

*Hydrologic conditions of the eastern Snake
River Plain aquifer, Idaho National
Laboratory and Magic Valley, Idaho*

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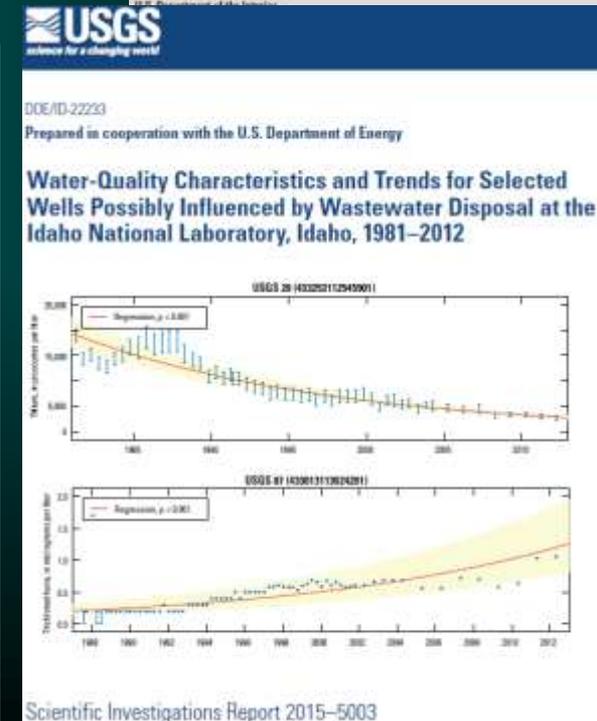
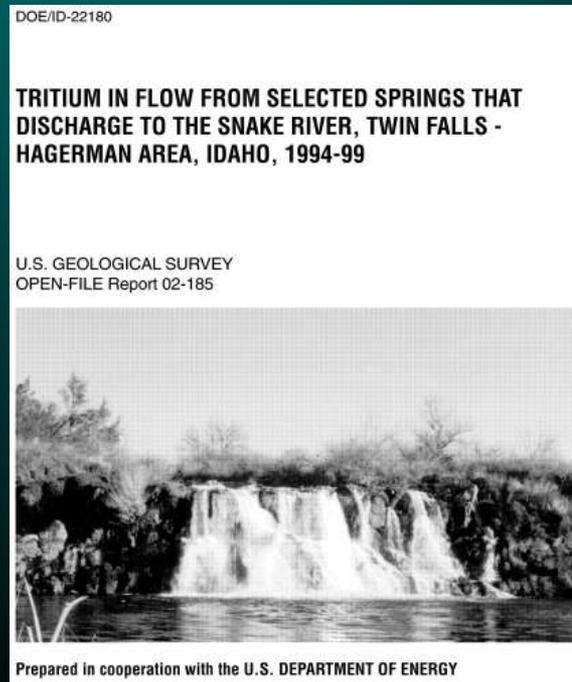
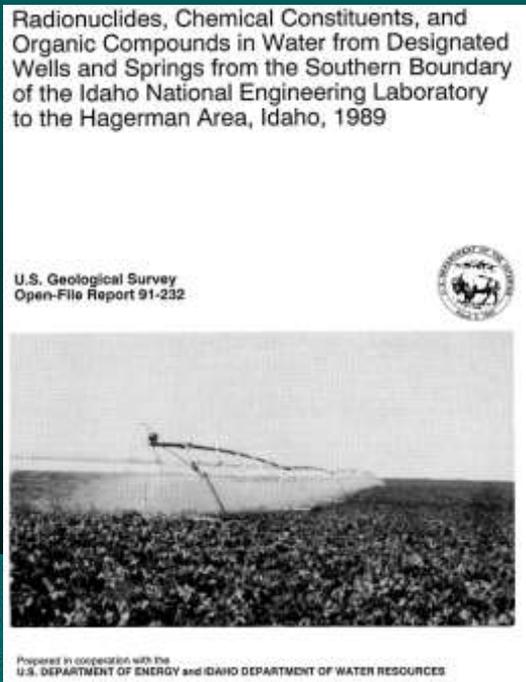
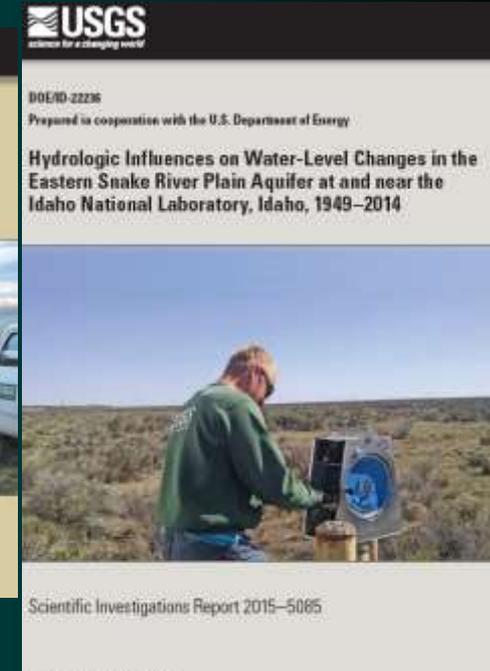
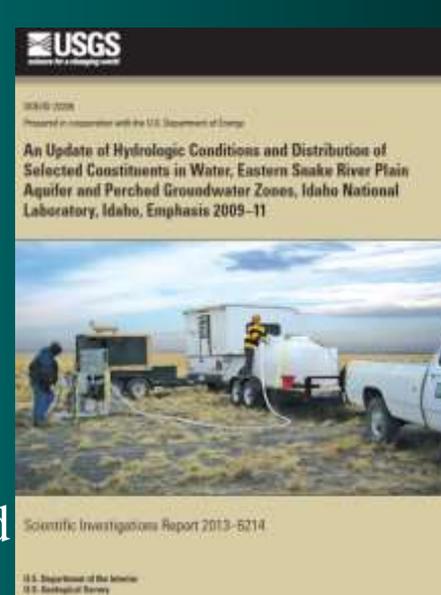
<http://id.water.usgs.gov/INL/>

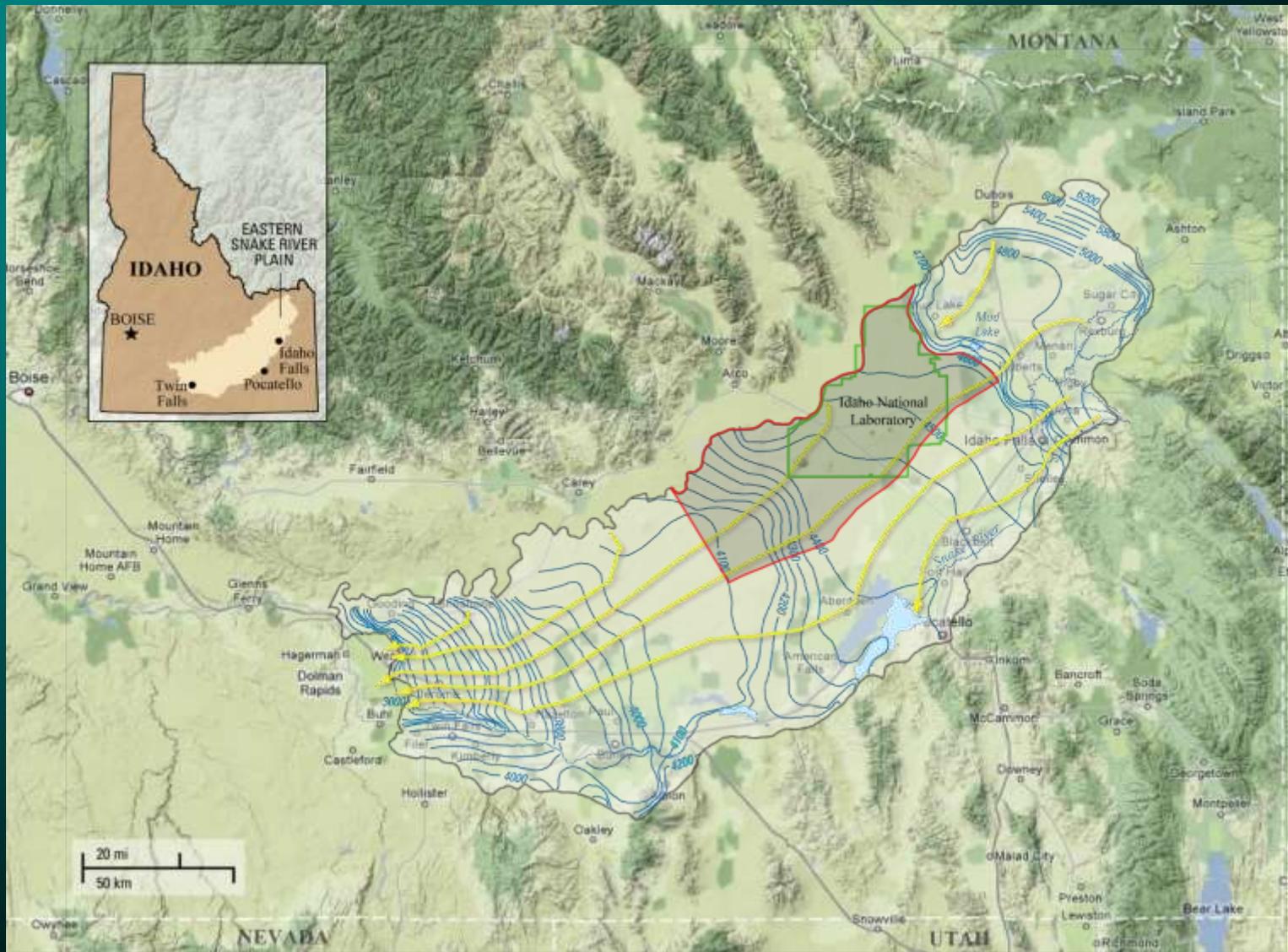
Phone: 526-2157



Presentation Overview

- Summarize water availability at INL following several drought years.
- Summarize water quality of constituents and trends of wells sampled at INL.
- Summarize water quality data collected from the Magic Valley and Thousand Springs area.





