



*a passion for discovery*

# Annual Groundwater Update

**Review of Plumes, Treatment Systems,  
Performance and Progress**

*Presentation to Community Advisory Council  
November 12, 2015*

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Managed for the U.S. Department of Energy  
by Brookhaven Science Associates

**Bill Dorsch, Manager  
Groundwater Protection Group**



# Agenda

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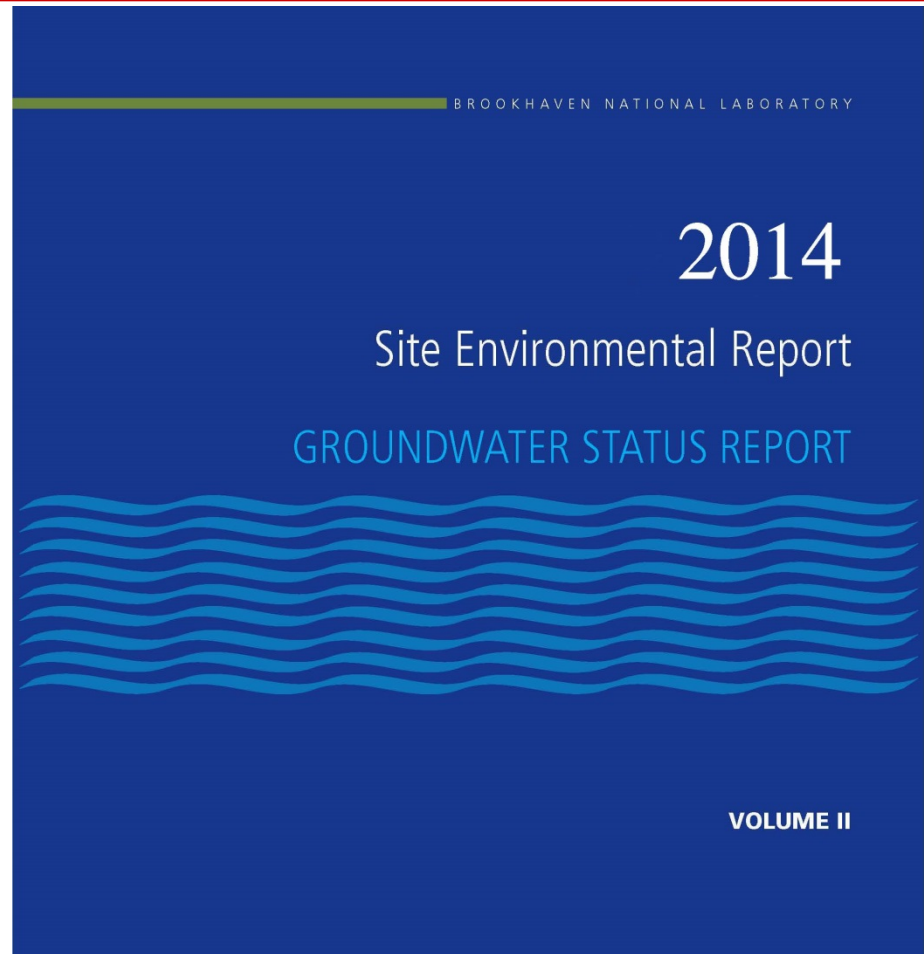
- Treatment system/plume summary
- Building 452 Freon-11 Treatment System progress milestone
- Strontium-90 (Sr-90) characterization at former Hazardous Waste Management Facility (HWMF)
- Status of Chemical Holes Sr-90 Treatment System
- Former reactor facility surveillance and maintenance update



# Groundwater Status Report (Volume 2 of Site Environmental Report)

- Presentation provides up to date status on groundwater cleanup program progress
- Web link for 2014 Groundwater Status report:

[https://www.bnl.gov/gpg/files/Annual\\_Reports/2014pdf/Main\\_Text.pdf](https://www.bnl.gov/gpg/files/Annual_Reports/2014pdf/Main_Text.pdf)

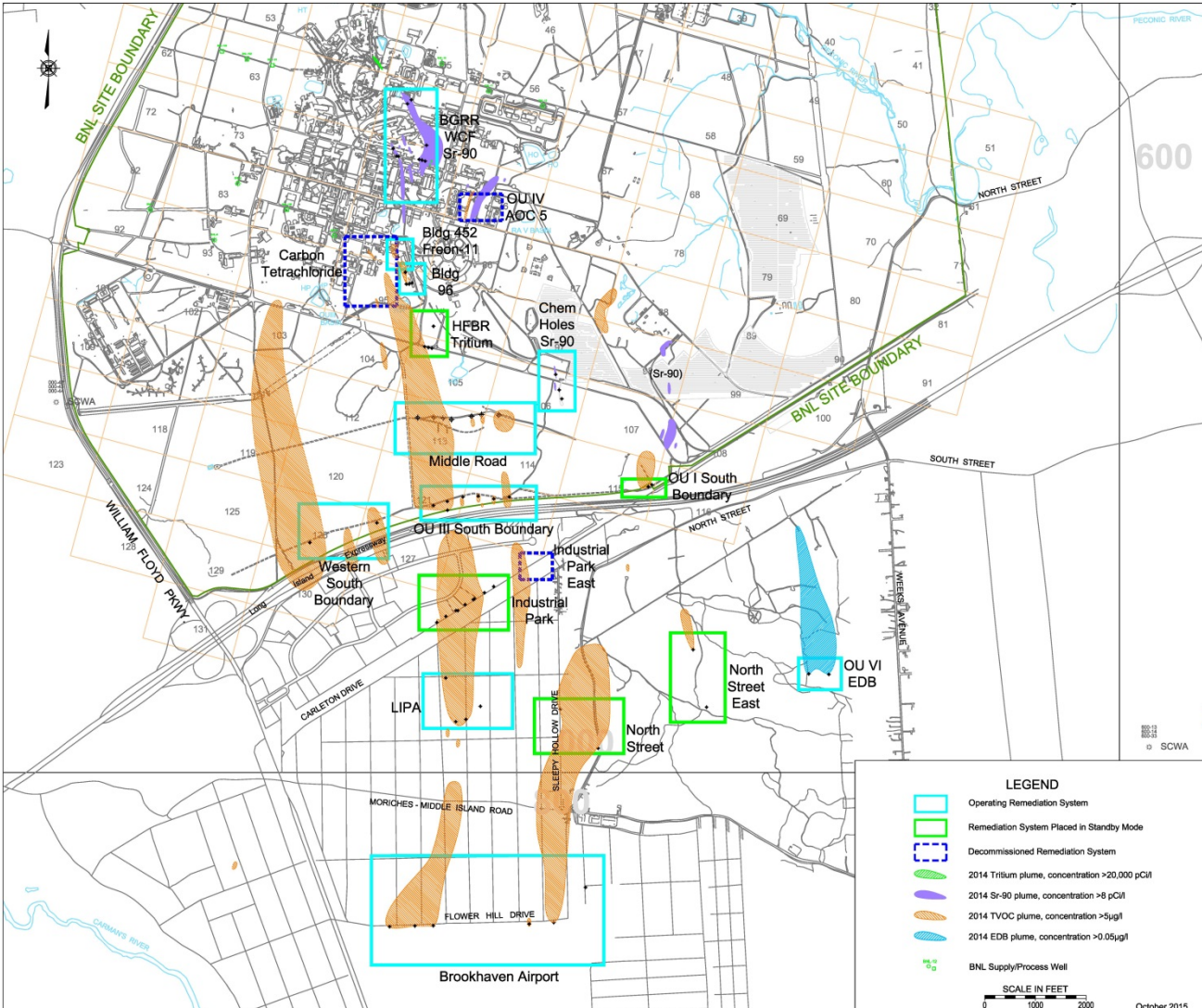


# Groundwater Treatment Systems/Plumes Status

- 10 systems operating
- 5 systems approved for shut-down
- 3 systems decommissioned

