



United States Army  
Fort Jackson Operational Range Assessment Program  
**Open House Overview**

Visit our  
website for  
program  
updates



# Welcome & Orientation

## Thank you for coming to the Open House!

We've set up seven "stations" for you to visit to learn about the history of Fort Jackson, the Army's efforts to address the presence of RDX, and the path forward.

There are experts at every station ready to answer your questions!

**Station 1:** Fort Jackson & RDX: A Brief History

**Station 2:** Historical Missions of Fort Jackson

**Station 3:** Results from the Remedial Investigation: Soil & Groundwater Sampling

**Station 4:** Groundwater: Residential Sampling & Treatment

**Station 5:** RDX & Your Health

**Station 6:** Assessing Options for Groundwater Cleanup

**Station 7:** Improving & Protecting Groundwater

If you don't have a smart phone to scan the website code above, please use this link to access the Fort Jackson Operational Range Assessment Program website:

<https://home.army.mil/jackson/index.php/about/Garrison/directorate-public-works/ORAP>





# United States Army Fort Jackson Operational Range Assessment Program Fort Jackson & RDX: A Brief History

# 1

## Key Dates

**1960s:**  
Use of High Explosive (HE) 3.5-inch rockets at Fort Jackson

**1964:**  
Kasserine Pass used for demolition training, machine gun training, & 40mm grenade launchers

**1976:**  
AT-4 and light anti-tank weapon rocket firing begins at Kasserine Pass

**2009-2013:**  
ORAP Phase II:  
Study of surface water & groundwater in the area east of Weston Lake confirms RDX in groundwater

**4 December 2013 – February 2014:**  
86 off-post private wells sampled, RDX detected in 10

**January 2014:**  
Results of first two studies published (ORAP Phase I & Phase II Assessments)

**3 July 2014:**  
Installation of 15 paired groundwater monitoring wells along Fort Jackson boundary & three at Remagen Range begins

**October 2014:**  
Interviews of residents about munitions sightings

**December 2014:**  
Archives Search Report complete  
First whole-house water filtration systems installed at two wells

**2019 - Present:**

- Feasibility Study & Engineering Evaluation / Cost Analysis (assessment of proposed alternatives to address RDX) **completed**
- Draft Proposed Plan approved by SC Dept of Health & Environ. Control – **in public review**
- Record of Decision in development – will document the remedy from the Proposed Plan if accepted by public

**1943:**  
Major manufacturing of RDX begins in the US

**1950s:**  
RDX first in use at Fort Jackson

**5 November 2005:**  
Department of Defense Instruction (DoDI) 4715.14, Operational Range Assessments (ORAP) published

**2006-2008:**  
ORAP Phase I: Fort Jackson & McCrady ranges evaluated for impacts from past or current use that could affect human health or the environment

**November 2013:**  
Media round table & Public Meeting #1 to discuss RDX detections. First requests to sample residential wells.

**February 2014:**  
Public Meeting #2

**April 2014:**  
Evaluation of munitions use at historical ranges to assess possible sources of RDX begins (Archives Search Report)

**June 2014:**  
Public Meeting #3

**4 February 2015:**  
Public Meeting #4

**July 2015 – Present:**  
Off-post residential well sampling program begins, wells sampled at least 1x a year.

**3 2016-2018:**

- Additional groundwater investigations on- and off-post.
- Remedial Investigation includes munitions survey, groundwater & soil sampling.
- Results confirm RDX is present due to historical munitions use.
- Draft report submitted to SC DHEC in July 2019

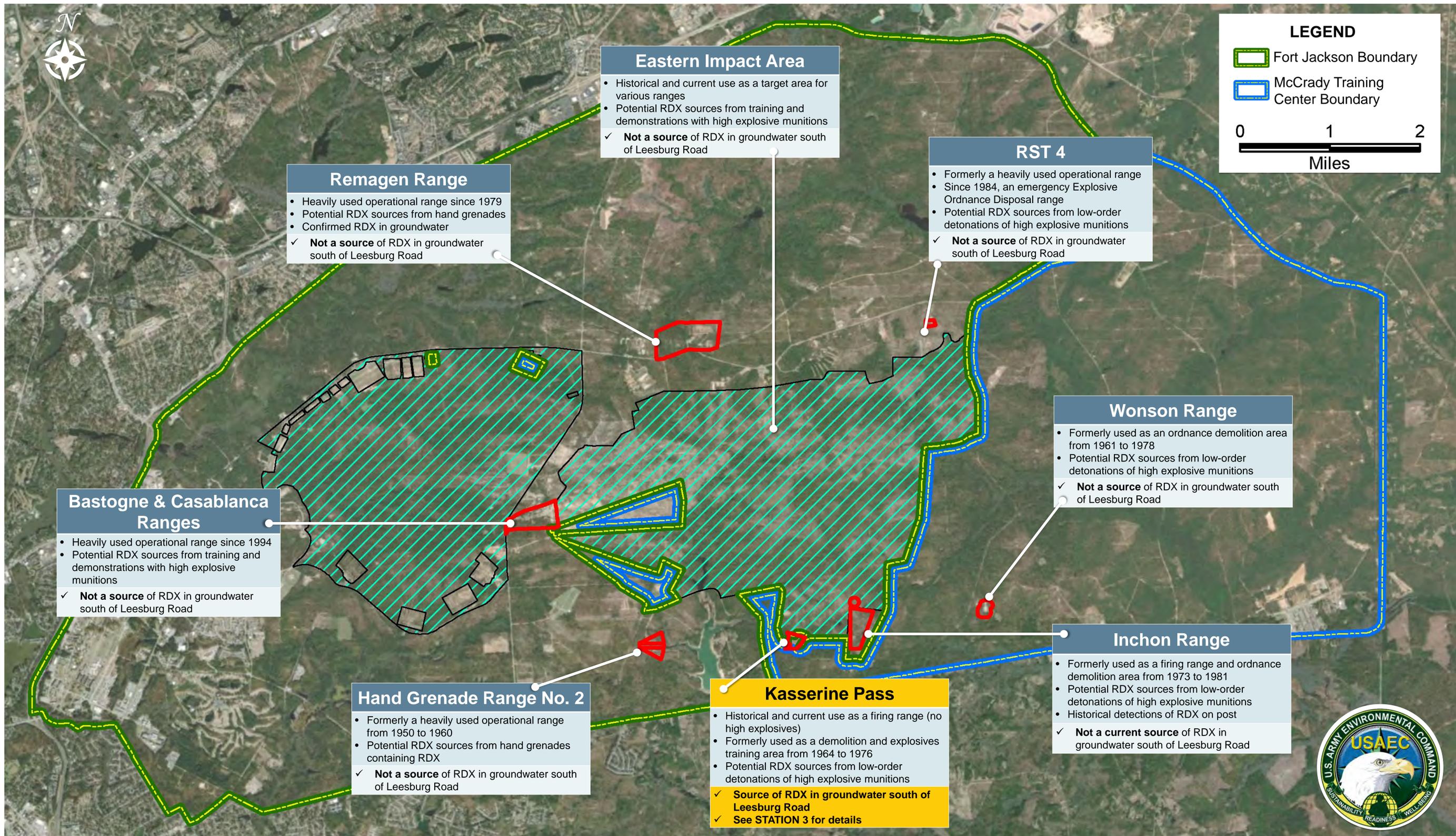
2 See these stations for more information on the topic mentioned