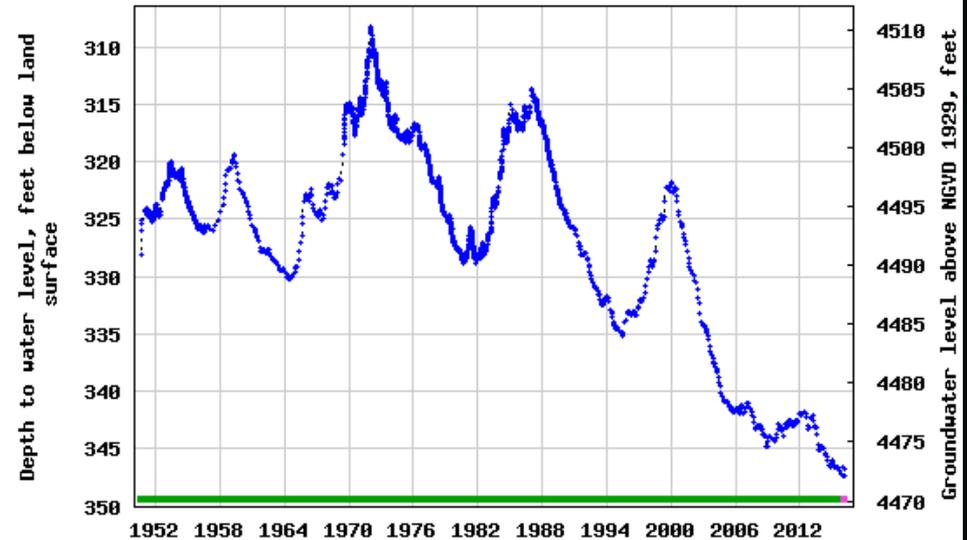
Cyclical nature of the Aquifer

- Eastern Snake River Plain aquifer goes through cycles of increasing and decreasing water levels related to wet and dry cycles.
- Trends seem to indicate new lows and longer drought period
- 2015 had new record low levels in all our wells



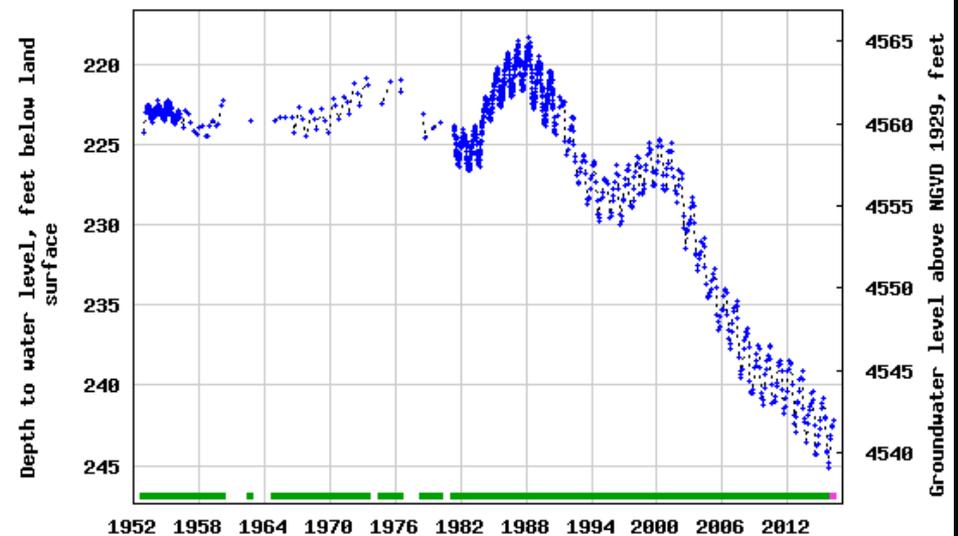
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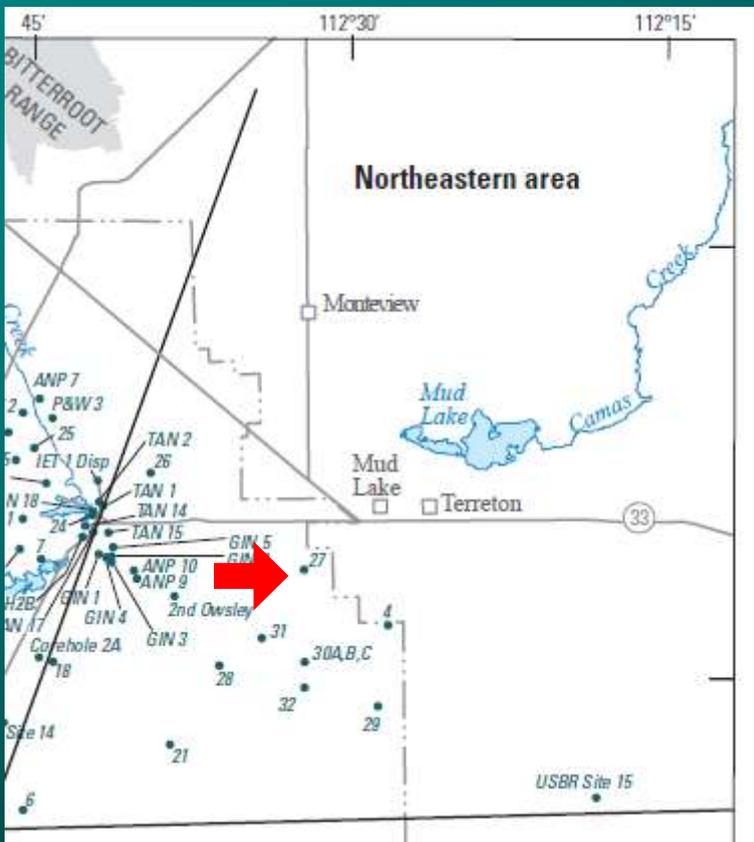
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USGS 27



Period of approved data

Period of provisional data

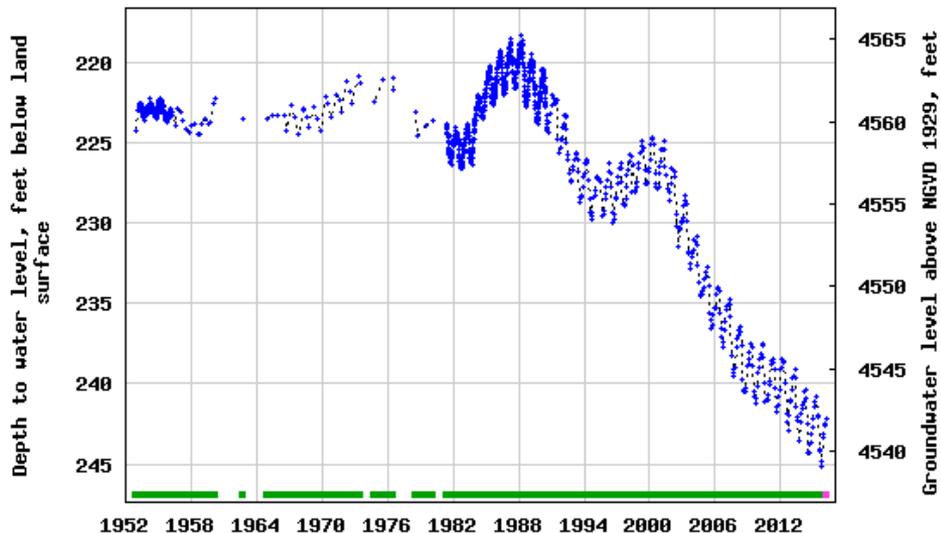


Northeast-we see influence of groundwater irrigation and larger seasonal variation (4 to 5 ft change)



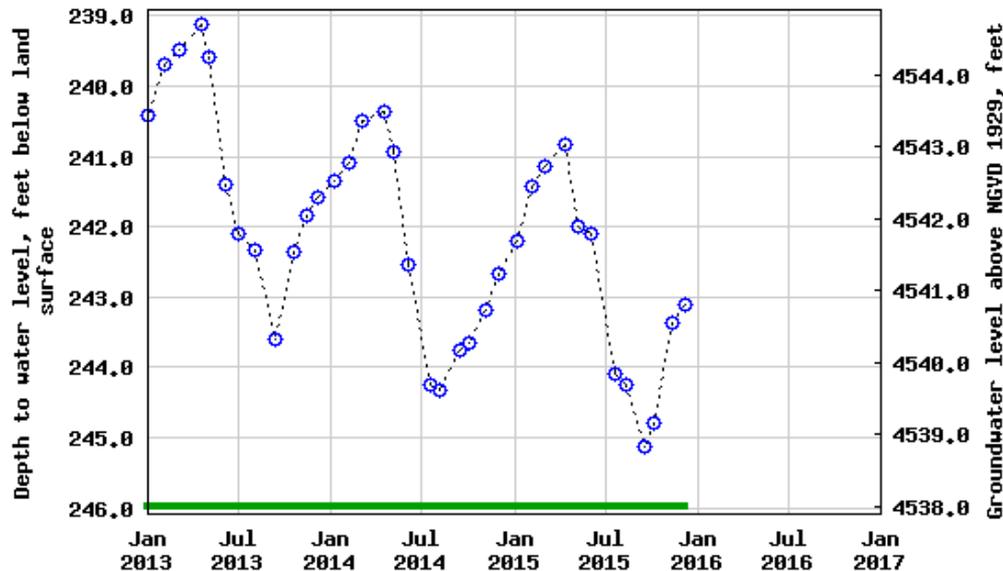
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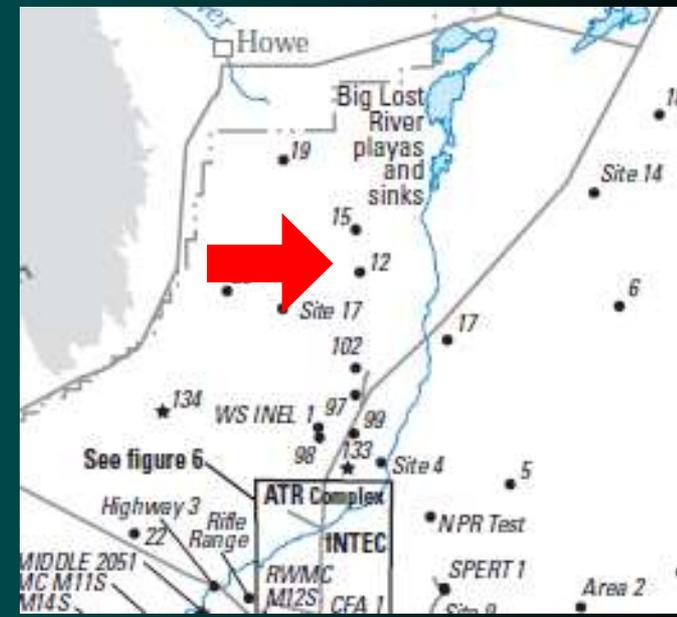
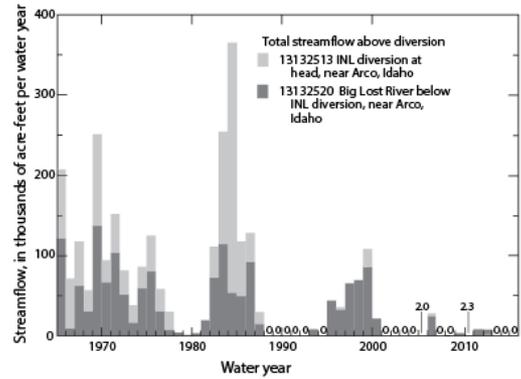
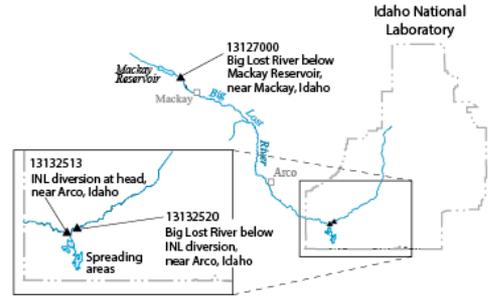
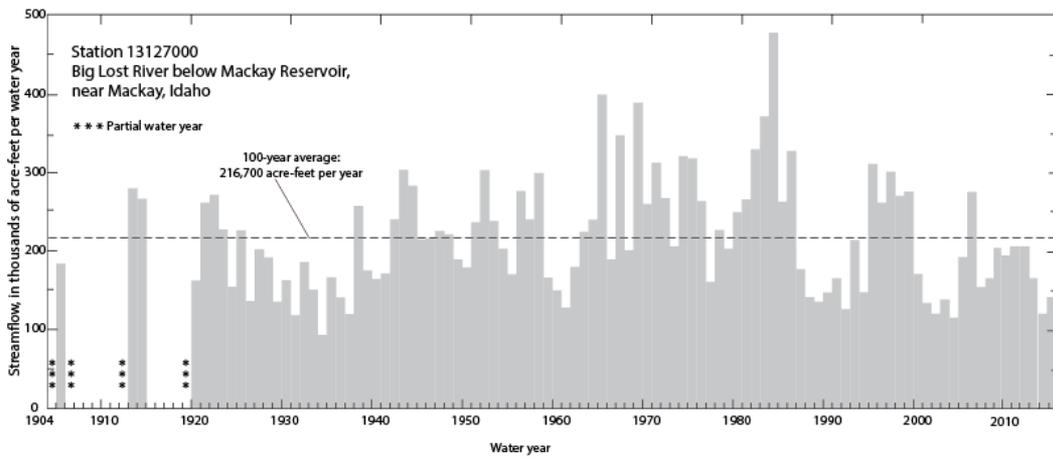
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— Period of approved data



