

Update of the Hydrologic Conditions of the eastern Snake River Plain aquifer at the Idaho National Laboratory

Roy Bartholomay

USGS INL Project Office

Email: rcbarth@usgs.gov

Website:

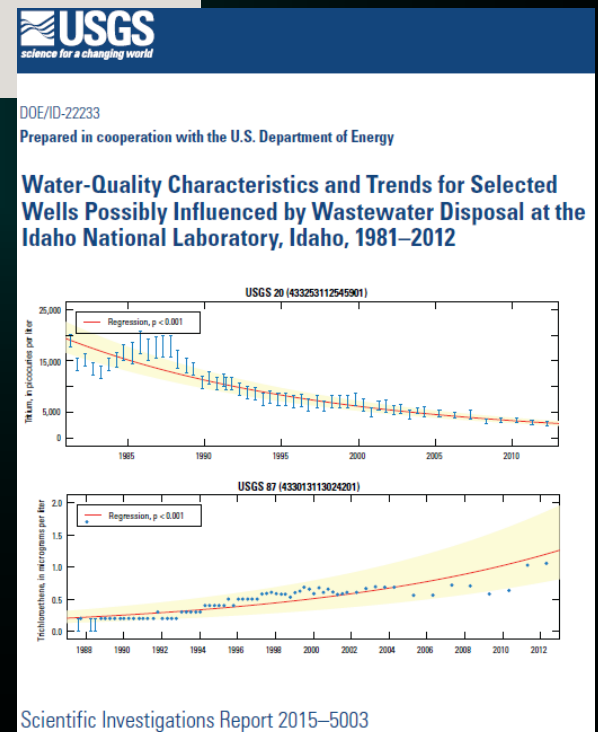
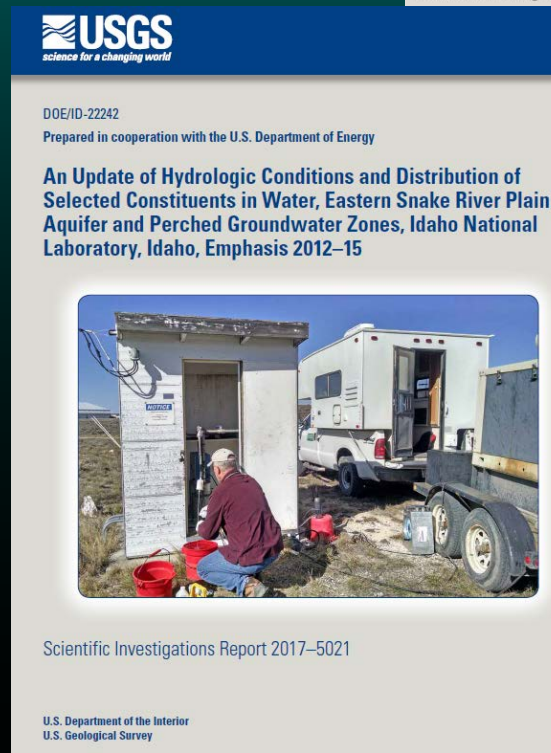
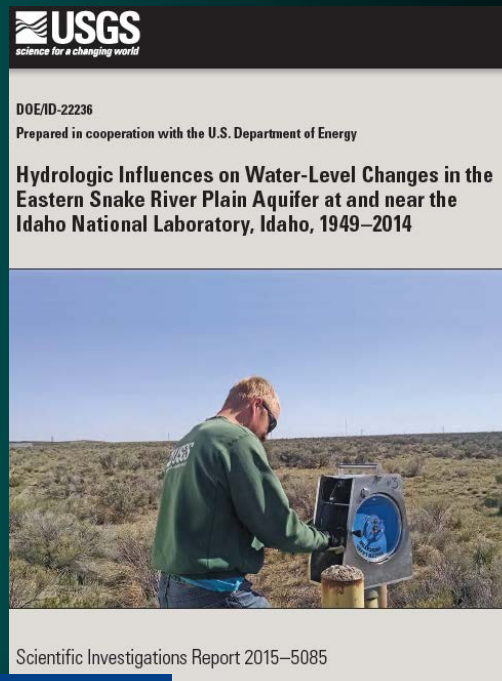
<https://id.water.usgs.gov/INL/>