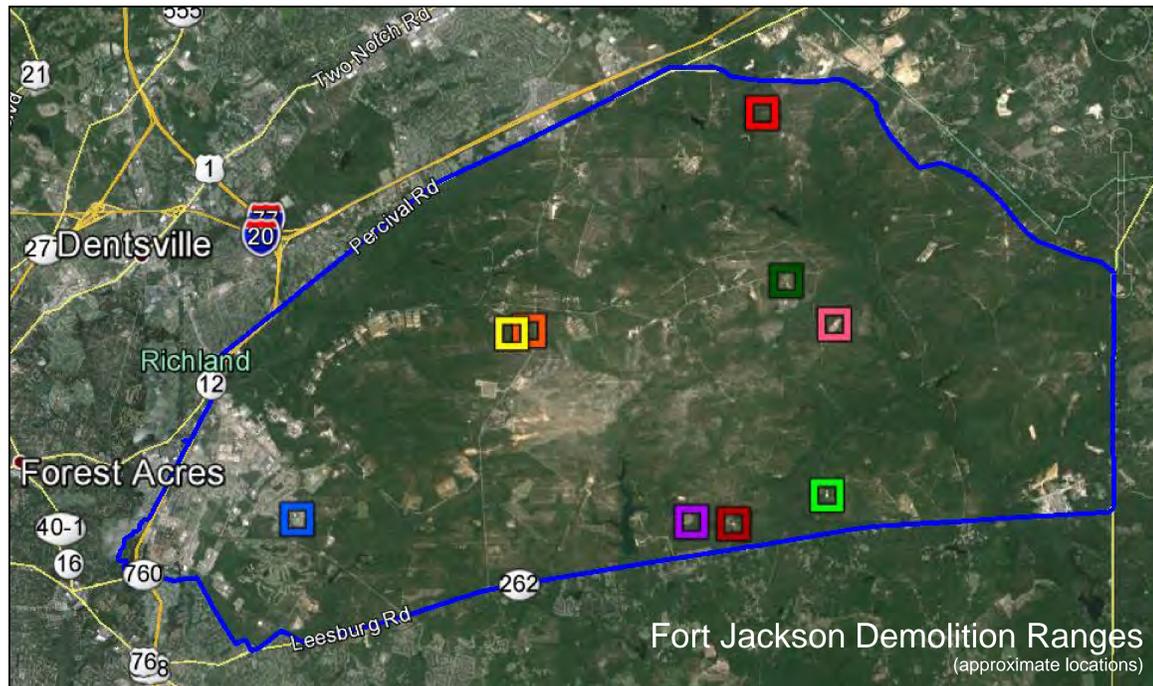
# United States Army Fort Jackson Operational Range Assessment Program Fort Jackson & RDX: A Brief History

# 1





# United States Army Fort Jackson Operational Range Assessment Program Fort Jackson & RDX: A Brief History



**Approximate Years of Use:**

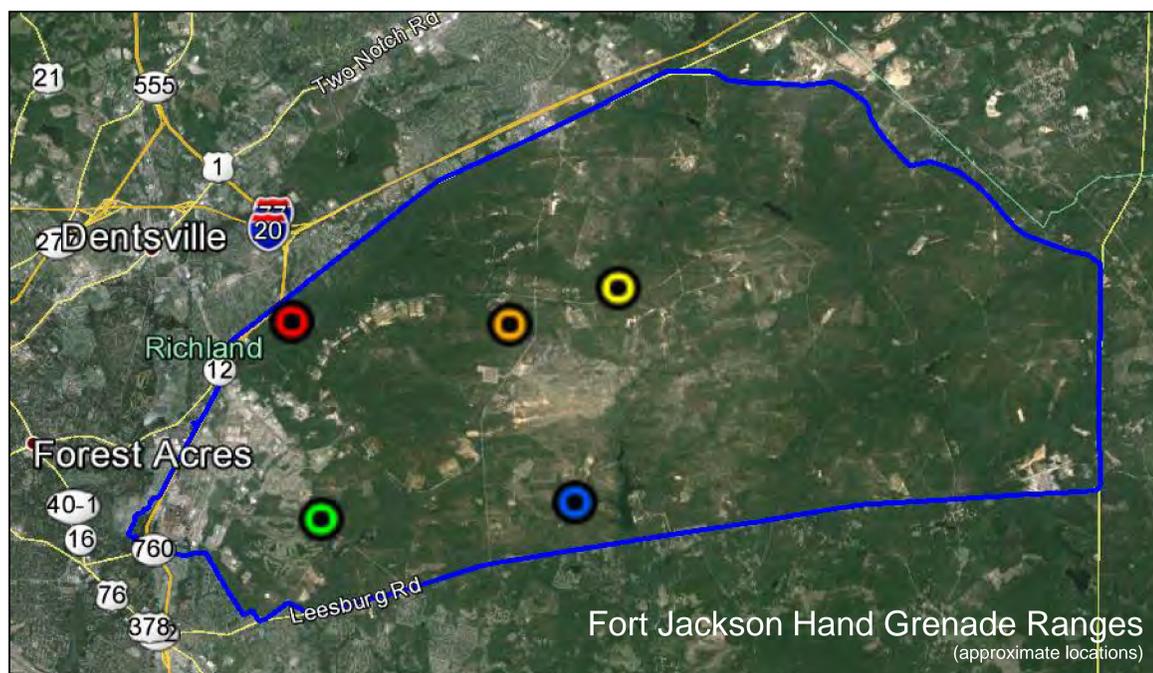
- 1955 - 1959
- 1959 - 1980
- 1960 - 1971
- 1961 - 1978
- 1964
- 1964 - 1976
- 1973 - 1981
- 1984 - Present
- 2009 - Present