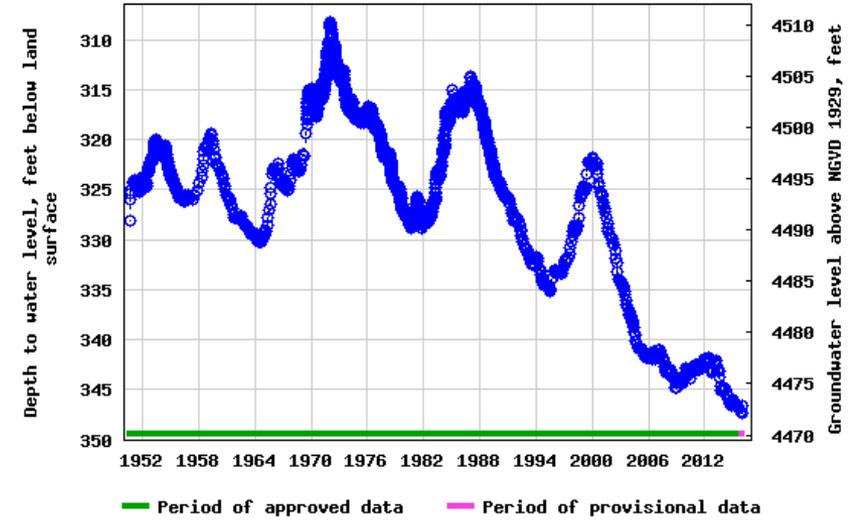


Northwest and southwest more affected by surface water recharge from Big Lost River



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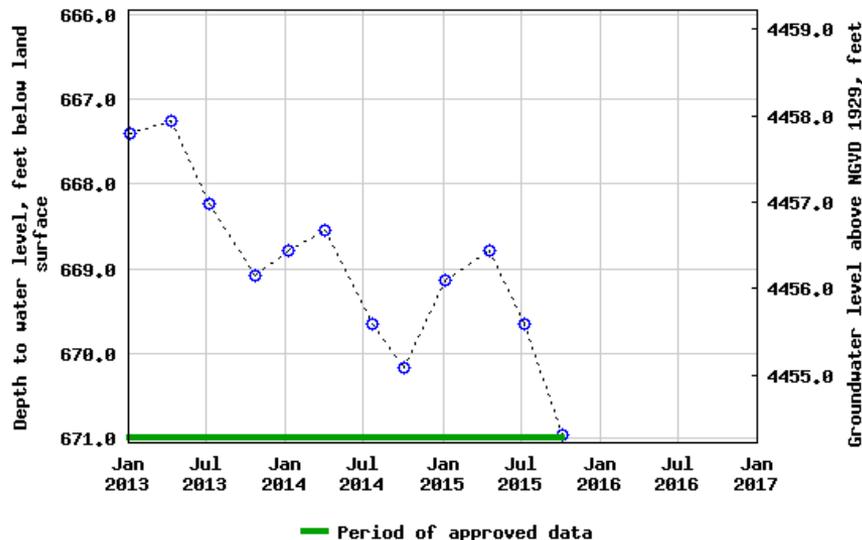


Southeast-see less influence of irrigation or flow in the Big Lost, less seasonal variability (1 to 1.5 ft change) and less overall decline



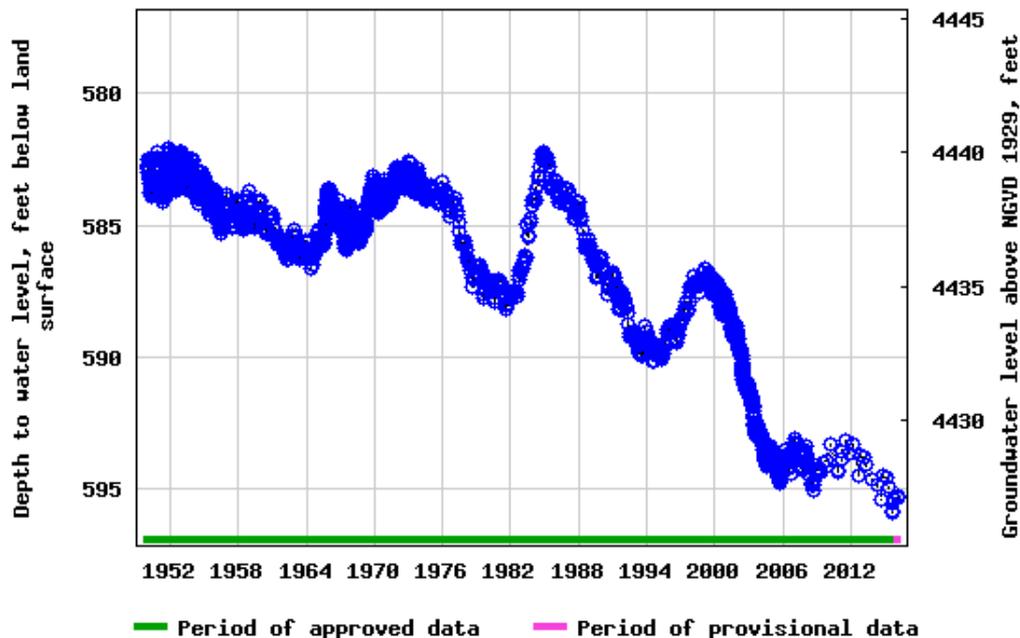
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USGS 432700112470801 02N 31E 35DCC1

USGS 1



Water Sample Monitoring at INL

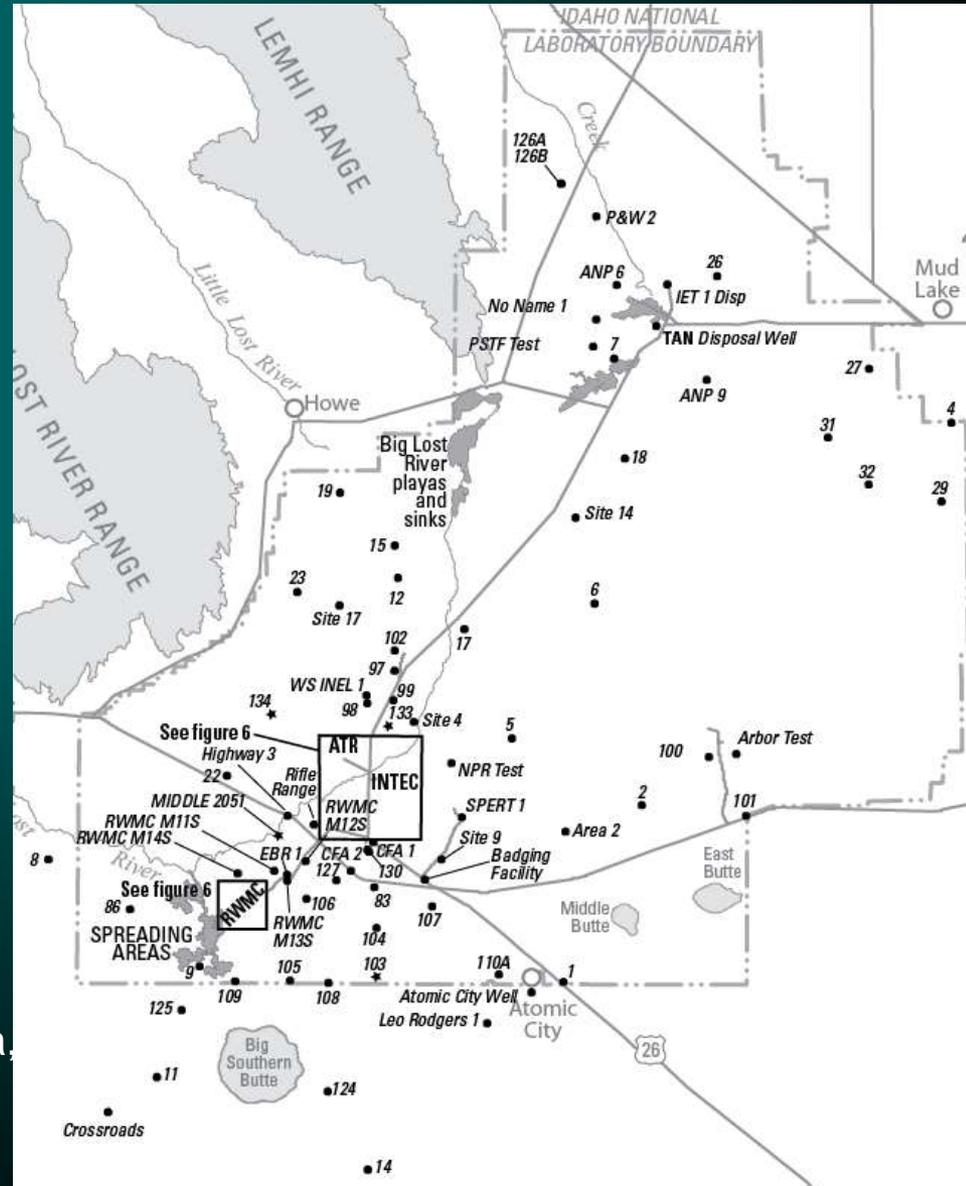


Water quality – annually at 150 sites, but back in the 1990s sampled as many as 200 sites

Sampled quarterly and semi-annually at many wells between early 1960's-2002; annual sampling since