1996 - 2014:

- 23 billion gallons of contaminated groundwater treated and recharged to the aquifer
- 7,276 lbs VOCs removed
- 30 mCi Sr-90 removed





# Groundwater Treatment System Completion Process

Achieve plume capture goal for system (typically  $< 50 \mu\text{g/L}$  Total VOC (TVOC) in monitoring and extraction wells)



**Petition Regulators for system shutdown**



Upon approval, turn extraction wells off and maintain in standby mode/sample wells for several years



**When rebound in VOC concentrations if present has ceased, petition Regulators for system closure (upon approval, decommission equipment, abandon wells, limited continued monitoring)**

# Groundwater Treatment Systems/Plumes Status

## Systems

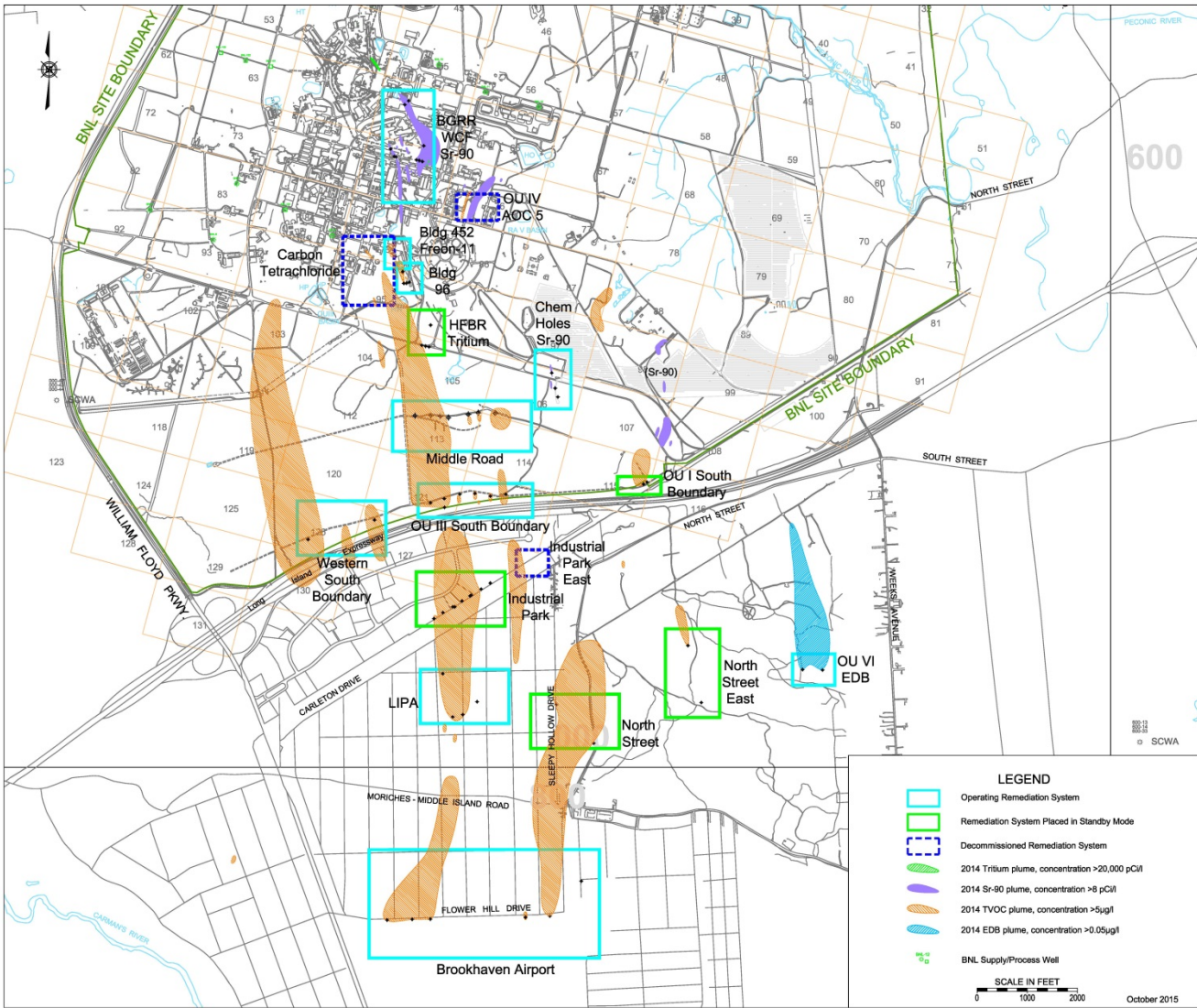
### Closed/Decommisioned:

- OU IV Air Sparge/Soil Vapor Extraction (2003)
- Carbon Tetrachloride (2010)
- Industrial Park East (2013)

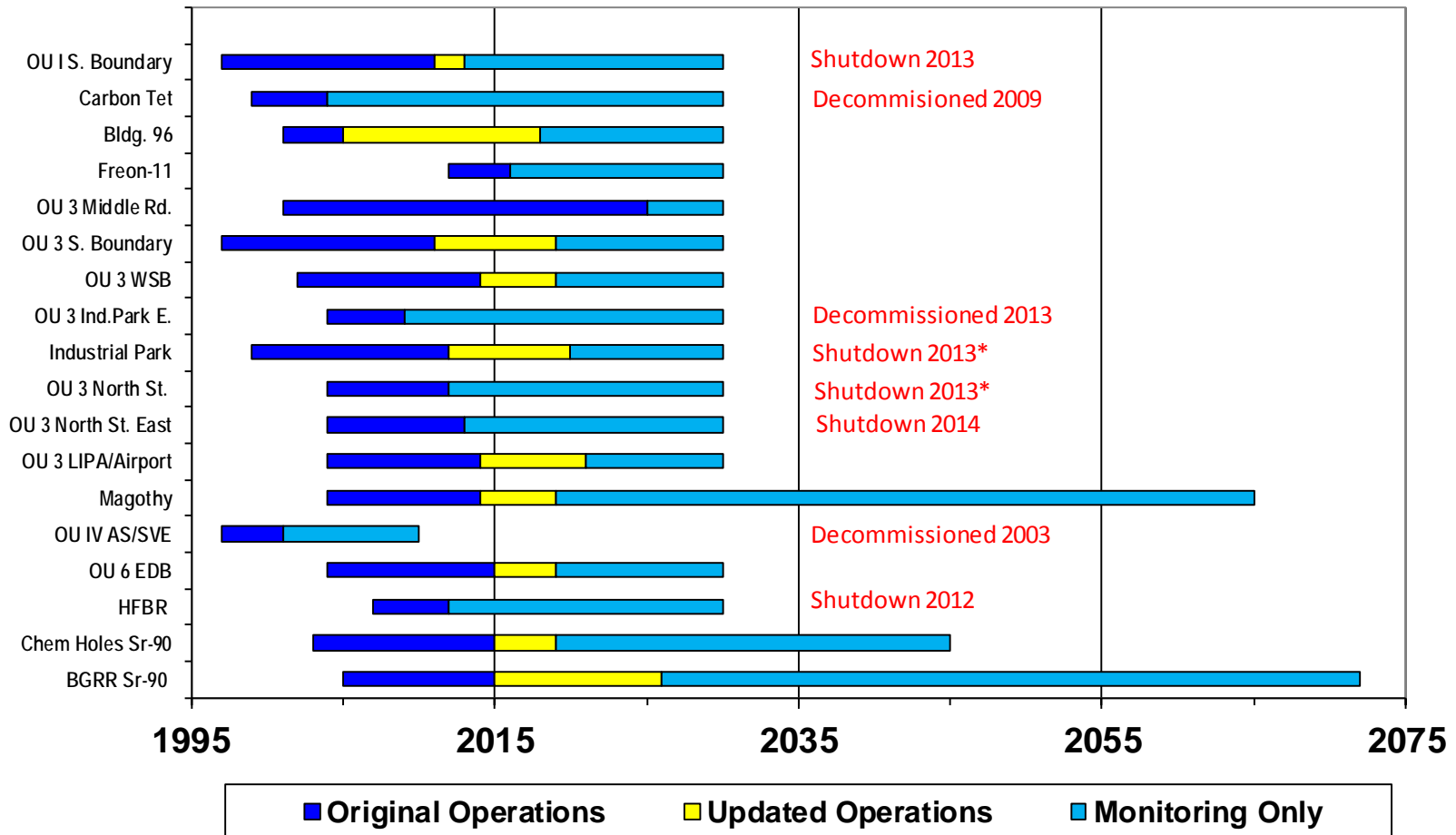
### Systems Approved for Shut-Down:

- OU I South Boundary (2013)
- Industrial Park (2013)\*
- North Street (2013)\*
- North Street East (2014)
- HFBR Tritium Pump and Recharge (2013)

\*Note – system temporarily back in operation to address VOC rebound



# Groundwater Treatment System Status



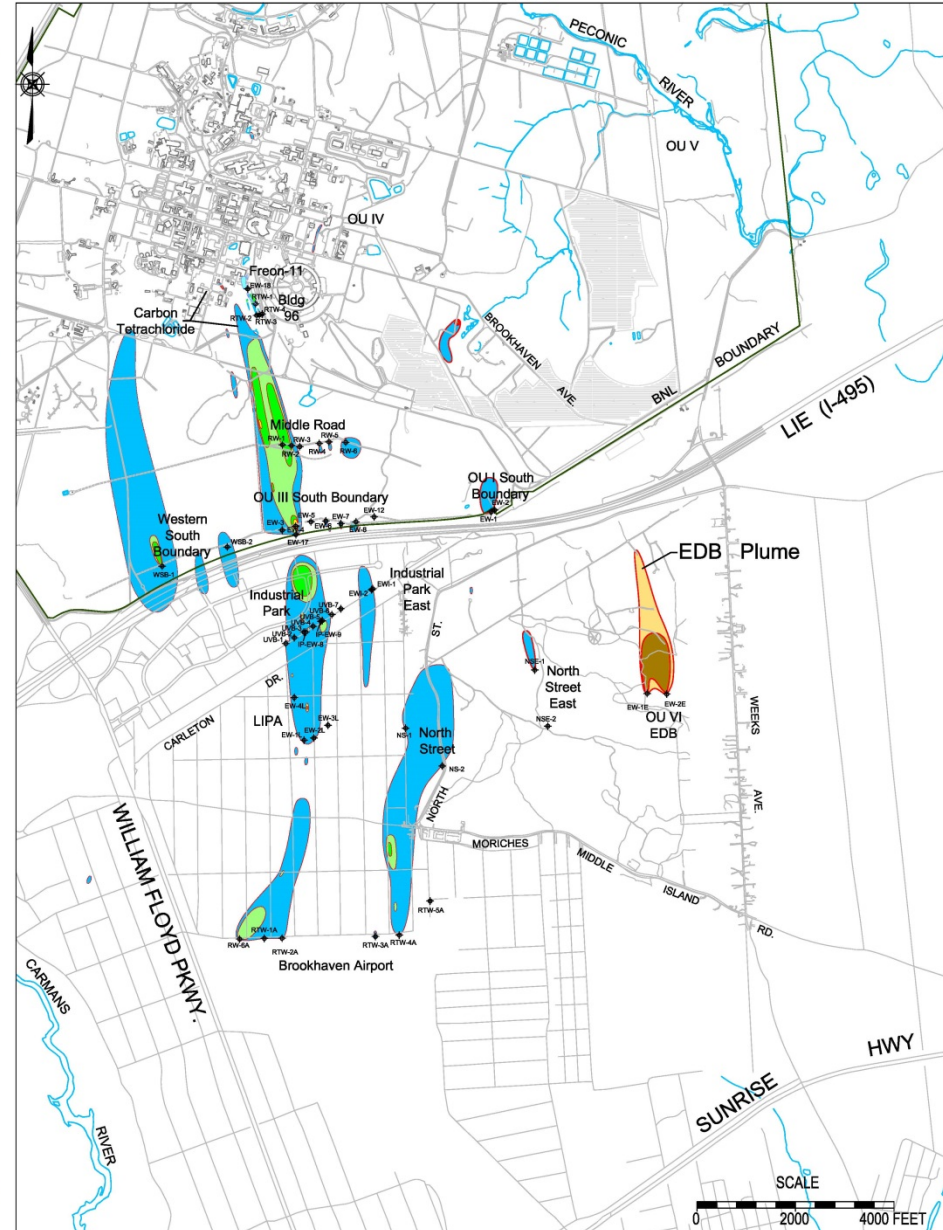
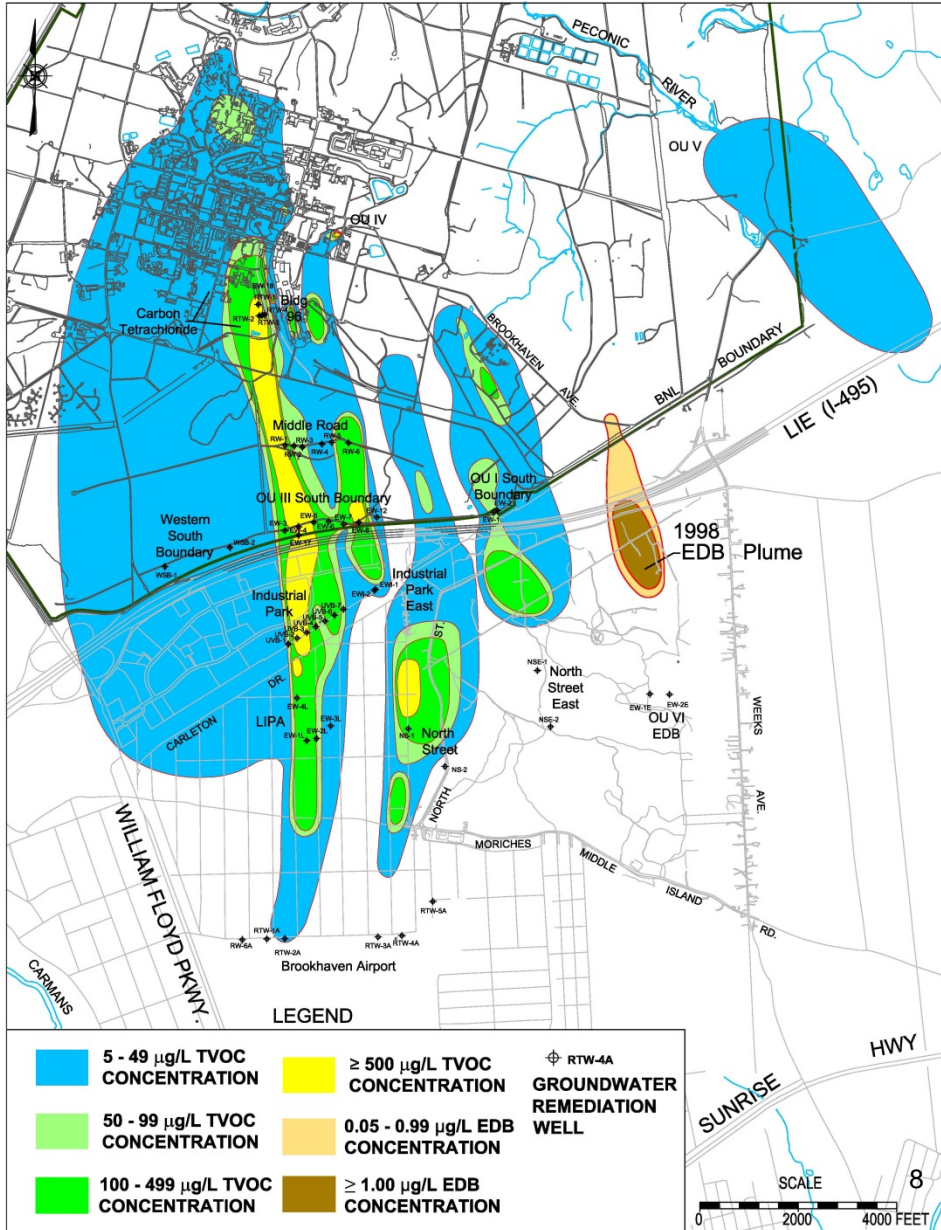