**RDX is an explosive used in munitions.**

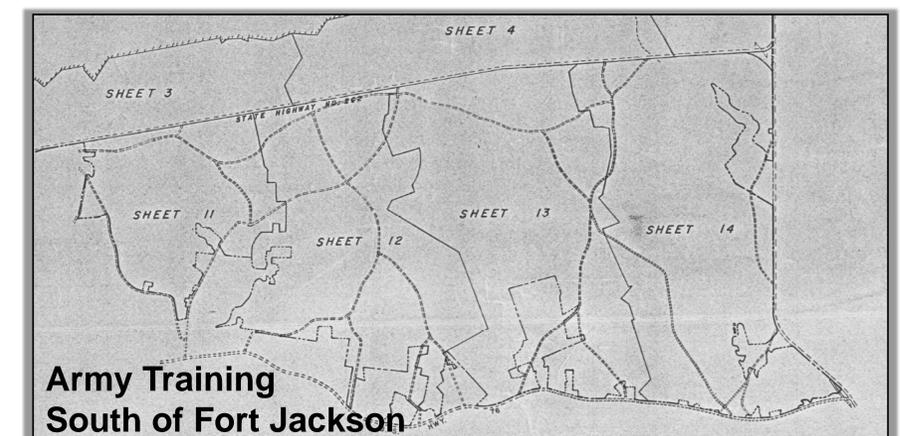
At Fort Jackson, it's been in the munitions we use for training soldiers since the late 1950s. As a result, RDX could be found in any of these areas:

- Rocket Ranges
- Mortar Ranges
- Artillery Ranges
- Recoilless Rifle Ranges
- Anti-Tank Range
- Anti-Tank & Antipersonnel Mines Firing Areas
- Rifle Grenade Ranges
- Hand Grenade Ranges
- Ordnance Demolition & Demolition Training Areas



**Approximate Years of Use:**

- 1943 - 1950 (No RDX Use Suspected)
- 1943 - 1979
- 1950 - 1960
- 1965 - 1975
- 1979 - Present



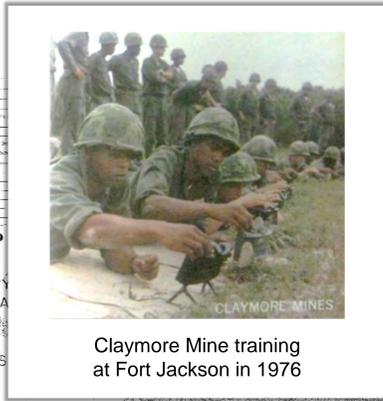
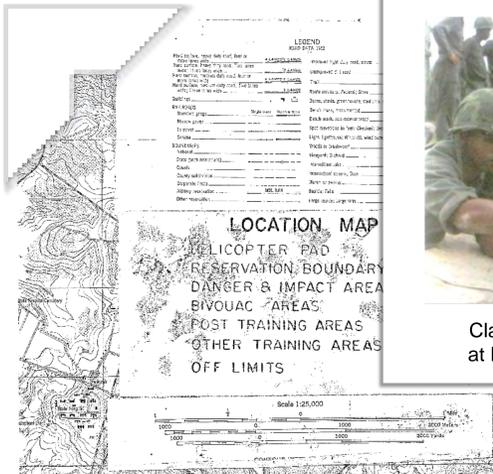
During the 1950s, the Army leased ~17,000 acres south of Fort Jackson for maneuvers. The munitions known or suspected to be used at the Southern Maneuvers Area included small arms (blanks), smoke grenades, and signal flares – none of which contained RDX.



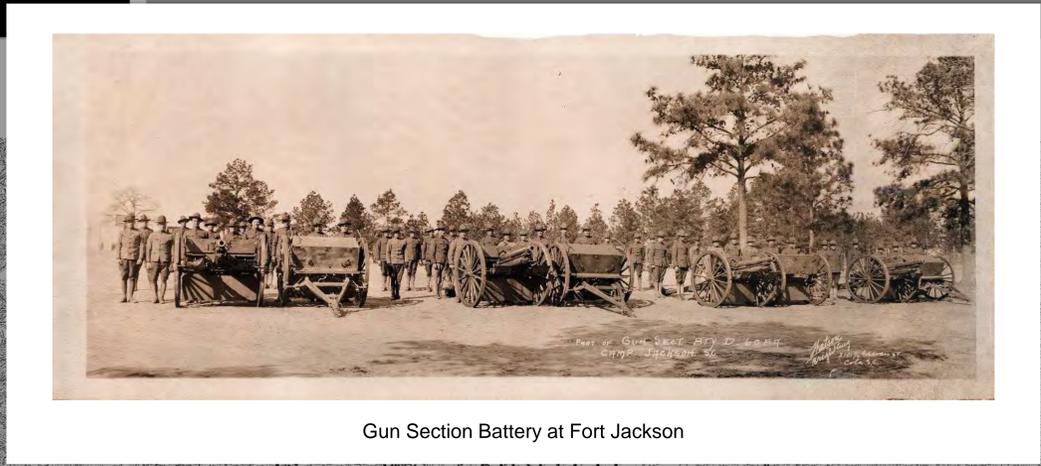


# United States Army Fort Jackson Operational Range Assessment Program Historical Missions of Fort Jackson

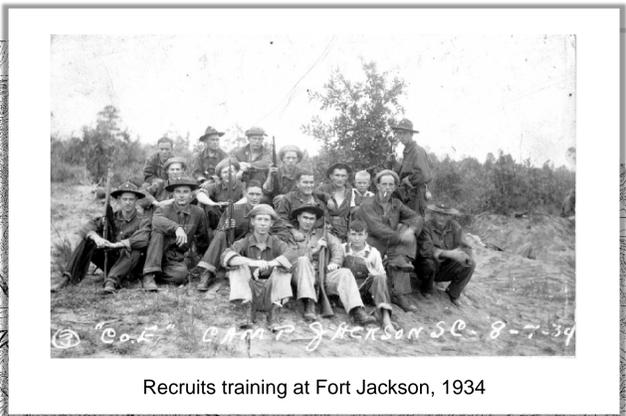
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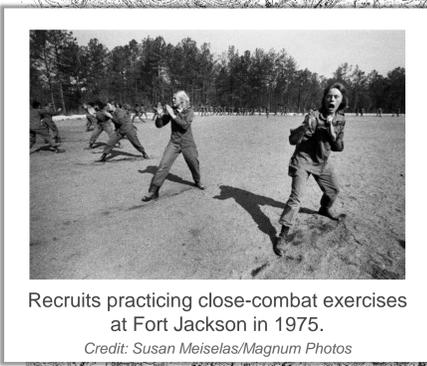
Claymore Mine training at Fort Jackson in 1976