Sample all sites for tritium and chloride

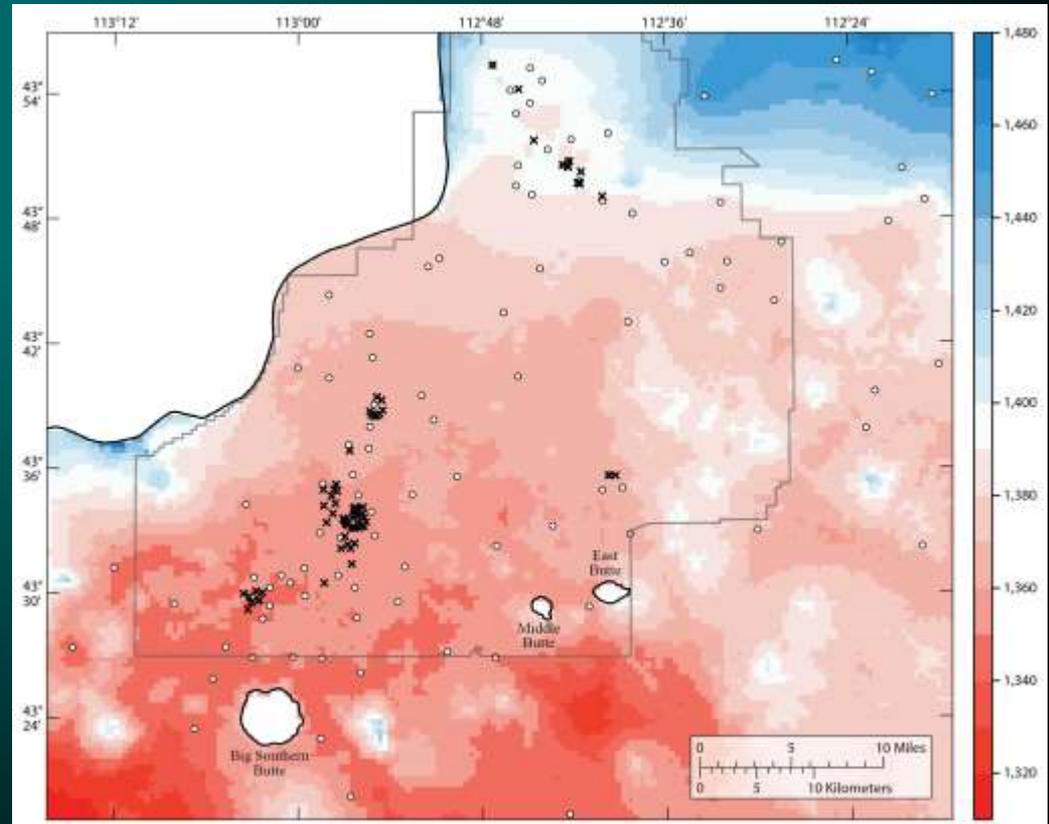
Selected sites for sulfate, sodium, fluoride, chromium, Sr-90, Pu, Am, alpha, beta, gamma, VOC's, TOC, suite of trace elements



USGS INL water-quality sample program Optimization study

- Study Objectives

- Discover potential sources of data redundancy in existing USGS INL water sample monitoring program to address questions posed by DOE: Which wells to sample; how often; and for what constituents.
- Started 3 Phase study in 2011



Final phase-Water sample optimization

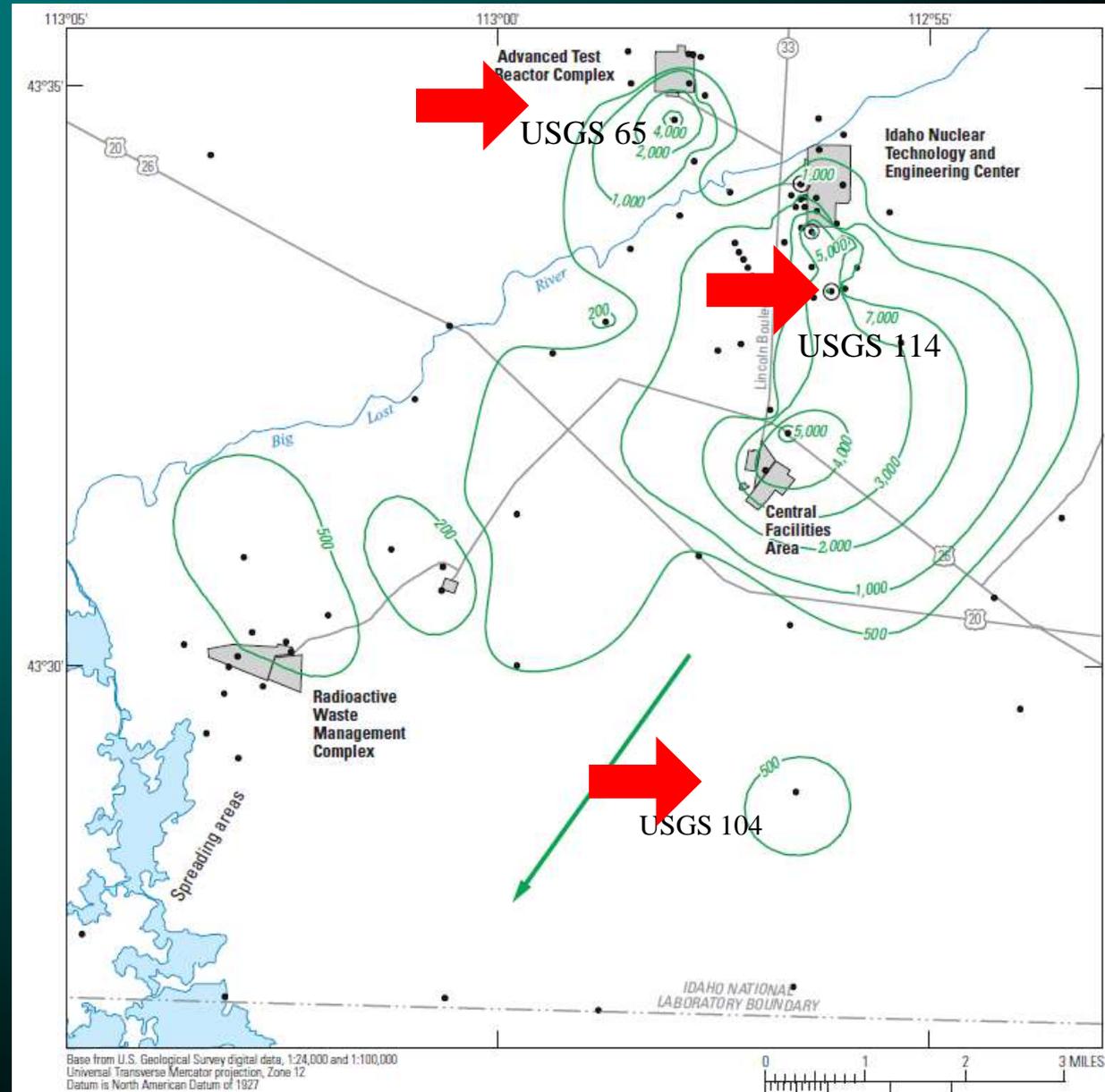
- Use an iterative thinning algorithm that removes at random, certain fractions of the historic dataset, but preserves the original trend.
- Number of well locations is reduced by searching for pairs of wells with highly correlated water-quality conditions and removing one or the other because of redundancy.
- Similarly, for water samples collected from an individual well, the number of constituents to include in laboratory analysis is reduced by searching for pairs of constituents with highly correlated concentrations.



Tritium-2011-2015

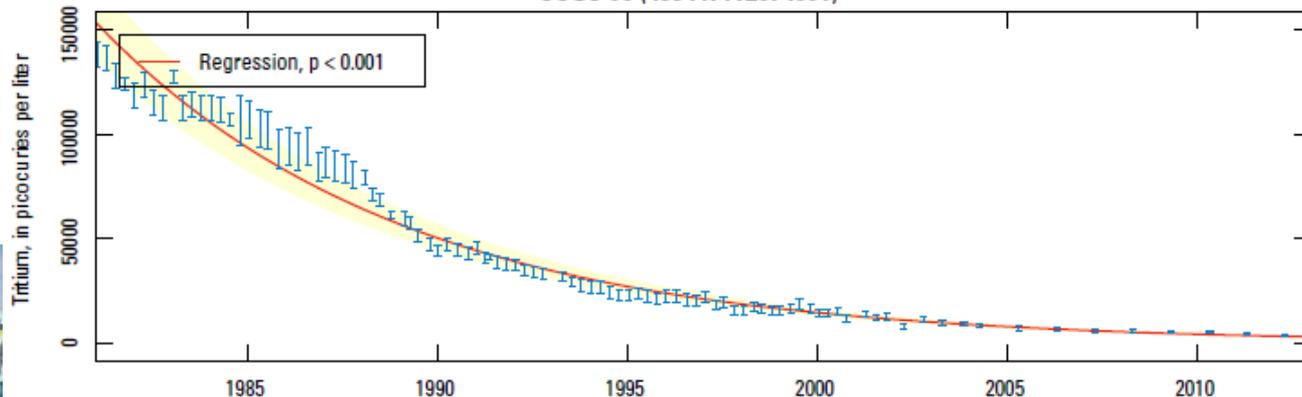
Largest concentration in the aquifer in 2014 was 6,330 +/-140 in well USGS 114; concentration in 2015 in USGS 65 was 2,460 +/-100 pCi/L

Have not had concentrations above the drinking water standard of 20,000 pCi/L since 1997

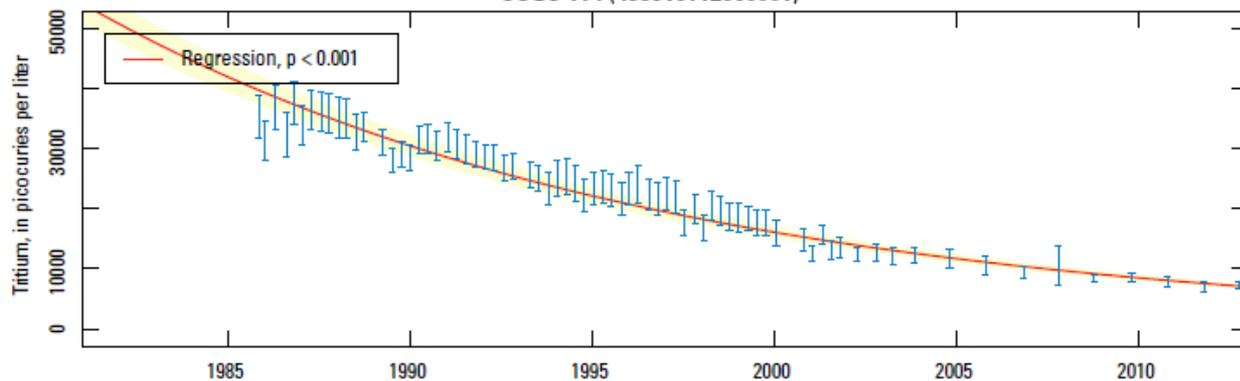




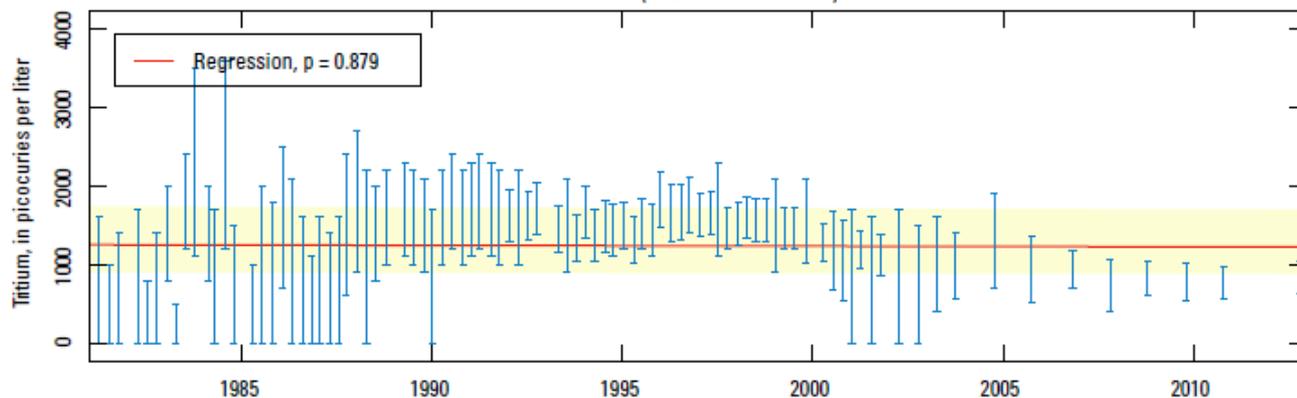
USGS 65 (433447112574501)