# VOC Remediation Progress 1997 to 2014



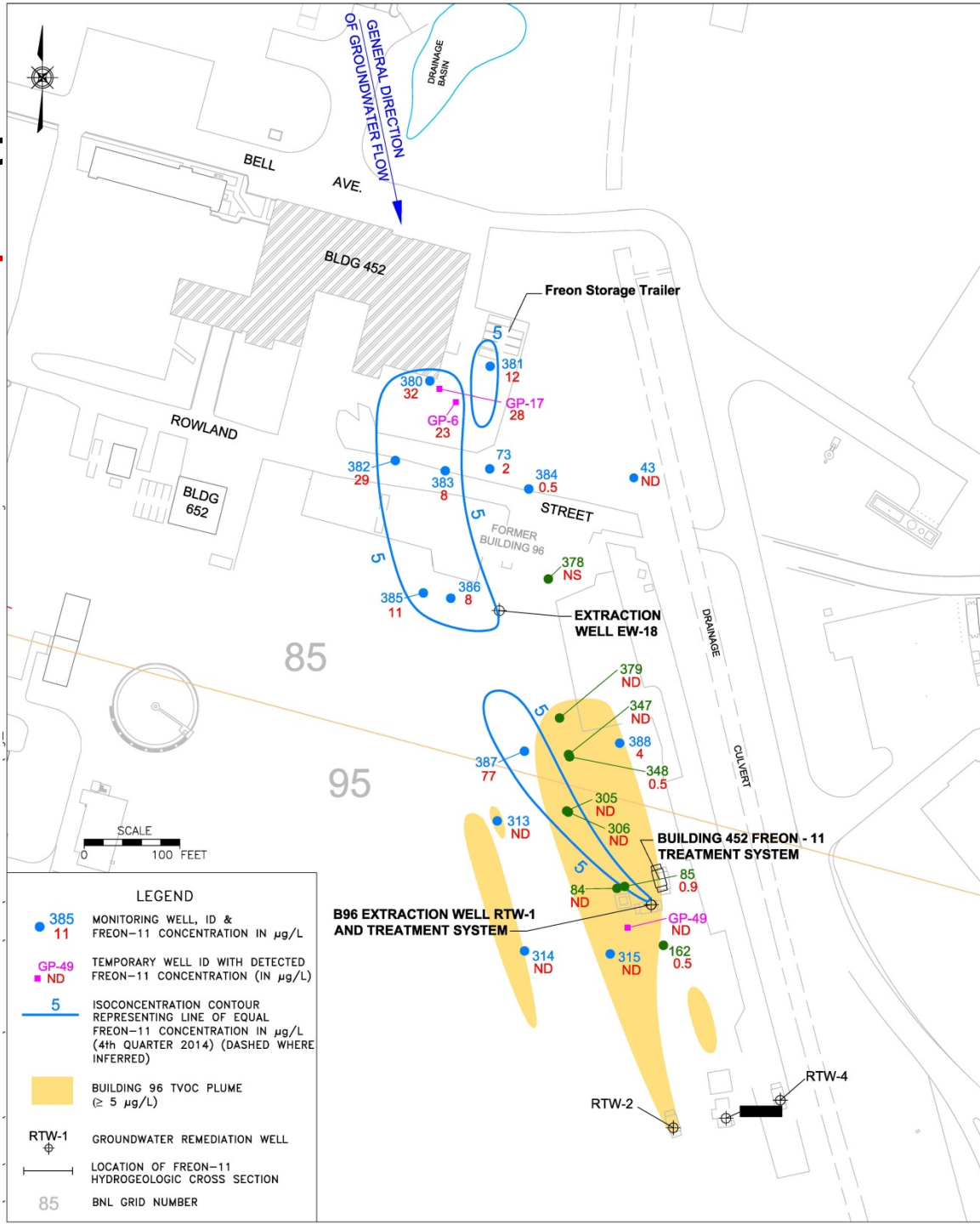
1997

2014



# Bldg. 452 Freon-11 Groundwater Treatment System Update

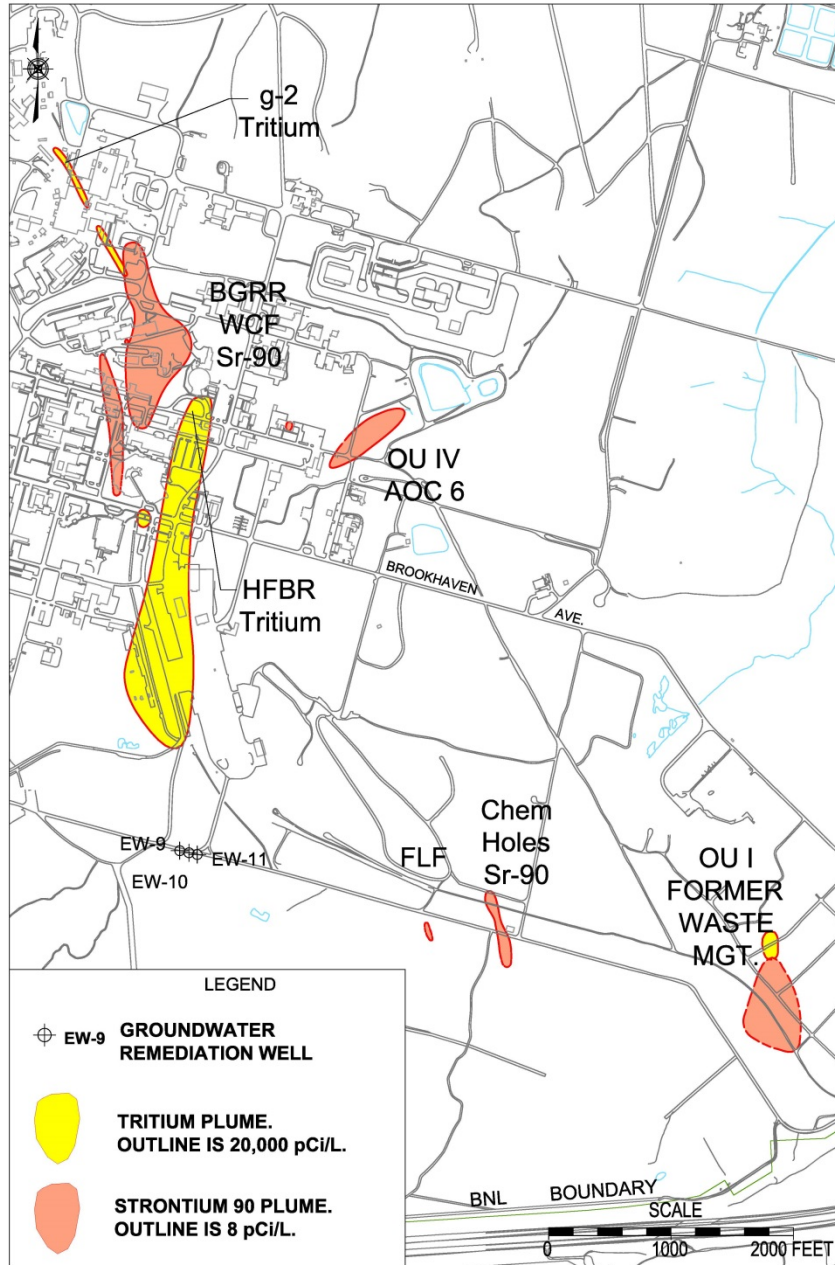
- Extraction well (EW-18) has been in operation since March 2012 ~ 100 lbs. Freon removed (some treated by Bldg. 96 Sytem)
- Maximum Freon-11 concentration in source area currently 13 ug/L (well 085-385 on 8/7/15)
- Preparing Petition for Shutdown of System for regulatory approval