Gun Section Battery at Fort Jackson

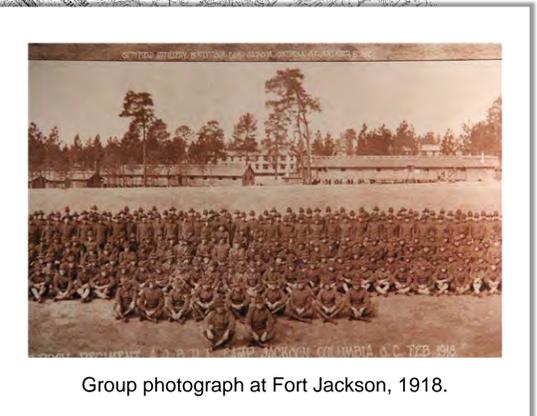
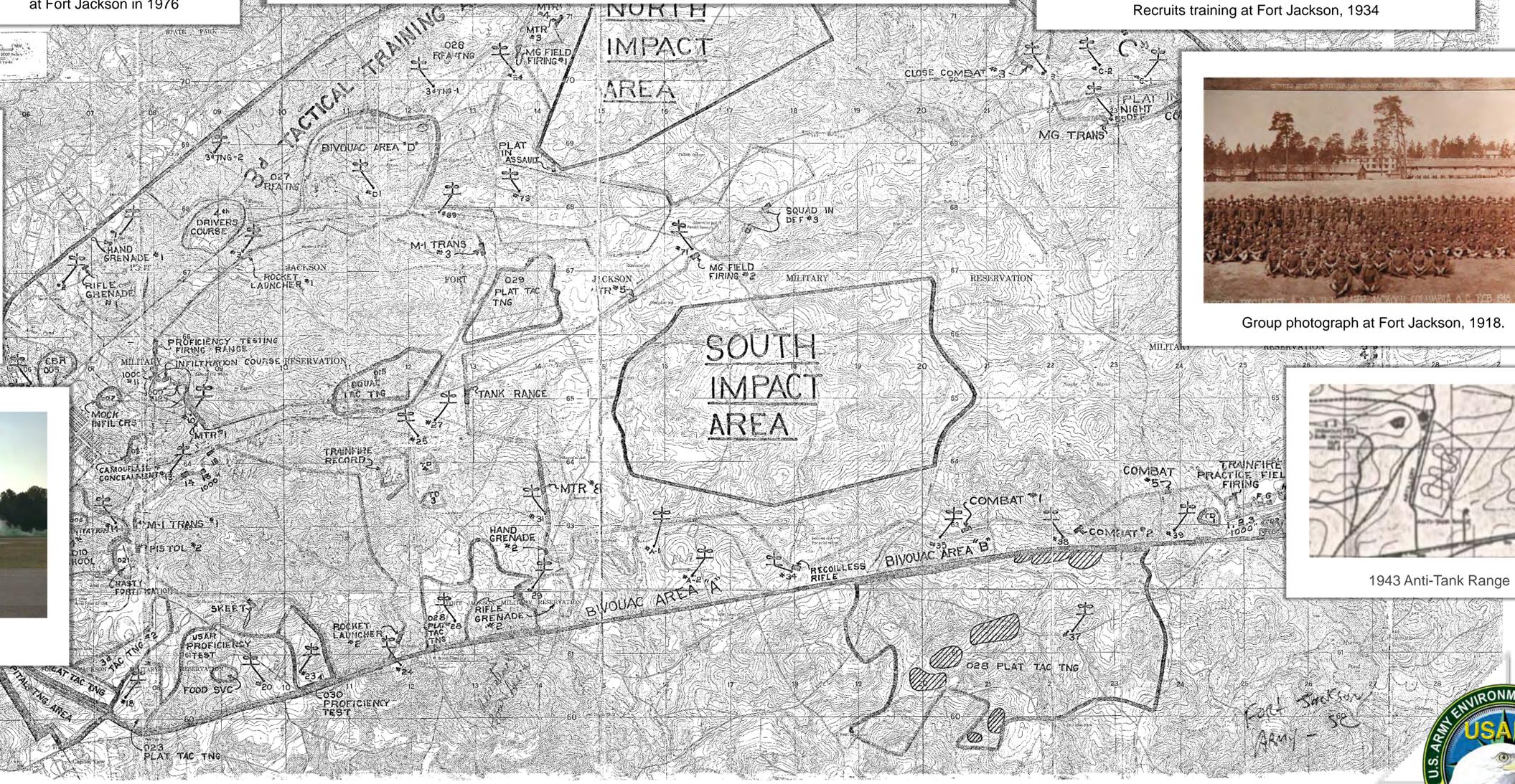


Recruits training at Fort Jackson, 1934



Recruits practicing close-combat exercises at Fort Jackson in 1975.

Credit: Susan Meiselas/Magnum Photos



Group photograph at Fort Jackson, 1918.



1943 Anti-Tank Range



Basic training graduation at Fort Jackson



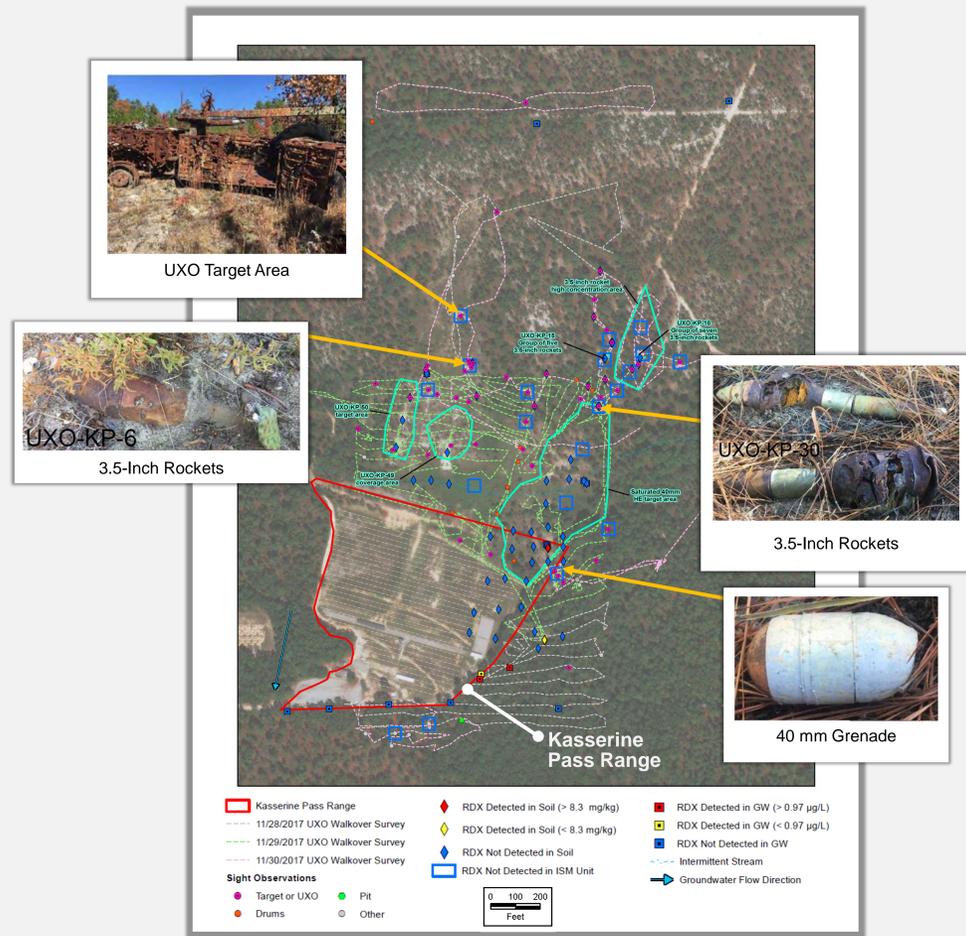
Fort Jackson was established in 1917 to train men of the 30th and 81st Infantry Divisions. Today, Fort Jackson is the largest basic training installation in the nation, turning out 50% of all soldiers and 60% of the women entering the Army each year.