USGS 114 (433318112555001)



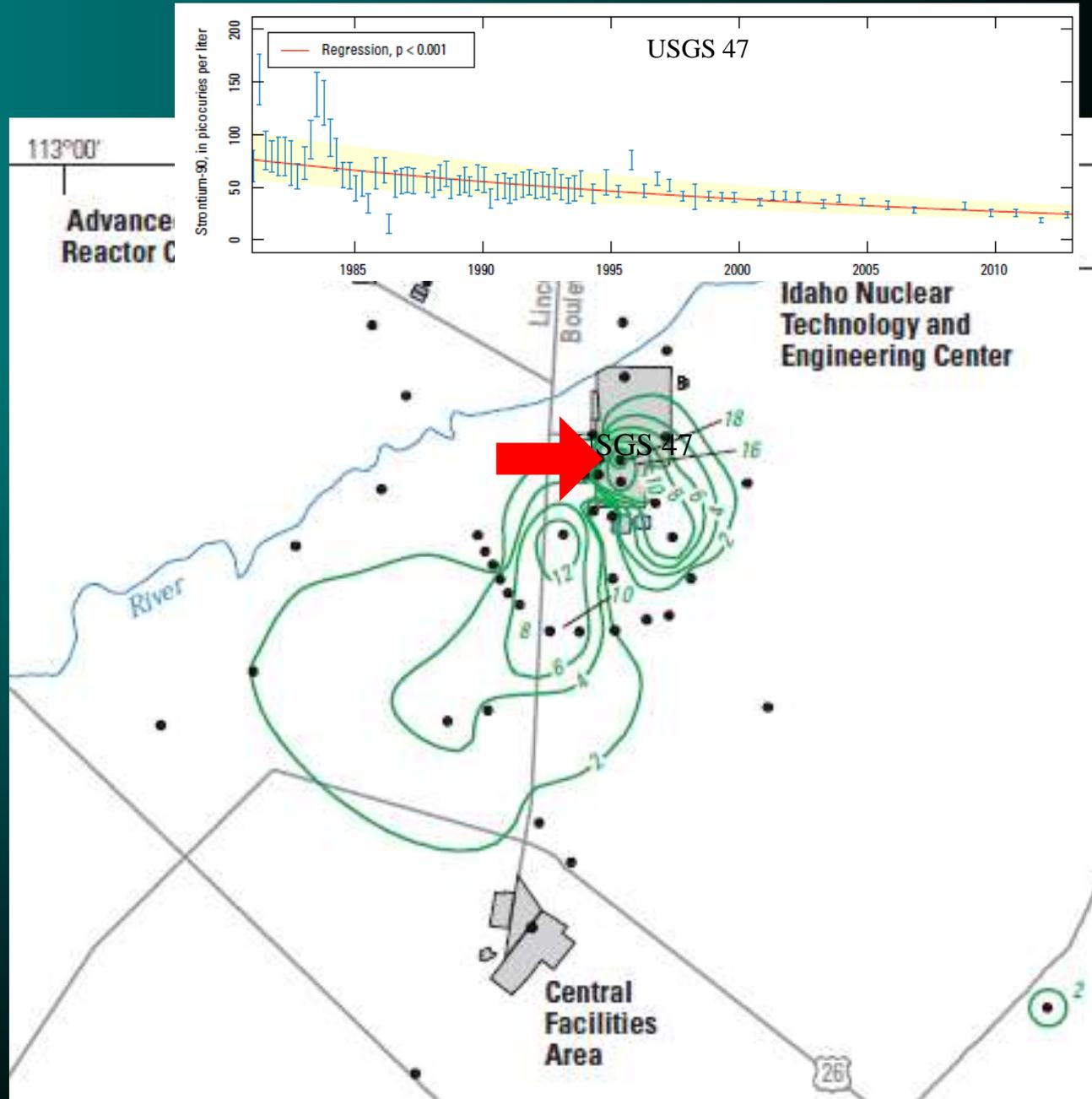
USGS 104 (432856112560801)



Strontium-90 2011-2014

Still have nine wells
USGS samples with
concentrations above
the drinking water
standard of 8 pCi/L.

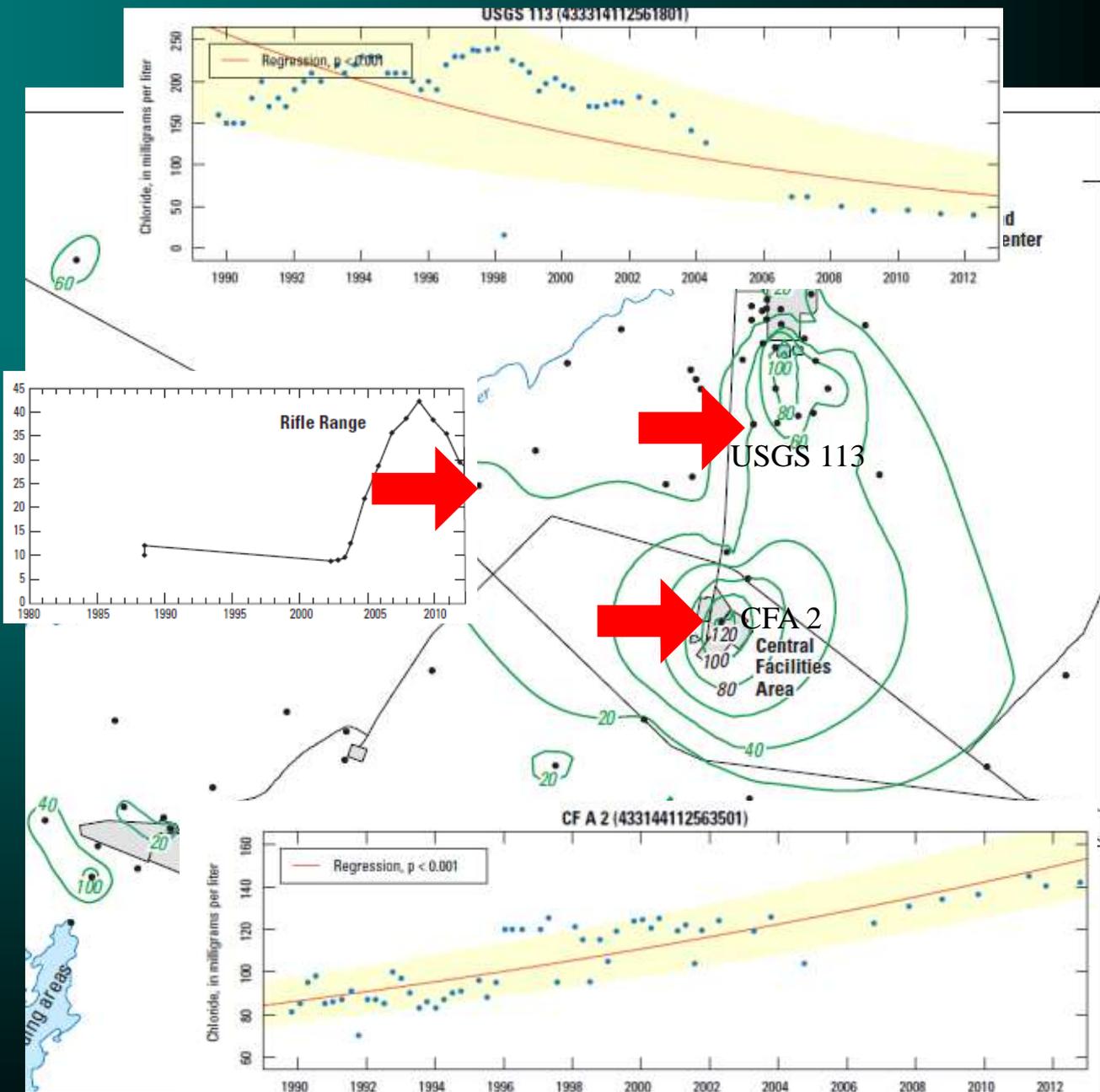
Largest concentration in
2014 was 19.6+/-1
pCi/L in USGS 47



Chloride-2011-2015

2015 concentration in USGS 113 was 29 mg/L.