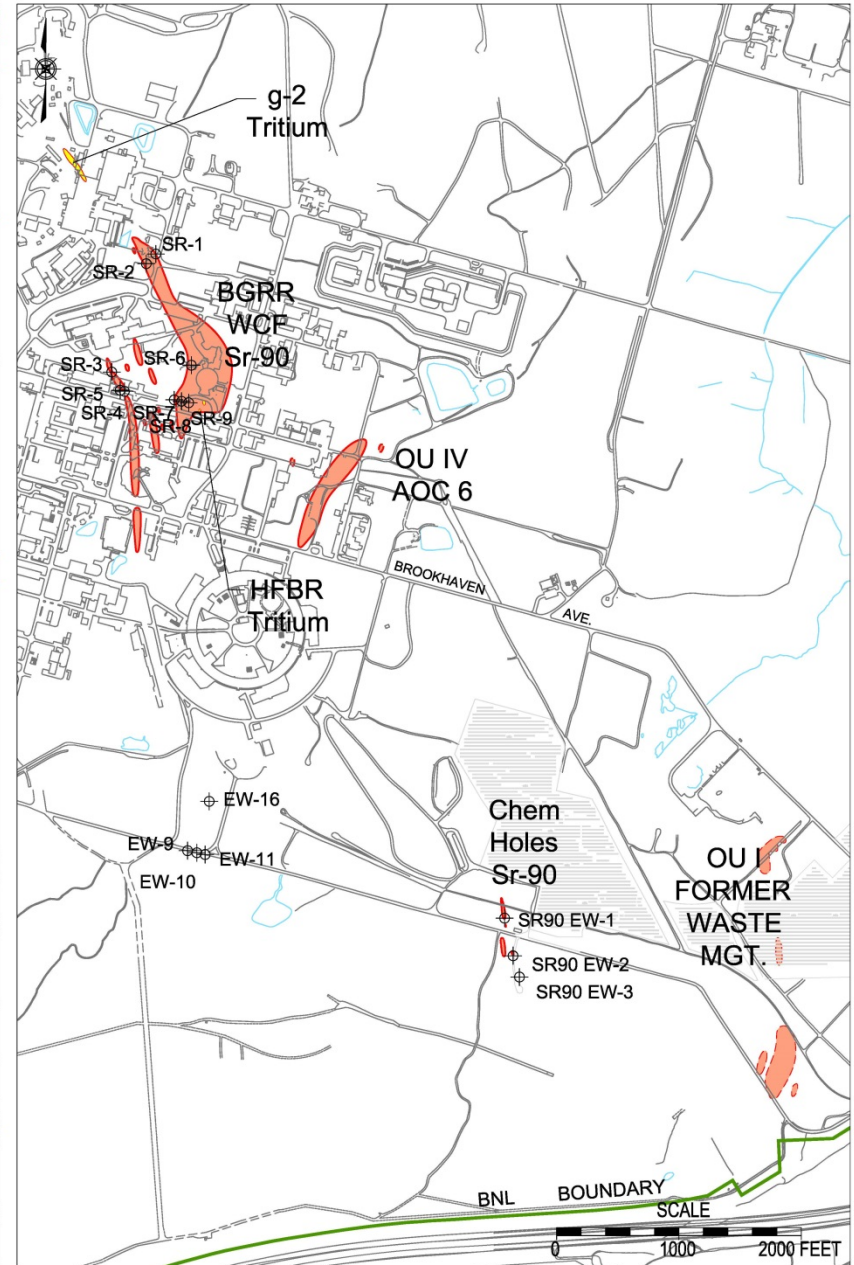


# Radiological Plumes

2002 RAD PLUME DISTRIBUTION



2014 RAD PLUME DISTRIBUTION





# Former Hazardous Waste Management Facility (FHWMF) Update

## Background:

- HWMF operations began in late 1940s
- Operations at facility ended in 1997
- Soil remediation and D&D completed in 2005
- Remediated soil to avg. of 15 pCi/g Sr-90 (higher individual samples to 80 pCi/g)
- Removed large areas of asphalt and concrete from central yard as part of remediation