# United States Army Fort Jackson Operational Range Assessment Program Results from the Remedial Investigation

# 3

## Soil Sampling Results & Key Observations



### Critical Observations:

- Kasserine Pass – Historical source of RDX in groundwater leaving the site
- Hundreds of 3.5-inch rockets observed – each contains at least 450 grams (1 pound) RDX
- Thousands of 40-mm grenades observed – each contains 1-2 grams RDX
- Hundreds of LAW Rockets observed – each contains 5.4 grams RDX

### Key Findings:

- Not much RDX in the soil – found in just 3 soil samples
- RDX above soil screening level in only 1 sample
- The RDX has mostly moved to the groundwater – see the map on the upper right

## Groundwater Sampling Results & Key Observations



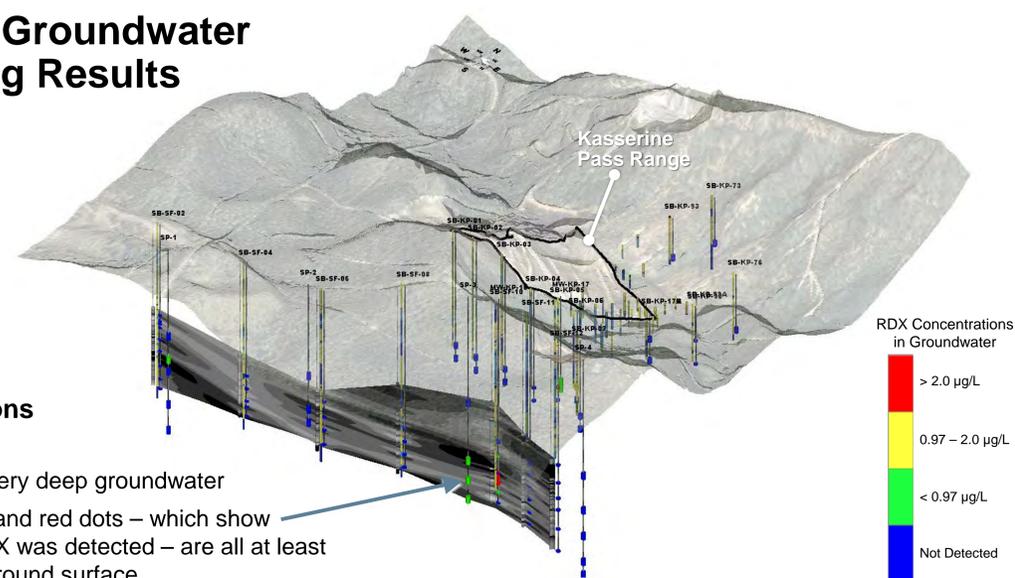
### Critical Observations & Key Findings:

- RDX moves in groundwater (water that is underground) from the Kasserine Pass Range to the southwest, including off the post under the neighborhood south of Leesburg Road
- The Army has collected & tested many samples of groundwater in the area south and west of Kasserine Pass Range to identify the affected area
- Results from a Human Health Risk Assessment indicate that in some locations the Army must evaluate ways to address the RDX

### Is Cedar Creek Affected?

- Groundwater may discharge into Cedar Creek, but...
- RDX in groundwater is below screening levels before it gets to Cedar Creek, AND
- RDX is in groundwater that is much deeper than Cedar Creek – see the 3-D map below for a view of the RDX results by depth
- If any RDX does reach Cedar Creek, it is broken down by sunlight (a process called photolysis) in a matter of minutes to hours

## 3-D View of Groundwater Sampling Results



### Critical Observations & Key Findings:

- RDX is present in very deep groundwater
- The green, yellow, and red dots – which show samples where RDX was detected – are all at least 50 feet below the ground surface



– Visit Station 6 for more information about the options to address RDX in groundwater –

