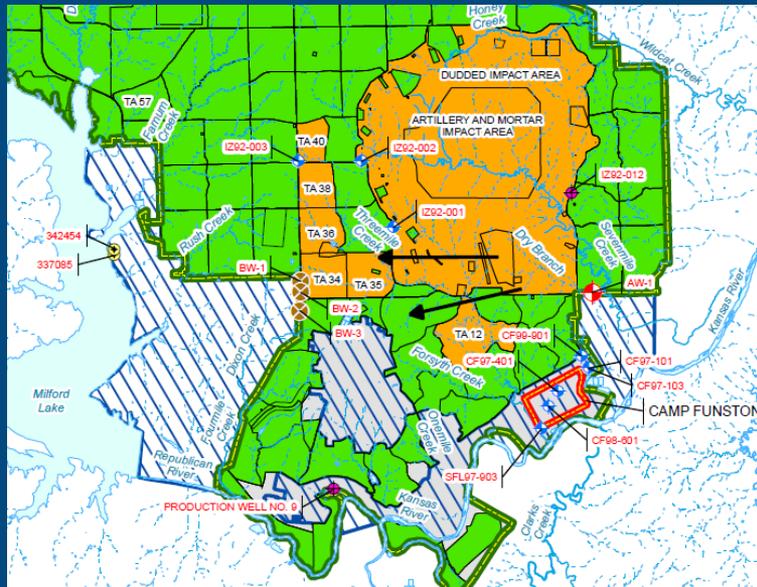
- Diversity Indices



Groundwater Investigation Technical Approach

■ Sample Locations

- Three new bedrock wells (location based on results of geophysical survey data use to determine potential fracture patterns)
- One new alluvial well
- Three existing water supply wells
- Ten existing monitoring wells
- Synoptic round of groundwater elevation measurements



■ Groundwater Analysis

- Explosives by EPA 8330B
- Perchlorate by EPA 6850
- Total Metals by EPA 200.8
- Dissolved Metals by EPA 200.8 (if turbid)
- Isotopic Uranium by EML A-01-R Mod (if total U is > action limit)