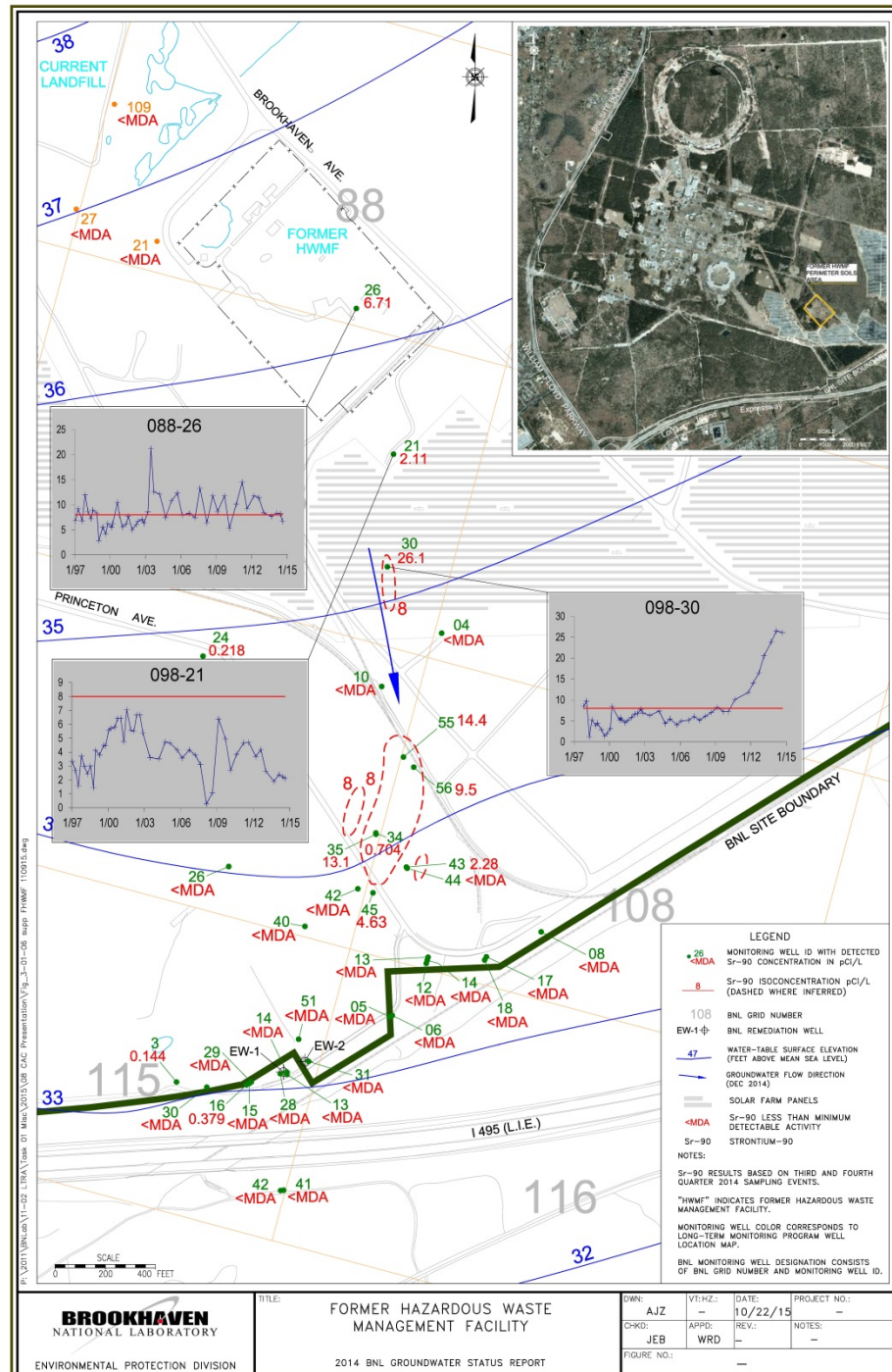




# Former Hazardous Waste Management Facility (FHWMF) Update

## Background:

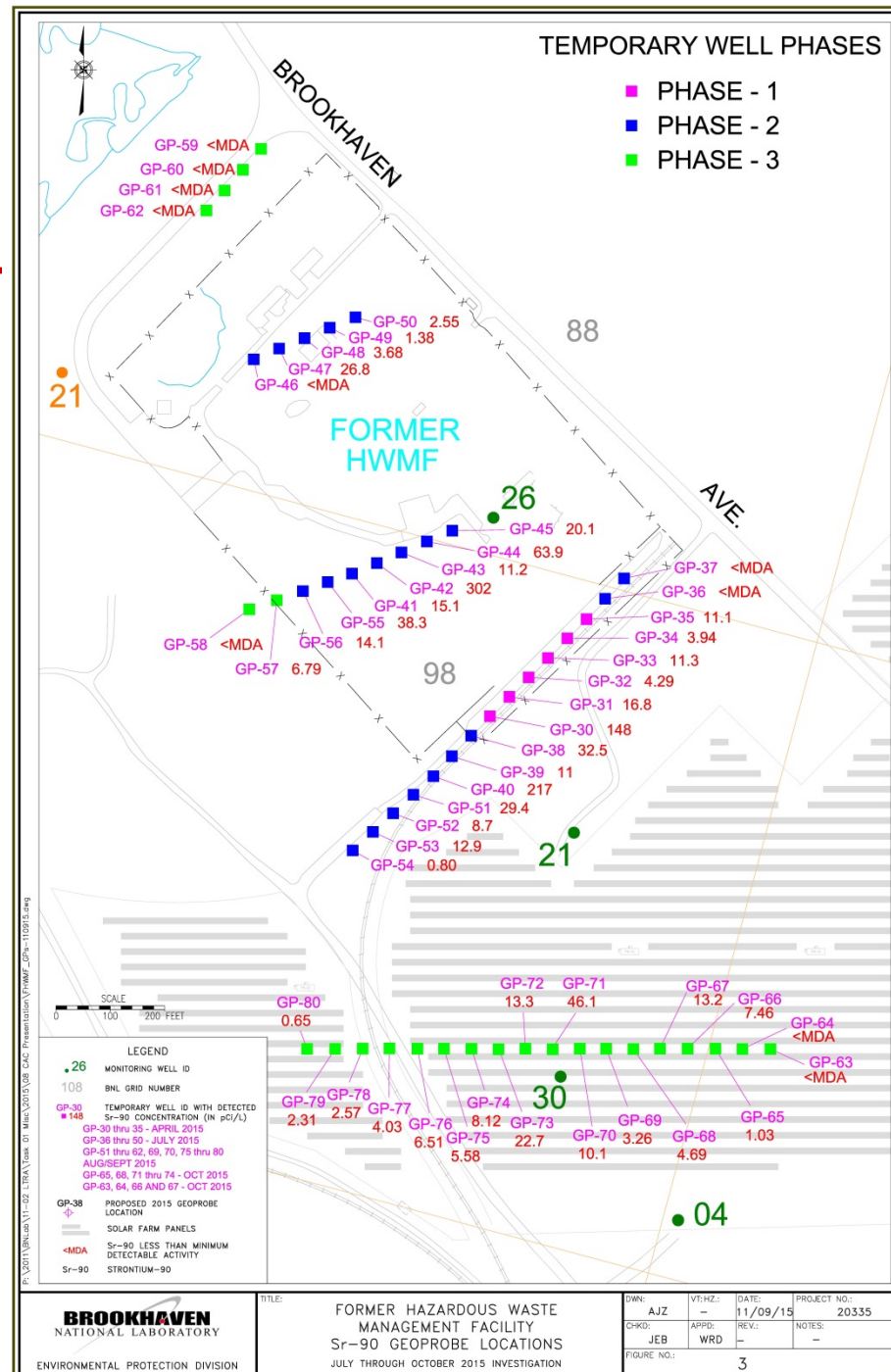
- Strontium (Sr)-90 half-life is 29 years
- Sr-90 travels slowly in groundwater (~40 feet per year in groundwater)
- Approximately 70 year travel time from center of FHWMF yard to boundary
- Recommendation in 2013 GW Status Report to characterize potential continuing source based on monitoring well data