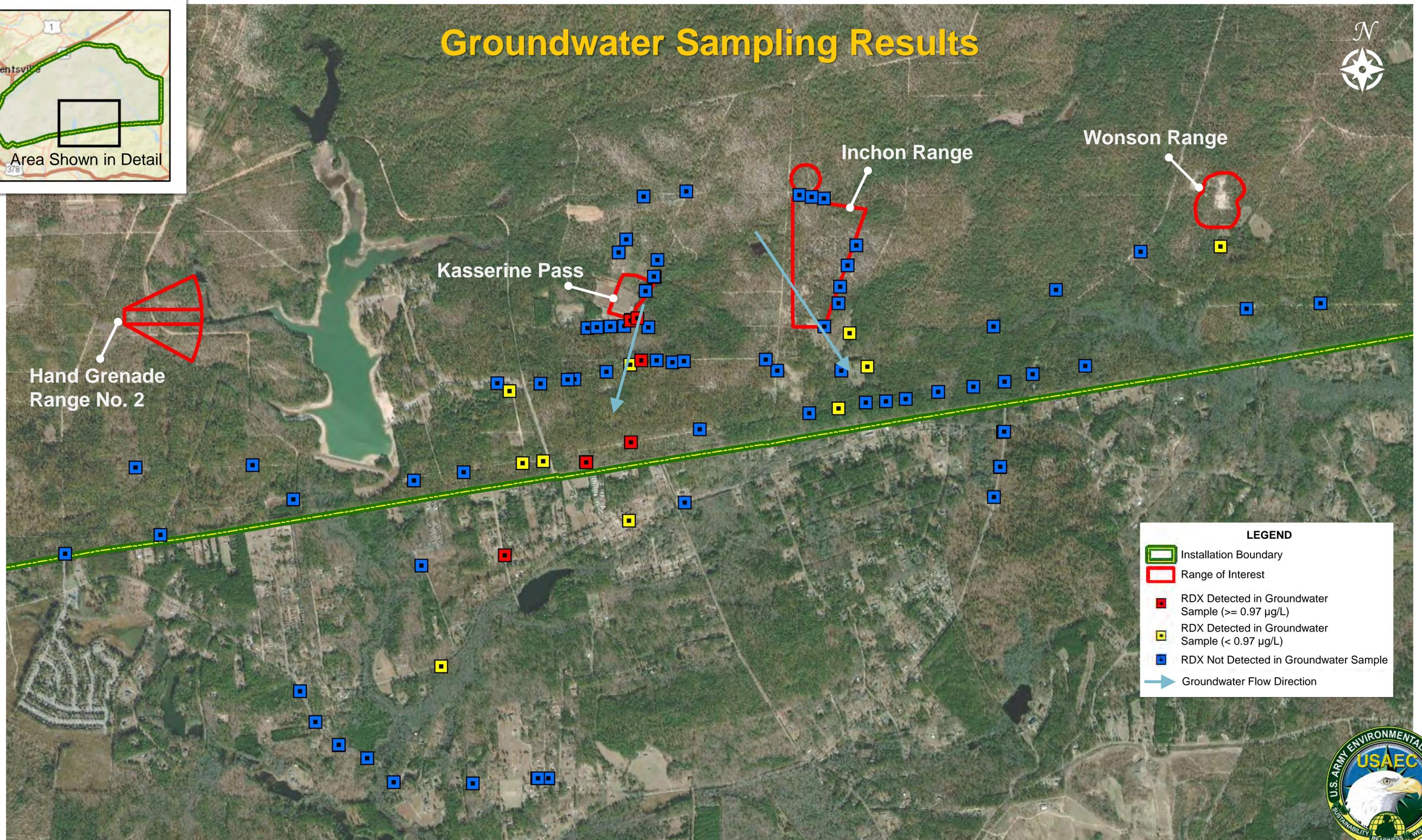


# United States Army Fort Jackson Operational Range Assessment Program Results from the Remedial Investigation

# 3



## Groundwater Sampling Results

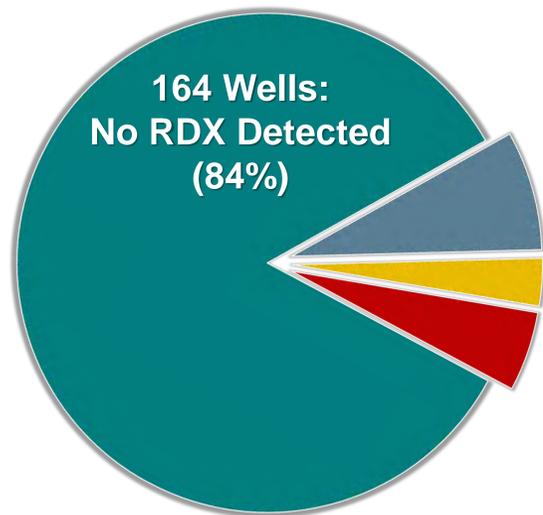




United States Army  
 Fort Jackson Operational Range Assessment Program  
**Residential Sampling & Water Treatment**

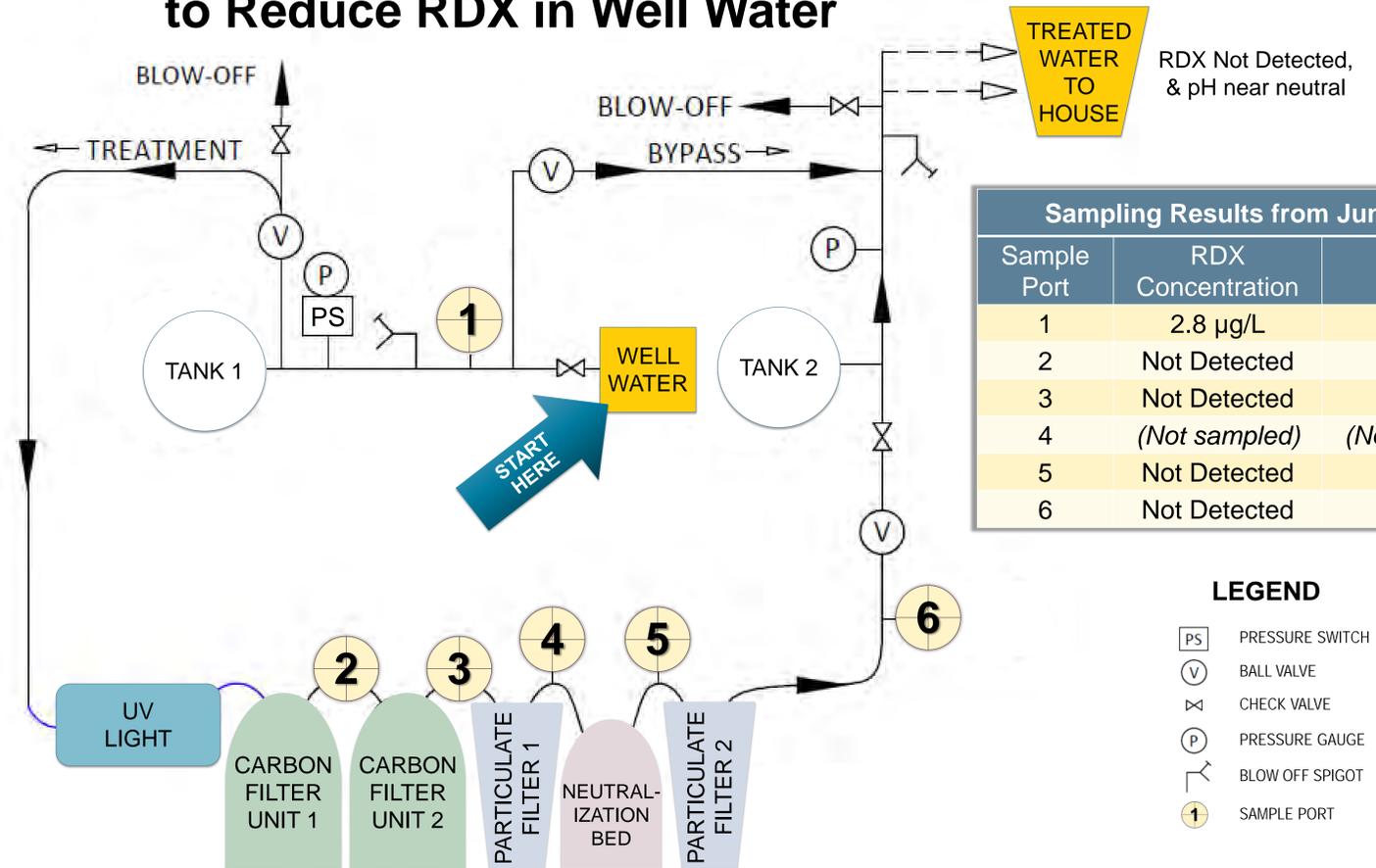
# Quick Facts

- The most common way people near Fort Jackson might be exposed to RDX is by drinking water from local wells. See **STATION 5** for more information.
- To address this potential risk, the Army has collected 1,000+ samples from 195 wells near Fort Jackson over the past eight years.
- The Army sends all samples to a laboratory certified by the SC Dept of Health & Environmental Control.
- The majority of wells – 164 of 195 – have no detectable levels of RDX.



- At the **10 locations with RDX above the Health Advisory Level**, the Army has installed water treatment systems.
- The Army will continue to test and maintain the treatment systems into the future. See **STATION 6** for more information on options for groundwater.