Largest concentration was in CFA-2 at 134 mg/L

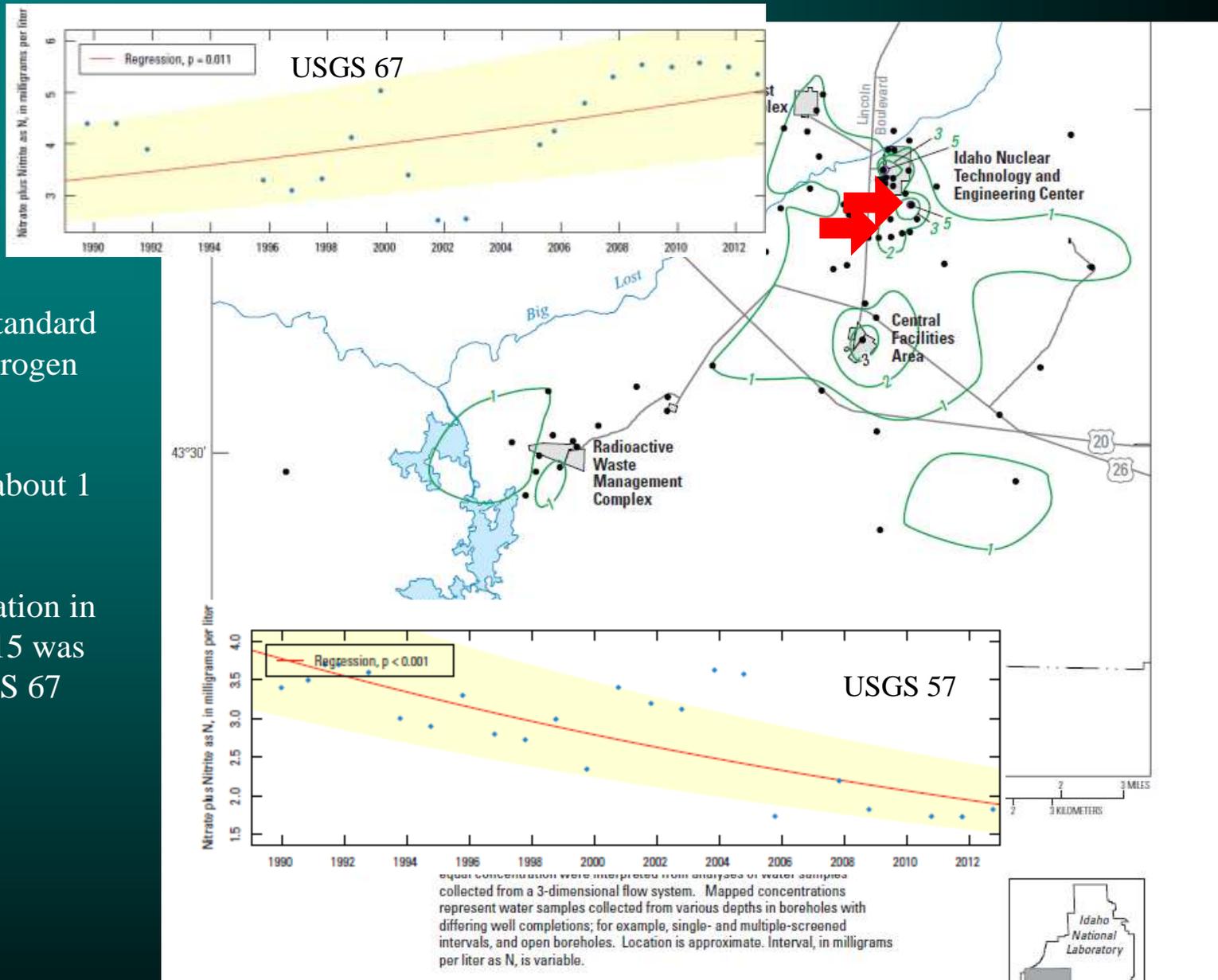


Nitrate

Drinking water standard is 10 mg/L as Nitrogen

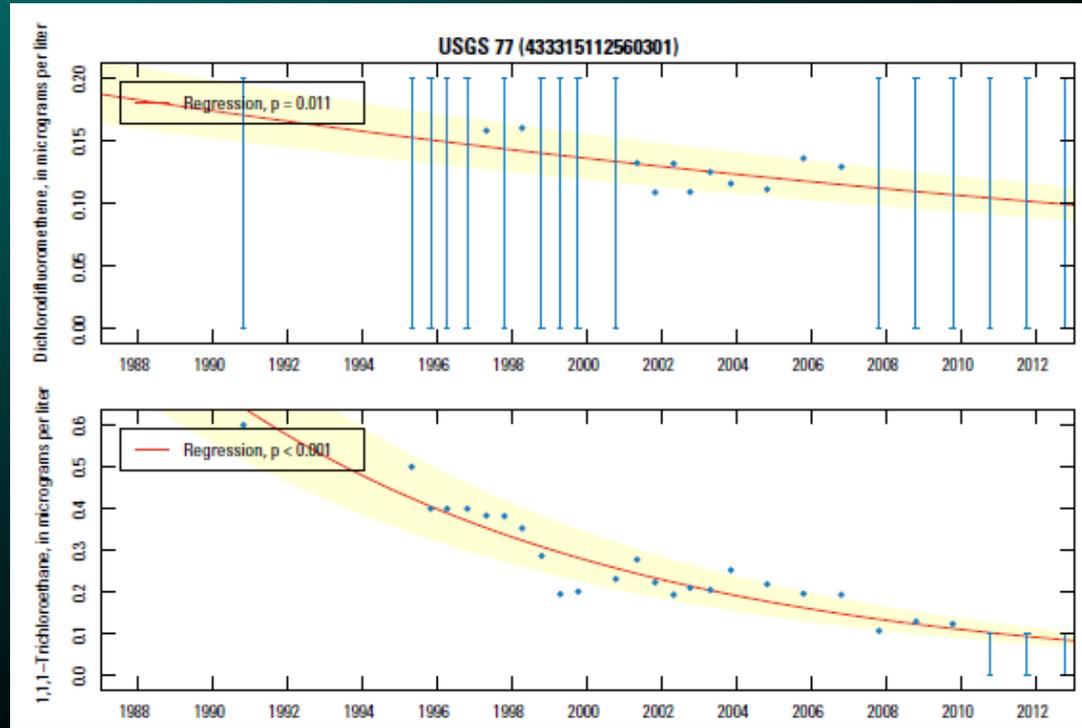
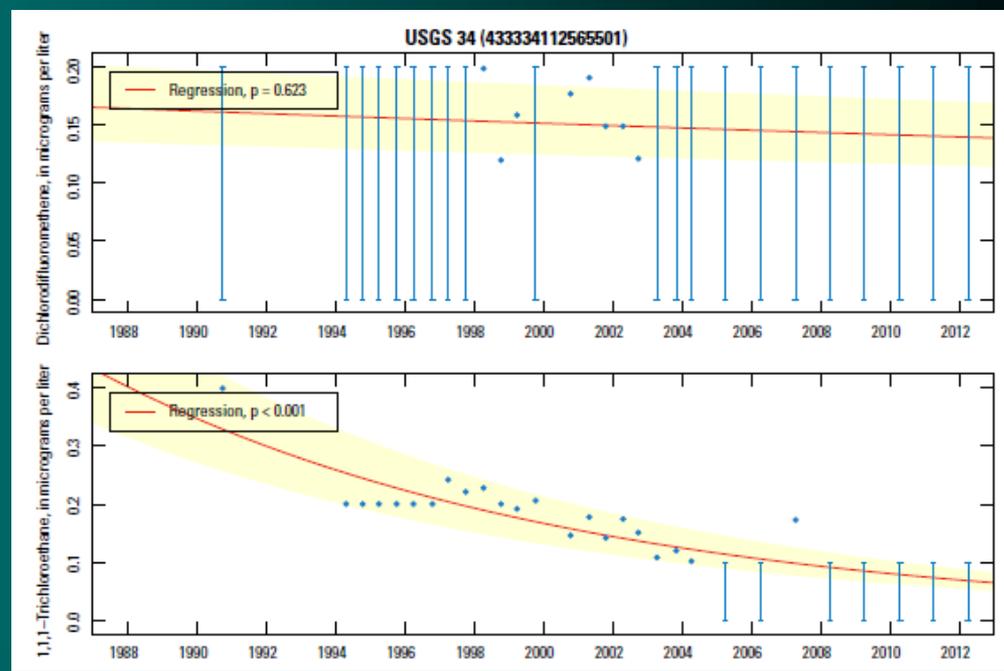
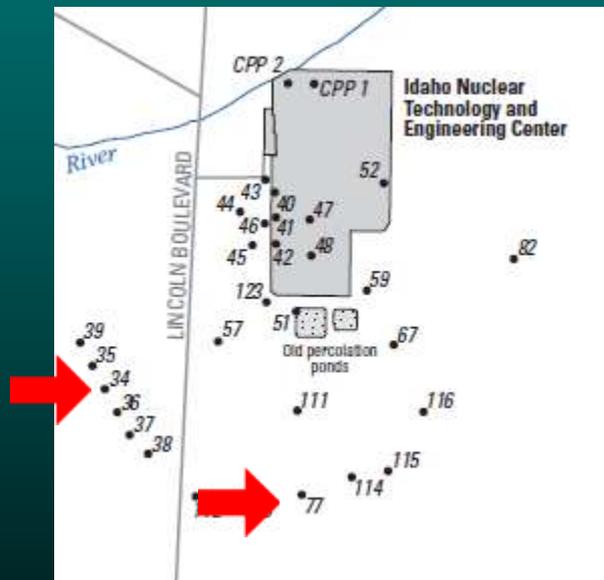
Background concentration is about 1 mg/L

Largest concentration in the aquifer in 2015 was 5.5 mg/L in USGS 67



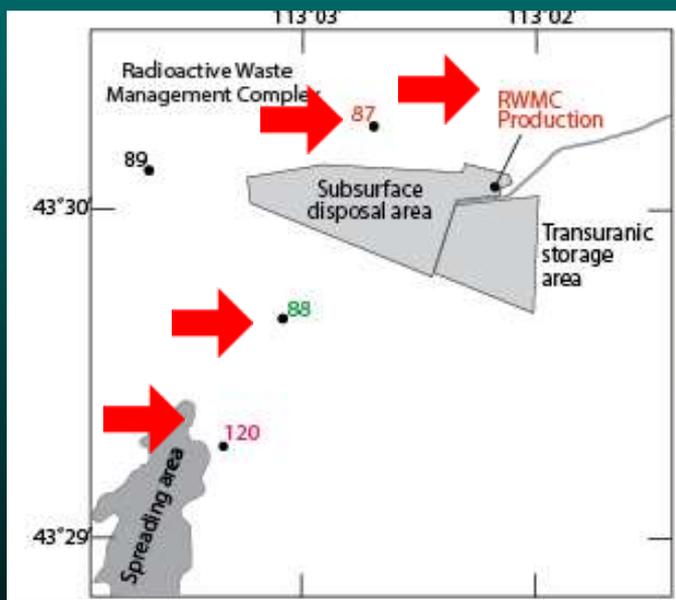
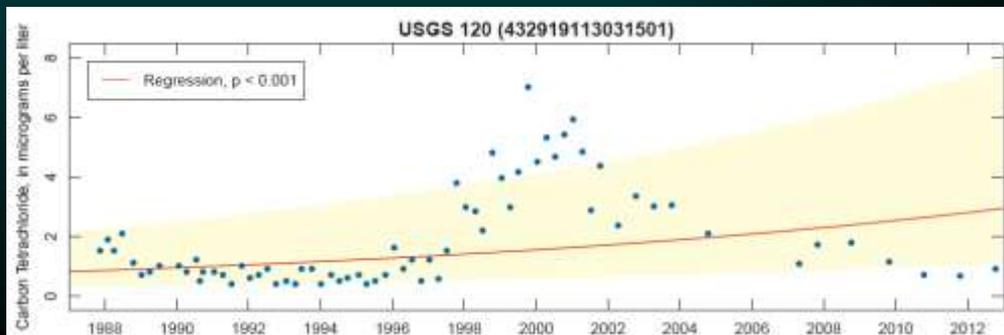
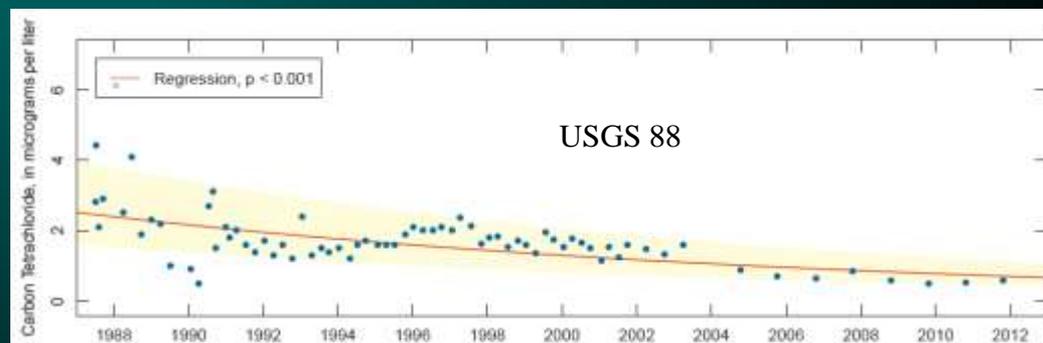
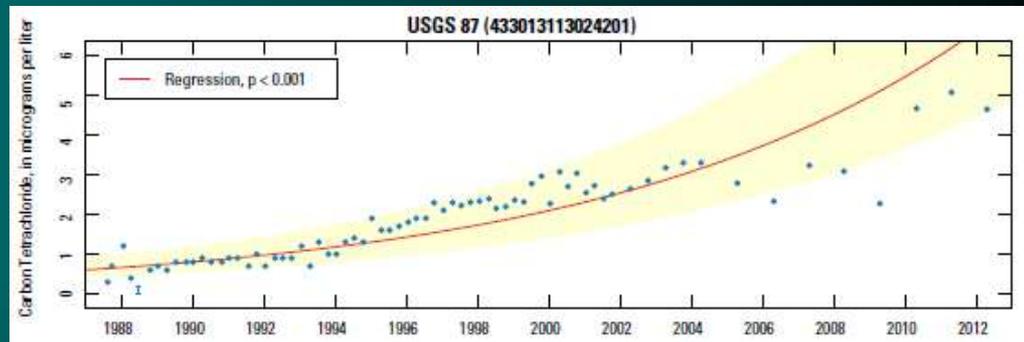
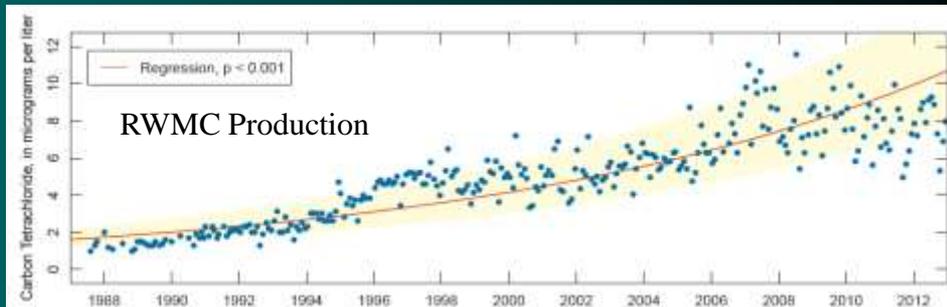
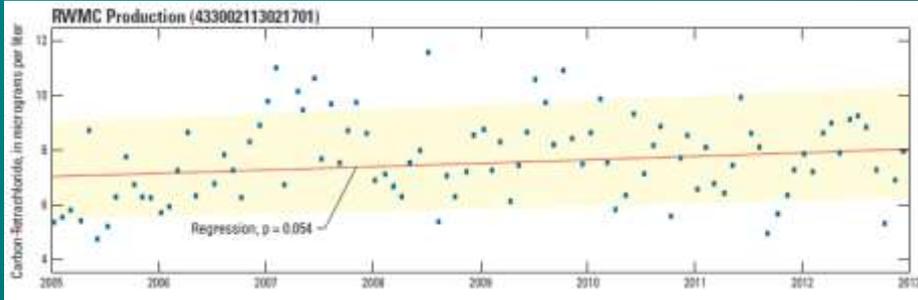
Volatile organics south of INTEC