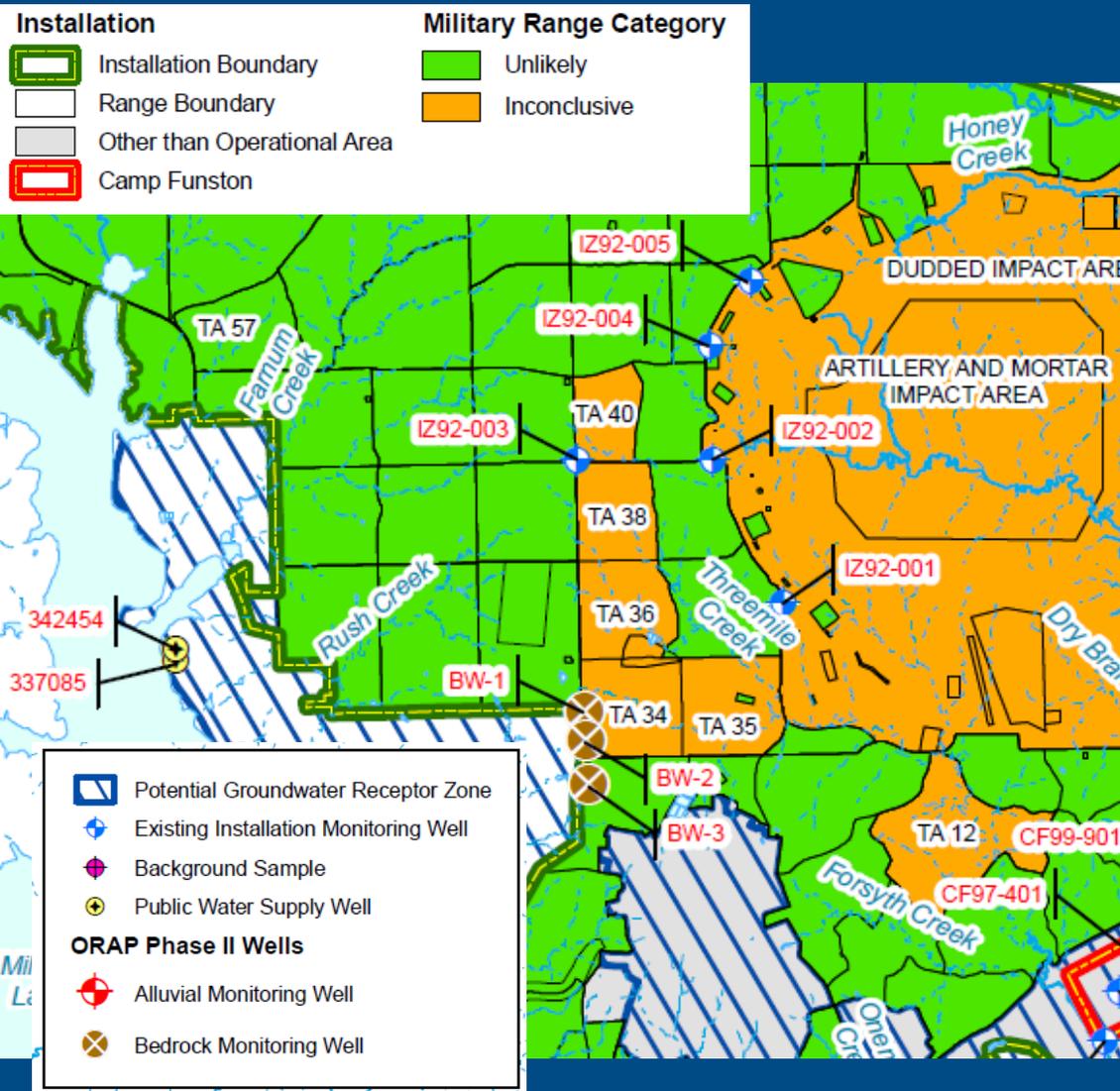
Surface Water Investigation Results

■ Results

- **Comparison to PALs:** No results for total or dissolved antimony, copper, lead, zinc, or uranium exceeded the PALs.
- **95% UCL Evaluations:**
 - The 95% UCL calculated using new and historical data for **total** lead in Sevenmile and Honey Creeks exceeded ecological and human health screening values.
 - The 95% UCL calculated using new and historical data for **total** copper in Sevenmile Creek exceeded ecological screening values.
 - The 95% UCLs calculated using new and historical data for **dissolved** metals were not found to exceed the PALs.
- **Comparison to reference location:** When total lead concentrations in Sevenmile and Honey Creeks and total copper in Sevenmile Creek to the reference concentrations, concluded there was no significant differences between identified independent variable t test with an alpha value of 0.05.
- **Benthic Macroinvertebrate data:** No impairments identified



Groundwater Investigation Results



- Surface geophysics suggested no fracture patterns (e.g., no karst).
- All perchlorate and explosive results below PALs and LRUs
- Metals Results
 - Some **total** metals > PAL in several samples.
 - All **dissolved** antimony, copper, and zinc < both the PAL and the LRU.
 - Only one **dissolved** lead > the LRU.

Surface Water and Groundwater Investigation Conclusions

- **Surface Water:** MCOC are not migrating via SW from operational range areas at concentrations that pose an unacceptable risk to human/ecological receptors.
 - No dissolved metals MCOC were found to exceed the PALs.
 - Even though total lead and total copper did exceed the PALs, they were not found to be significantly different than reference concentrations.
- **Groundwater:** All MCOC are considered to be unlikely to be contributing to groundwater at a level that is a risk to human or ecological receptors after the weight-of-evidence evaluation for groundwater exposure media.
 - MCOC concentrations in groundwater are either due to naturally occurring concentrations and/or are at levels that are below the PAL and LRU.