## Layout of a Water Treatment System to Reduce RDX in Well Water



**Critical Elements of the Water Treatment System, as installed**





# United States Army Fort Jackson Operational Range Assessment Program RDX & Your Health

## What we know about RDX & health



1. The most common way people near Fort Jackson might be exposed to RDX is by drinking water from local wells.
2. RDX does not build up over time in the bodies of people or fish, but some plants grown in soil contaminated with RDX do accumulate the chemical. There is no evidence that there is RDX contamination in soil near Fort Jackson.
3. If large amounts of RDX are breathed in or ingested, people and animals can get sick – it affects the nervous system and can cause seizures, muscle twitching, or vomiting. The levels of RDX that cause these effects are not found at or near Fort Jackson.
4. The United States Environmental Protection Agency has established a Health Advisory Level (HAL) for RDX of 2.0 micrograms per liter and a Regional Screening Level (RSL) of 0.97 micrograms per liter.
5. The HAL means that even if you are exposed to RDX for a full lifetime, as long as the levels are at or below 2.0 micrograms per liter, there are no expected negative effects on human health.
6. The Army has collected 1,000+ samples from 195 wells near Fort Jackson over the past eight years. The majority of wells have no detectable levels of RDX, and 10 were above the HAL.

## What we don't know about RDX & health



1. There are no studies of cancer in people exposed to RDX. Based on studies of mice, the United States Environmental Protection Agency has classified RDX as having suggested evidence of carcinogenic potential.
2. There is no information available about whether children are more sensitive to RDX than adults.
3. See the RDX Fact Sheet for more health-related information.

## Actions you can take

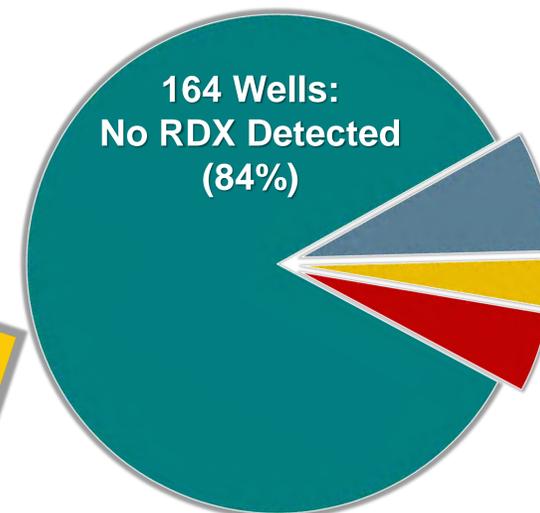


1. **Get your well water tested!** You can sign a Right-of-Entry form & start the process tonight!
2. If test results show that levels of RDX are **above** the Health Advisory Level (HAL), the Army will install a treatment system at your home, free of charge. The Army will also provide bottled water while the treatment system is designed, built, and tested.
3. If RDX is detected but it's below the HAL, you may choose to drink or cook with bottled water, or install a commercially-available activated carbon water filter approved by NSF International.



Scan this code to visit the NSF site on drinking water filters

**RDX Sample Results from Off-Post Wells**



**15 Wells:**  
RDX below RSL (8%)

**6 Wells:**  
RDX above RSL (3%)

**10 Wells:**  
RDX above HAL (5%)  
*These homes have treatment systems.*





# United States Army Fort Jackson Operational Range Assessment Program Assessing Options for Groundwater Cleanup

# 6

## Overall Process:



## Current Situation:

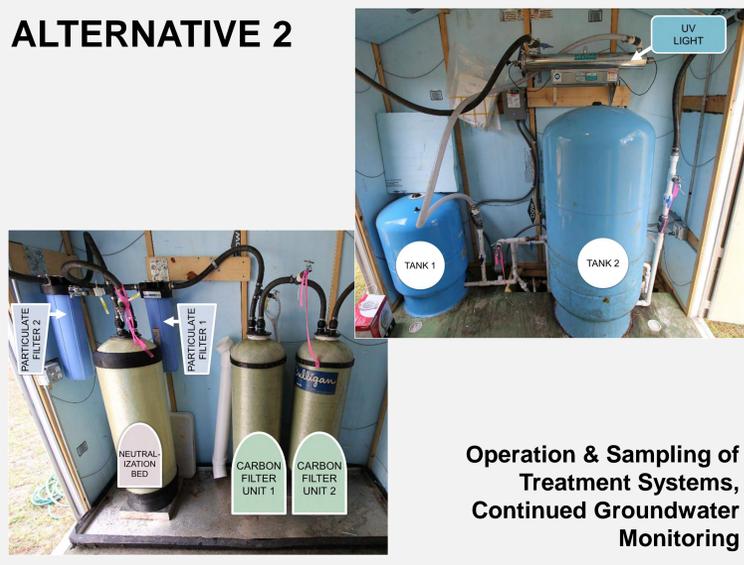
1. Kasserine Pass was a **historical source of RDX** to off-post groundwater (see STATION 3).
2. The Army **collected water samples** from 195 wells near Fort Jackson, and **installed drinking water treatment systems** at 10 properties (see STATION 4).
3. A Feasibility Study was completed to develop and assess long-term solutions. The **Army evaluated multiple options** (called alternatives) to address RDX in groundwater above the Regional Screening Level (see STATION 5).
- ★ 4. The public has formal opportunities to comment on the Proposed Plan. **Let us know what you think tonight! Comments can be sent to Fort Jackson until June 7, 2023.**
5. A Record of Decision will be prepared to document the selected alternative(s).

### ALTERNATIVE 1

No Further Action

- Alternative 1 Summary:**
- Will not address the human health threat posed by RDX in groundwater
  - Inclusion of No Further Action is required by the US Environmental Protection Agency

### ALTERNATIVE 2



Operation & Sampling of Treatment Systems, Continued Groundwater Monitoring

- Alternative 2 Summary:**
- Current residential treatment systems will be operated & maintained by the Army
  - Systems will be sampled at least once per year
  - Annual off-post groundwater monitoring program will continue to evaluate RDX in residential drinking water
  - Will install additional residential treatment systems as necessary, based on well sampling results