Concentrations of TCA have decreased to below the reporting levels recently; always have been below the MCL of 200 micrograms/liter

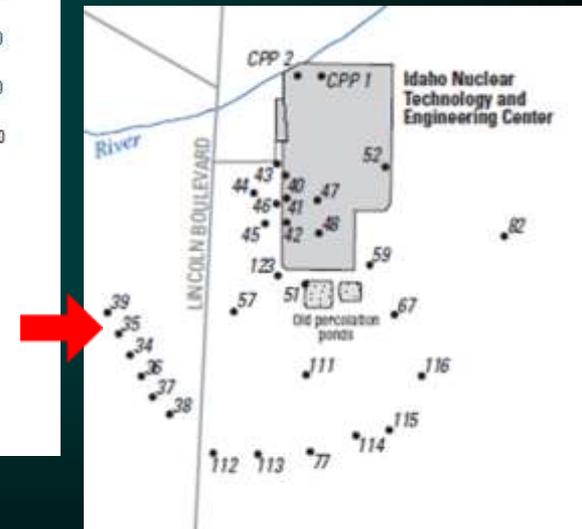
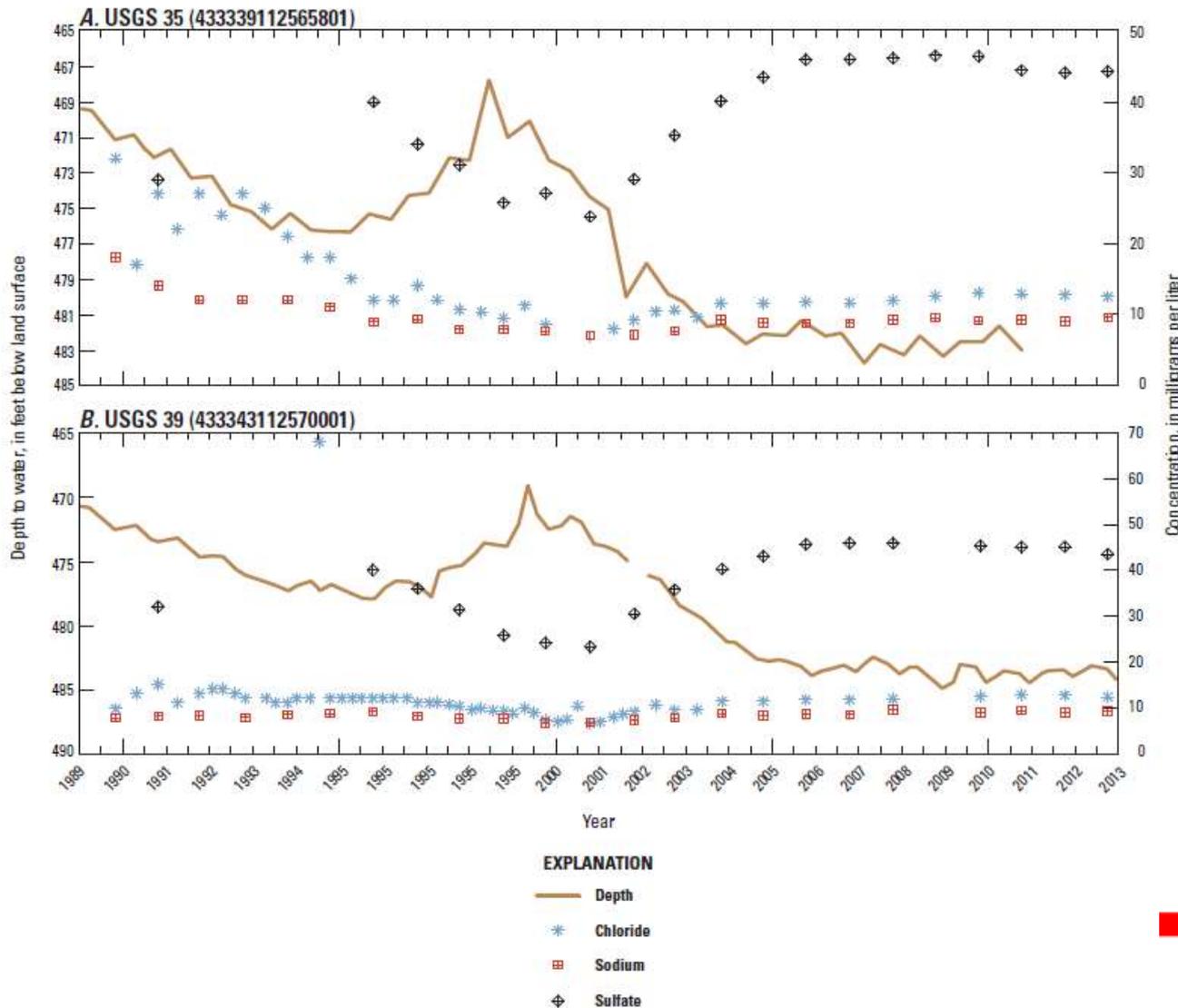


Carbon tetrachloride

Drinking water standard is 5 µg/L



Several wells have concentration changes that seem to be consistent with wet and dry periods of recharge.