# Former Hazardous Waste Management Facility (FHWMF) Update

## Recent efforts:

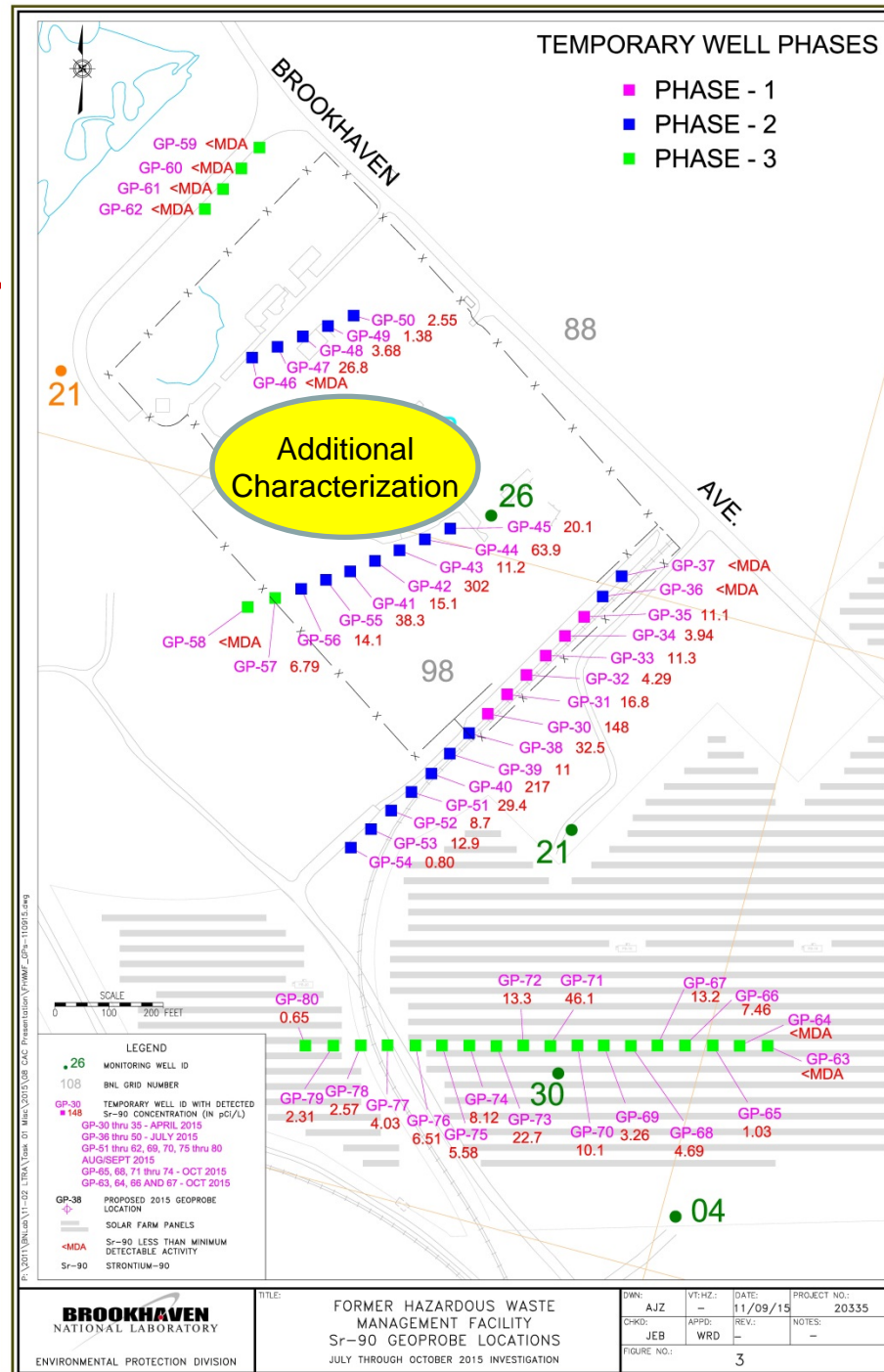
- Began groundwater characterization in April 2015 (briefed CAC in September 2015)
- Detected 148 pCi/L in first row of temporary wells
- Completed 3 phases of characterization to date
- Targeted an area immediately downgradient of majority of spills and operations
- Detected 302 pCi/L immediately downgradient of suspected source area
- Detected 217 pCi/L along southern boundary of former HWMF
- Maximum Sr-90 concentration of 46 pCi/L on southernmost transect in LI Solar Farm



# Former Hazardous Waste Management Facility (FHWMF) Update

## Next Steps:

- Additional groundwater characterization in center of former facility
- Update model with new data and model attenuation of Sr-90
- Evaluate follow up actions

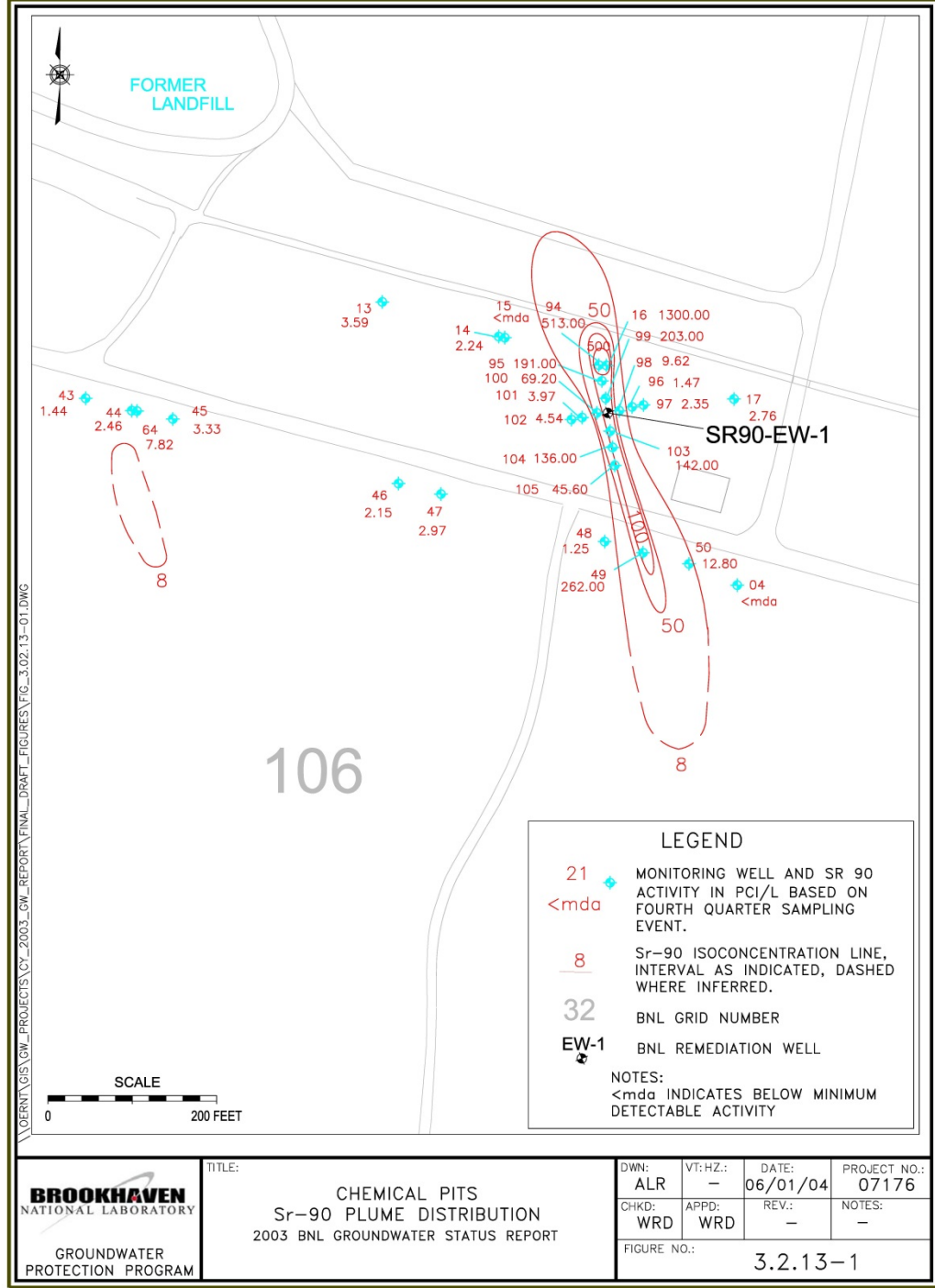




# Chemical Holes Sr-90 Plume

## Background:

- Buried waste excavated in 1997
- Extraction Well EW-1 began operating in 2003
- EW-2 and EW-3 added in 2007
- Historical high Sr-90 concentration of 4,720 pCi/L in 2005, January 2015 concentration was 178 pCi/L