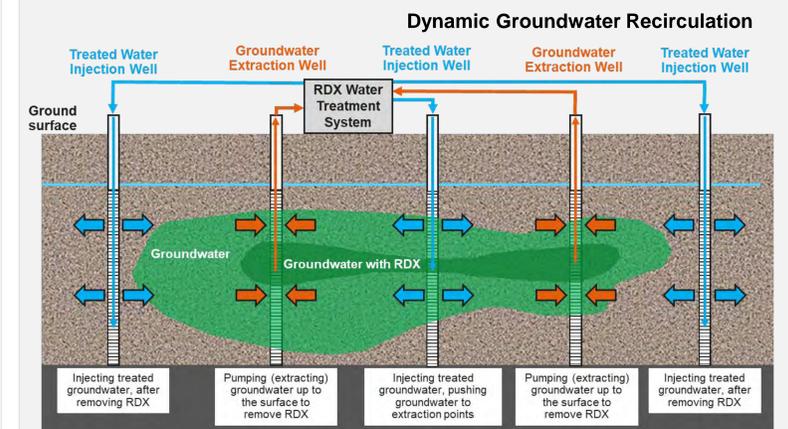
### ALTERNATIVE 3



Extension of City Water Main & Continued Groundwater Monitoring

- Alternative 3 Summary:**
- City of Columbia water main line will be extended to the area where homes have treatment systems, and treatment systems will be removed
  - Additional property owners may choose to connect to City water, if desired
  - Off-post groundwater monitoring program will continue to evaluate RDX in residential drinking water

### ALTERNATIVE 4



Dynamic Groundwater Recirculation & Operation/Sampling of Treatment Systems for 10 Years

- Alternative 4 Summary:**
- Dynamic Groundwater Recirculation System will be constructed & operated by the Army
    - Includes installation of 15 extractions wells with treatment systems, plus 30 reinjection wells
    - Groundwater will be captured, treated, tested, and injected back underground
    - RDX targets are expected to be achieved in 10 years
  - Current residential treatment systems will be operated & maintained by the Army for 10 years
  - Well installation would be both on- and off-post, permission from property owners would be necessary

## Evaluating the Alternatives:

The **critical factors** that the Army and SC Dept of Health & Environmental Control must consider while developing the potential options for addressing RDX in groundwater include:

1. How quickly and effectively will the alternative protect public safety and the environment?
2. What level of protection and effectiveness would the alternative provide in the short term?
3. Will that protection and effectiveness be maintained over the long term?
4. Does the alternative satisfy all the key rules and regulations?
5. Are the right people and equipment available to actually build and maintain the alternative?
6. Is the alternative likely to be accepted by local groups? What about governmental acceptance?
- ★ 7. **Community acceptance is also a key factor** – let us know what you think about these options, keeping in mind that the alternatives described here could be carried out individually, or in combination.

See STATION 7 for more information on Dynamic Groundwater Recirculation





# United States Army Fort Jackson Operational Range Assessment Program Improving & Protecting Groundwater

## Quick Facts

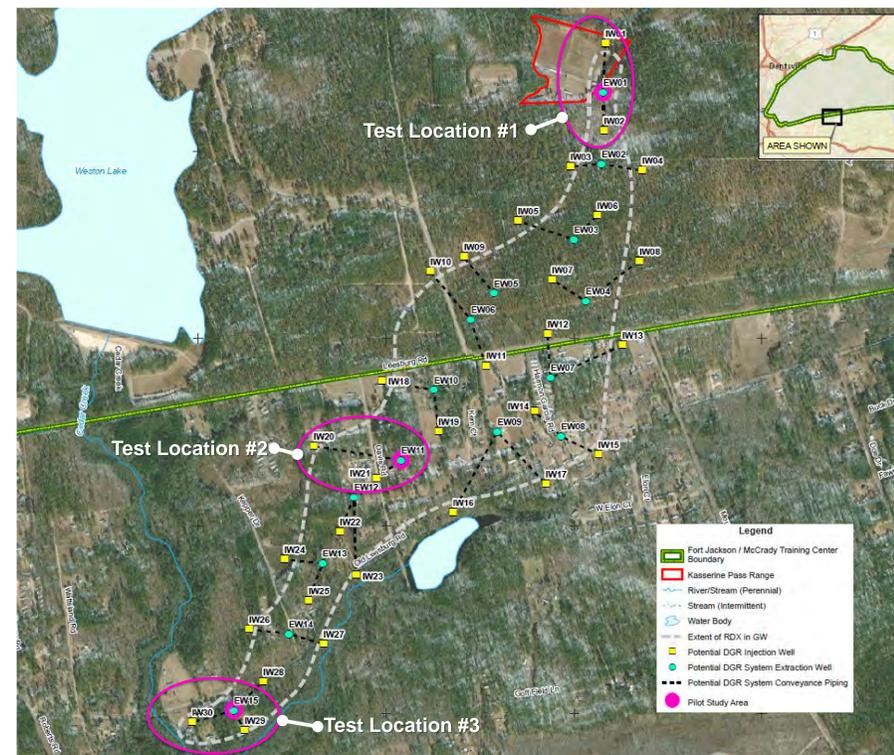
- Water treatment systems at homes are providing benefits and reducing risks (see **STATION 4**), but they don't address the source of the issue, which is RDX in the groundwater that is flowing into the wells.
- To achieve the goals of reducing potential risks to people who may be exposed to drinking water from local wells AND cleaning the groundwater (the water underground that flows into the wells), the Army has a new approach: **Dynamic Groundwater Recirculation, or DGR.**
- **What's next?**
  - The Army needs to test and refine the DGR approach by installing three sets of wells (see the map to the right), and testing the pumping rates, groundwater quality, and injection rates. Clean water will be used for injection tests.
  - The DGR pilot test is currently planned for 2024, and will take about 1 month to complete.
  - A holding tank, pumps, and generator will be present at each location during the test.
  - After the tests are complete, the Army will plan a full-scale implementation, which may include installation of up to 15 sets of extraction and injection wells. There would be treatment sheds at each extraction well (map of proposed test locations and photos of equipment to the right).
- **Key questions?**
  - Some wells may need to be installed on private property, and may require removal of trees or shrubs. The Army will work with property owners to identify locations and request permission for property access.
  - Based on current information, after the full system is installed, the groundwater may be below the Health Advisory Level (HAL) for RDX in about 10 years vs the current projection of at least 30 years for the groundwater to recover if only the home treatment systems are used.

### What's DGR? It's a multi-step process:

1. Continuously pump groundwater out of the ground using an extraction well
2. Remove RDX from the water using multiple treatment tools: pump it through bag filters, expose it to ultraviolet light, and move it through two carbon filter units – this provides redundancy
3. Test water periodically:
  - After each treatment element to make sure the tools are working as intended and determine when they need to be replaced
  - At the end, to confirm the treated water is clean (no RDX), and maintains useable aquifer conditions
4. Pump the clean water back into the ground using injection wells (typically two injection wells for each extraction well)

### What are the benefits of DGR?

- RDX is removed from the groundwater – this provides long-term benefits to human health and the environment
- It helps everyone in the community, not just those who have a well with water above the HAL
- Everyone with individual home treatment systems will eventually be able to get rid of them
- No water will be lost from the groundwater aquifer, since the clean water will be reinjected close to the extraction point
- It speeds up the process of cleaning the groundwater, because reinjected water will help push water with RDX towards extraction wells



**Test Locations for  
Dynamic Groundwater Recirculation**



**Example of a  
DGR Treatment Shed**