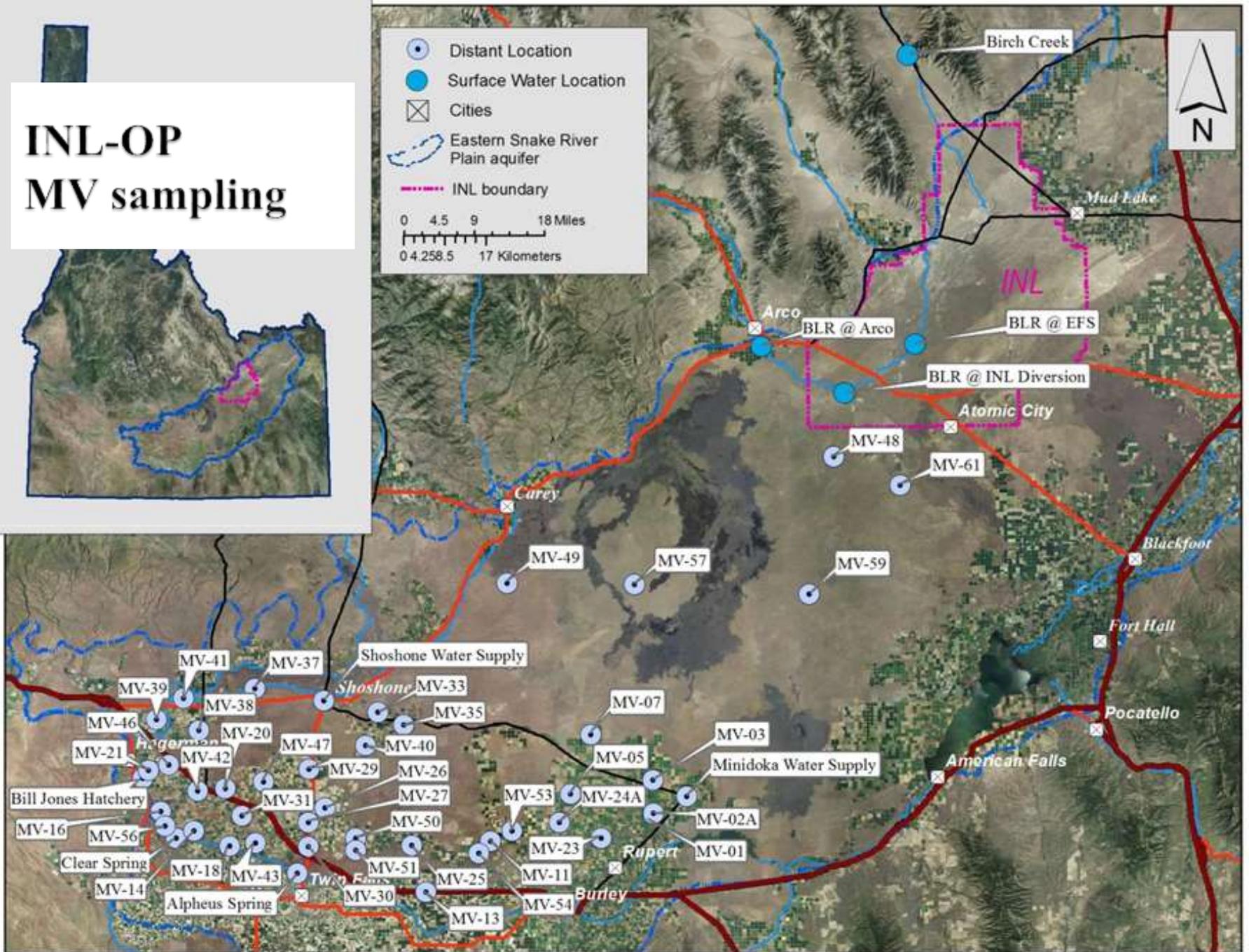


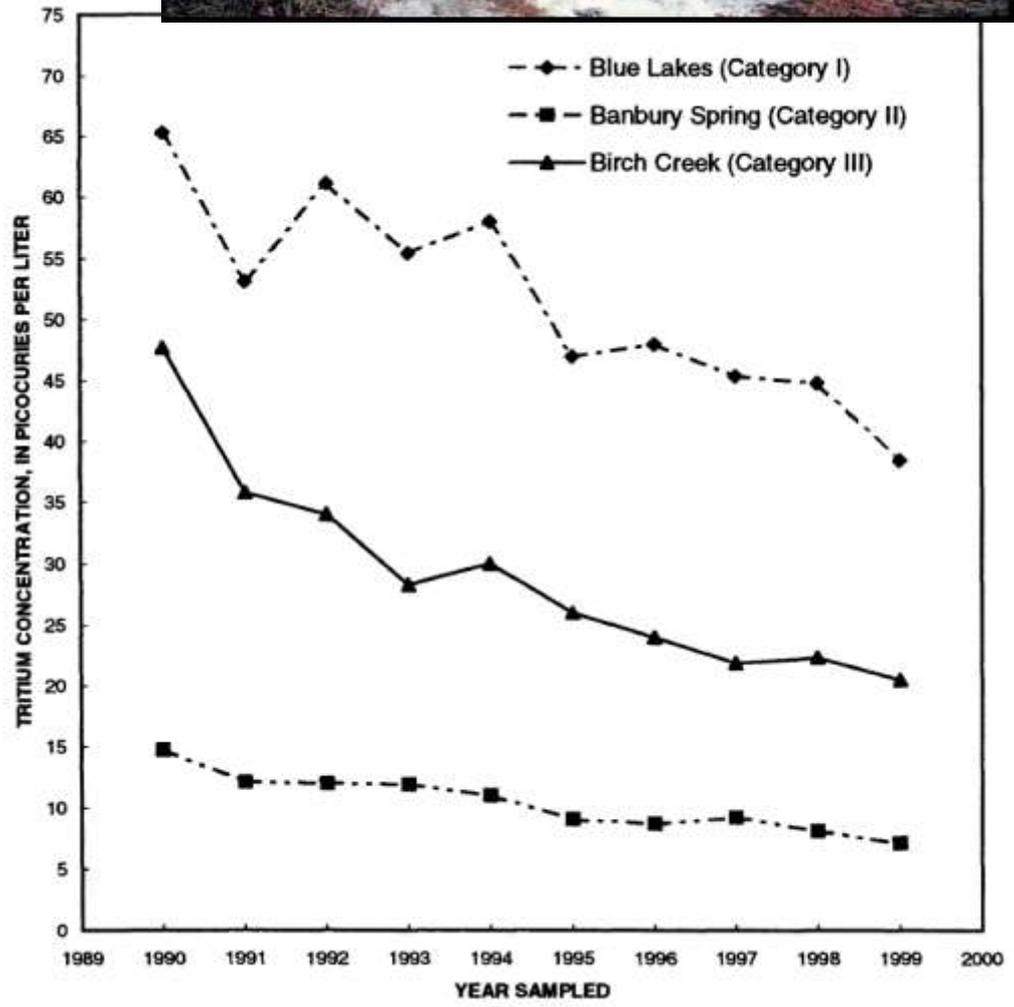
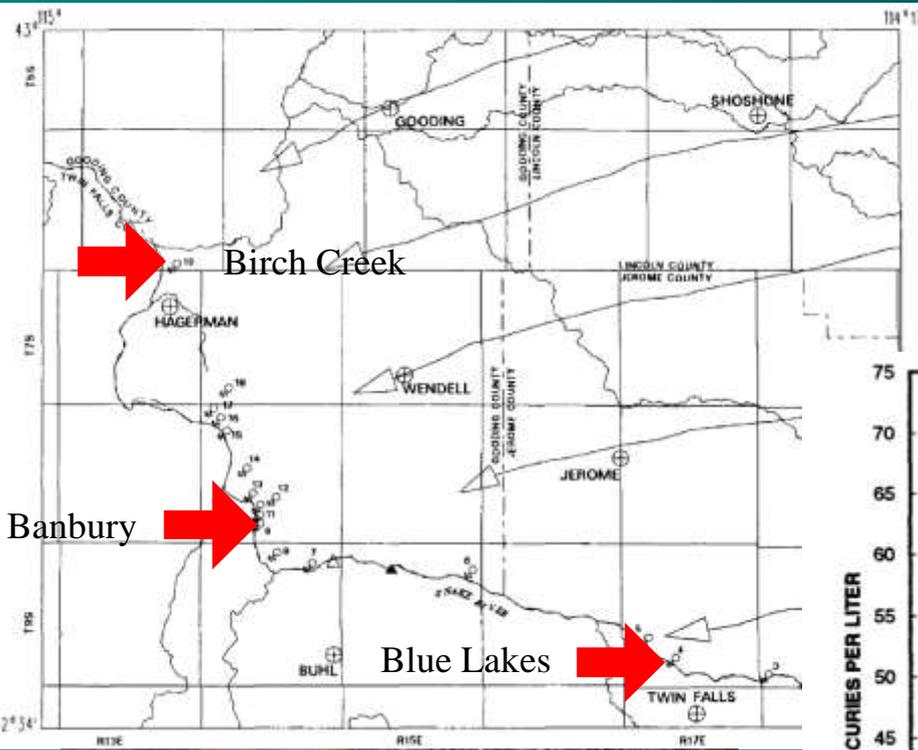
Water sampling history in wells downgradient from INL

- USGS/Idaho Department of Water Resources (IDWR) Magic Valley sampling program-1989-2003-Sampled 59 sites for a variety of radionuclides, cations, anions, nutrients, organics, and pesticides.
- 2004-present-Idaho Department of Environmental Quality-INL Oversight and IDWR-sample for a subset of the constituents from earlier program.
- 1989 through 2001-USGS sampled 19 springs for low-level tritium concentrations.

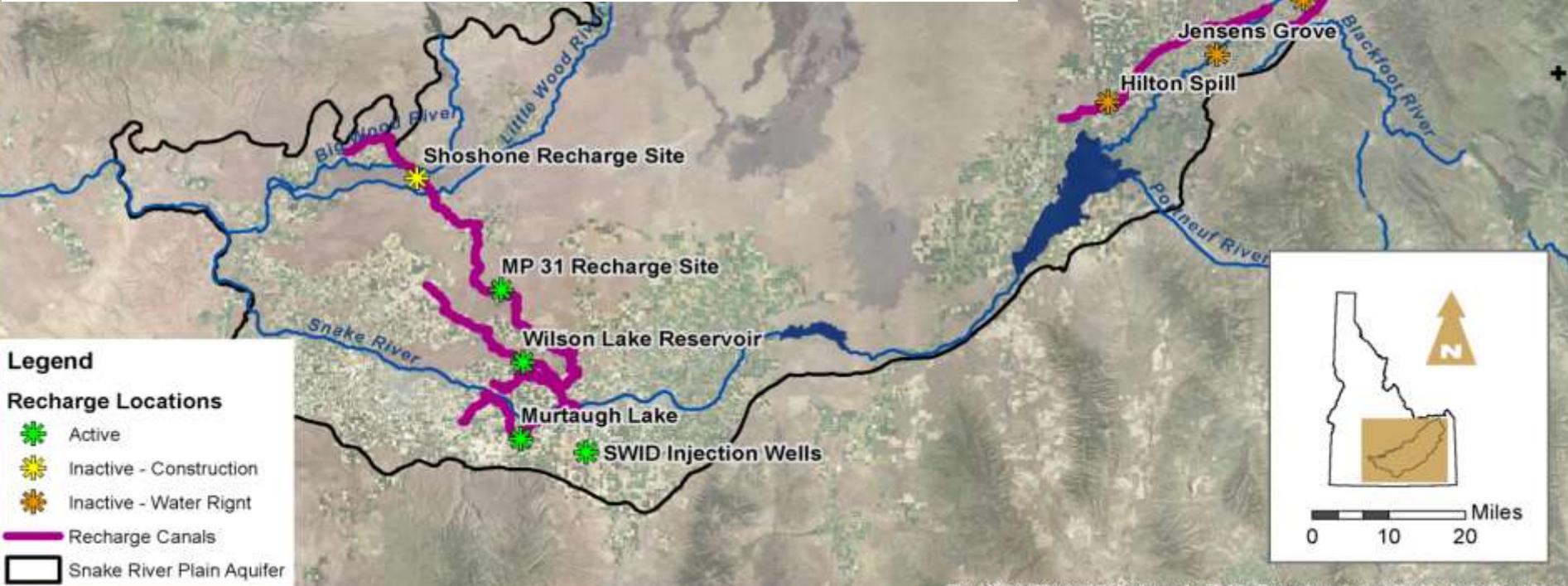
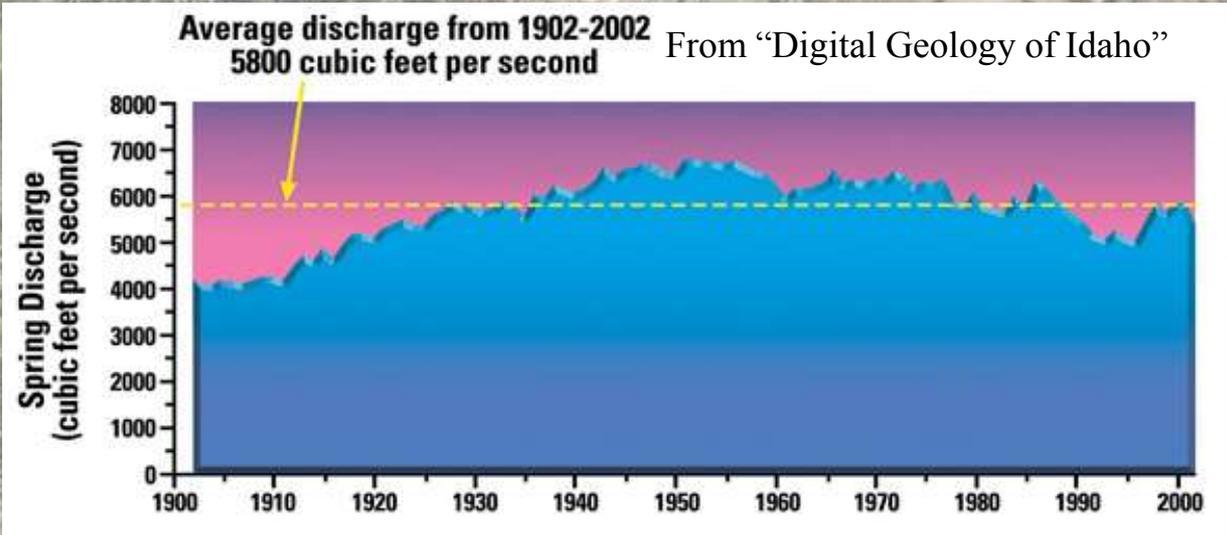


INL-OP MV sampling





IWRB - Canals & Locations used for Managed Recharge



Summary

- Water levels in the aquifer at the INL have been mostly decreasing over the past 15 years.
- Tritium and strontium-90 have been mostly decreasing in the aquifer due to discontinued disposal, dilution, dispersion and radioactive decay.
- Chloride and sodium are decreasing at disposal areas, but increasing in downgradient wells near CFA and RWMC
- Volatile organic compounds are decreasing at and downgradient of INTEC.
- Volatile organic compounds are increasing at 2 wells to the north of RWMC, one well to the south, decreasing in one well to the south



Summary

- Several wells have concentration changes that appear to correspond to wet and dry cycles of recharge.
- Tritium in thousands springs area showed decreasing trends for period sampled.
- Three different water types are present in the Magic Valley area



ANY QUESTIONS?

Augustine volcano
Alaska
Photo courtesy
of Cyrus Reed,
USGS 2006