Iowa Army Ammunition Plant (IAAAP), IA



MALCOLM
PIRNIE

Solutions for Life™

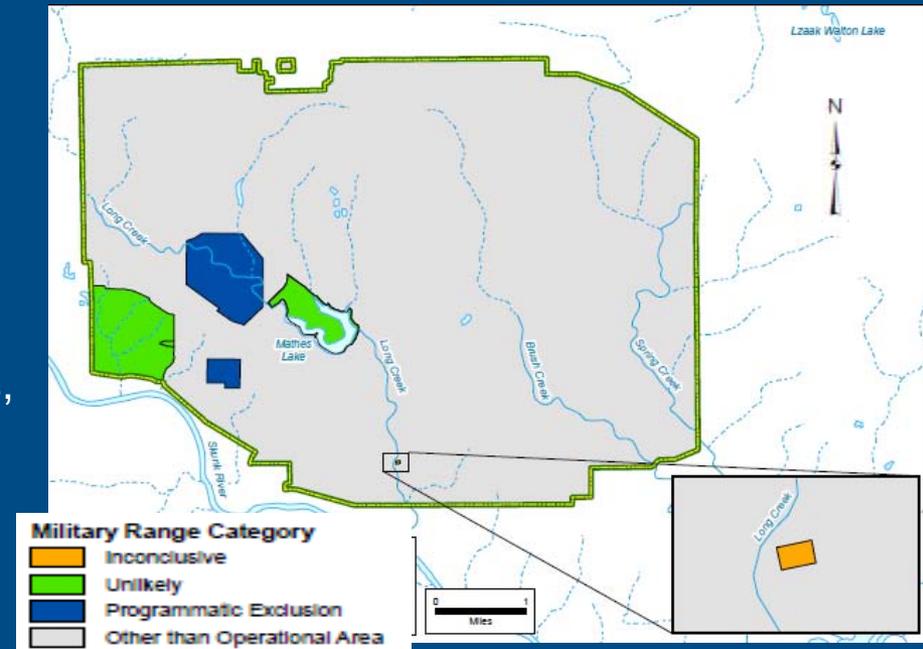
Installation Overview / Fast Facts

IAAAP -

- Army owned/operated by a private contractor, American Ordnance, LLC.
- Occupies 19,138 acres
- Established in 1941; current mission is to load, assemble, and pack ammunition items, including projectiles, mortar rounds, warheads, and anti-personnel mines.
- 1,273 operational acres / six operational ranges, but two excluded from ORAP (504 acres)

Phase I Conclusions

- *Unlikely – Three operational ranges, 768 acres (training and maneuver areas)*
- *Inconclusive – [insufficient info regarding off range source-receptor interaction] One operational range, about one acre (small arms range)*



Technical Approach Development

- For the Inconclusive Range, the only pathway potentially connecting the metals MCOC source to human and/or ecological receptors was surface water (Long Creek and Skunk River); no groundwater pathway was found during Phase I investigation.
 - Two surface water and sediment sampling locations had been chosen: a reference site upstream of the range and a downstream site.
 - The locations would be revised based on the information collected during the Phase II site visit.
 - Uncertainty/data gaps existed related to the historical firing at the range (originally fired in westernly direction into bank of Long Creek), the possible contribution of metals from a nearby MMRP site, and the current condition of the backstop berm relating to erosion and use of the range.



CSM Refinement

- Based on the Phase II site visit, it was determined that no sampling would be required under ORAP relating to the Inconclusive Range:
 - Updated MMRP site boundary covers the historical small arms range fan, and metals MCOC sampling will be covered under the MMRP RI investigation. Remains of the historical targets and piles of bullets were observed on the creek bank during Phase II site survey.
 - The backstop berm for the Inconclusive Range was re-constructed in 2009 (it is much higher and wider), seeded with erosion limiting vegetation, and improvements were made to erosion controls on the back of the berm. Thus, the current MCOC source at the range has been contained due to these recent actions.



Conclusions

- Based on the Phase II process, the current operational range activities at the Inconclusive Range are not considered likely to have resulted in a release of metals MCOC to an off-range receptor that creates an unacceptable risk to human health or the environment.
- The Inconclusive Range will be re-categorized as Unlikely; therefore, the entire IAAAP installation will be considered Unlikely.
- The IAAAP will be recommended to be incorporated into the five-year review process.