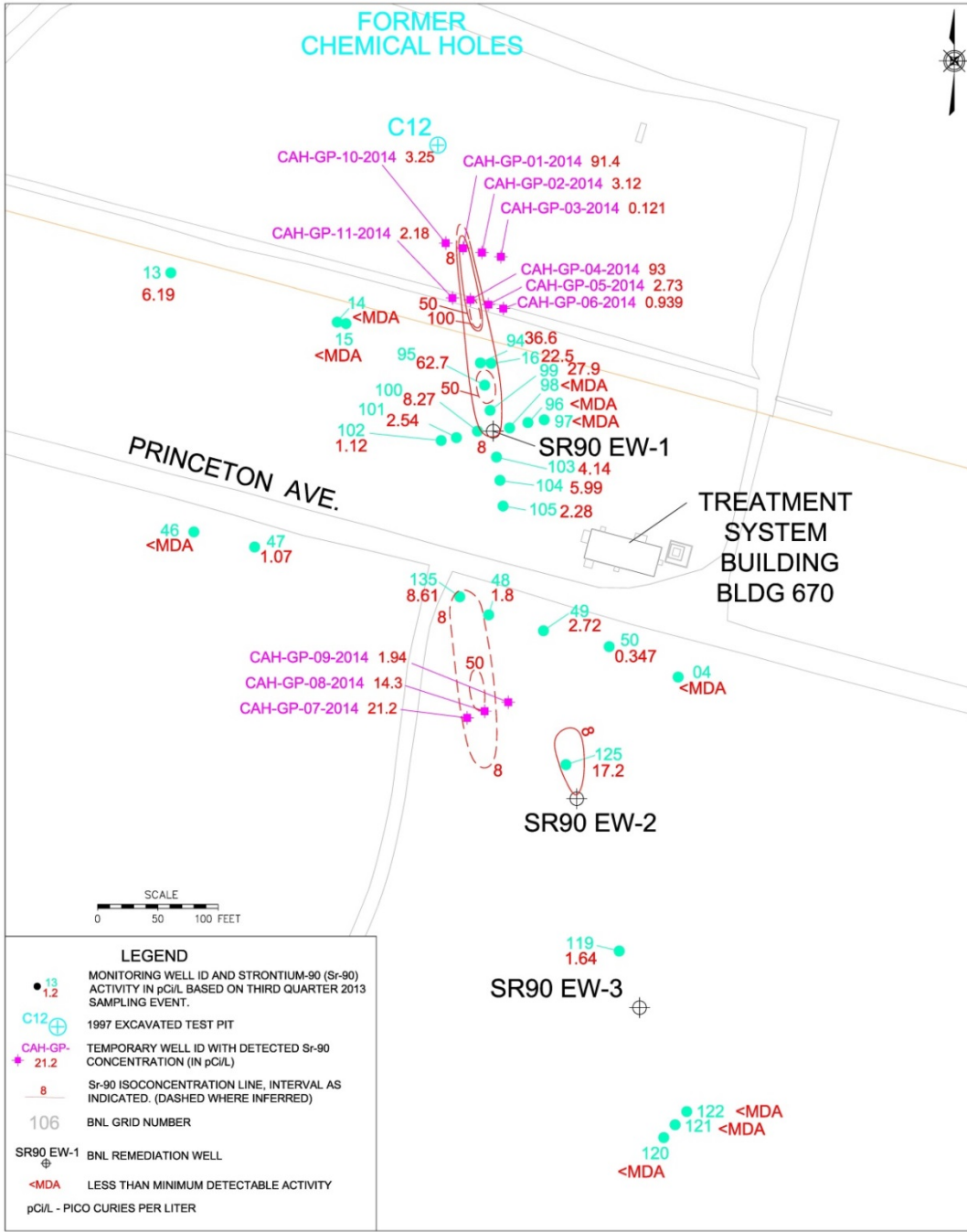


<b>BROOKHAVEN</b> NATIONAL LABORATORY GROUNDWATER PROTECTION PROGRAM	TITLE:	CHEMICAL PITS Sr-90 PLUME DISTRIBUTION 2003 BNL GROUNDWATER STATUS REPORT	DWN:	ALR	VT: HZ.:	-	DATE:	06/01/04	PROJECT NO.:	07176
	FIGURE NO.:	3.2.13-1	CHKD:	WRD	APPD:	WRD	REV.:	-	NOTES:	-

# Chemical Holes Sr-90 Plume

## Current Status/Next Steps:

- Persistent elevated source area monitoring well Sr-90 concentrations
- Petition for Shutdown planned in 2015 postponed
- Targeting source area for focused soil sampling effort



# Reactor Surveillance and Maintenance Update

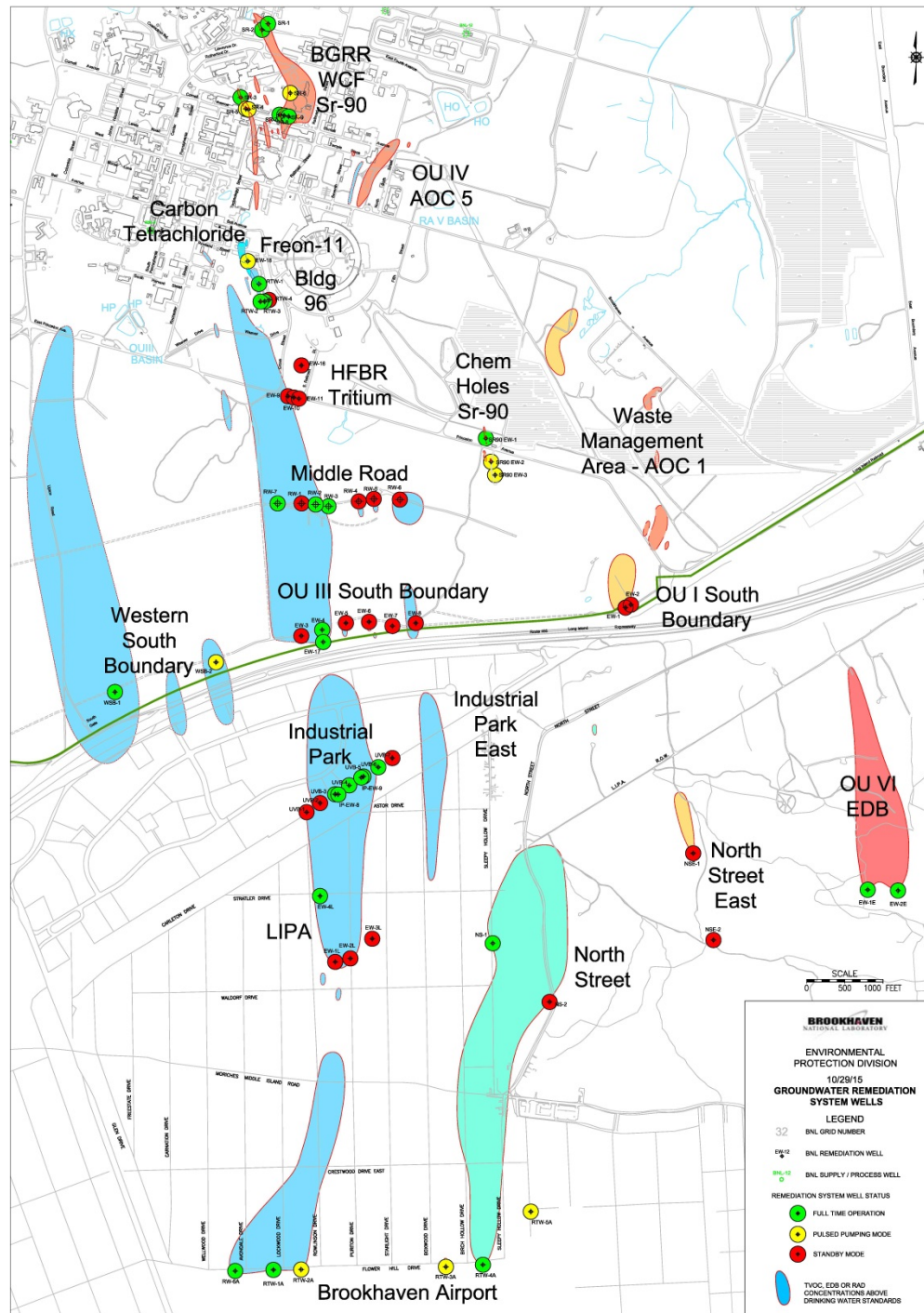
- Completed replacement of BGRR office windows
- Repairing roof drainage at BGRR
- Updated HFBR security system
- Routine reactor facility inspections resulted in no significant findings
- Annual BGRR and HFBR structural inspections resulted in no significant findings
- Awarded contract for minor repairs and safety enhancements to HFBR stack ladder





# Questions and Answers







# Conditions Leading to Potential Groundwater Impact from Source Areas