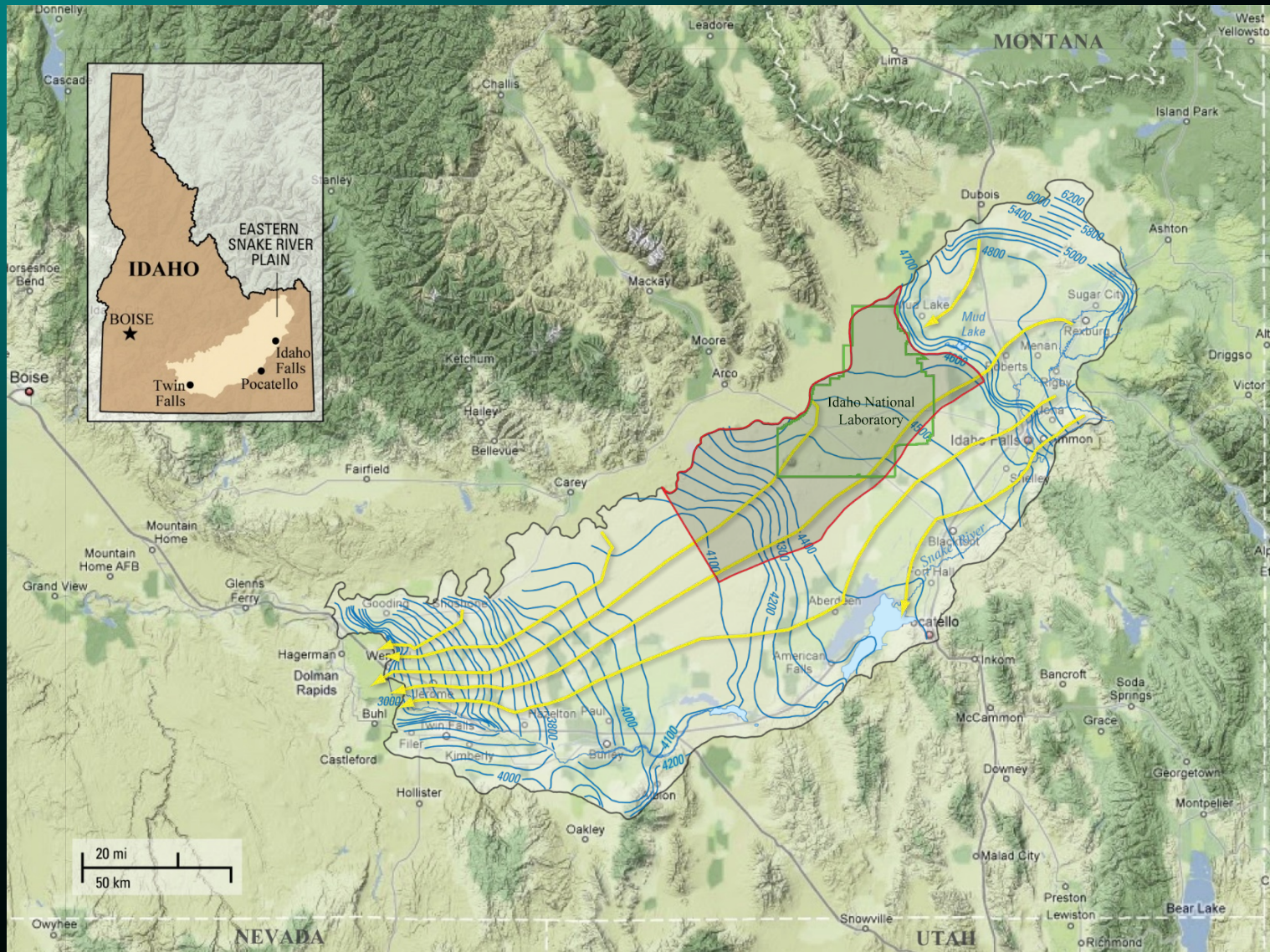
Phone: (208) 526-2157



Presentation Overview

- Summarize water level information at INL following several drought years and 2017 wet year.
- Summarize water quality of selected constituents and trends of perched water wells and aquifer wells sampled at INL.





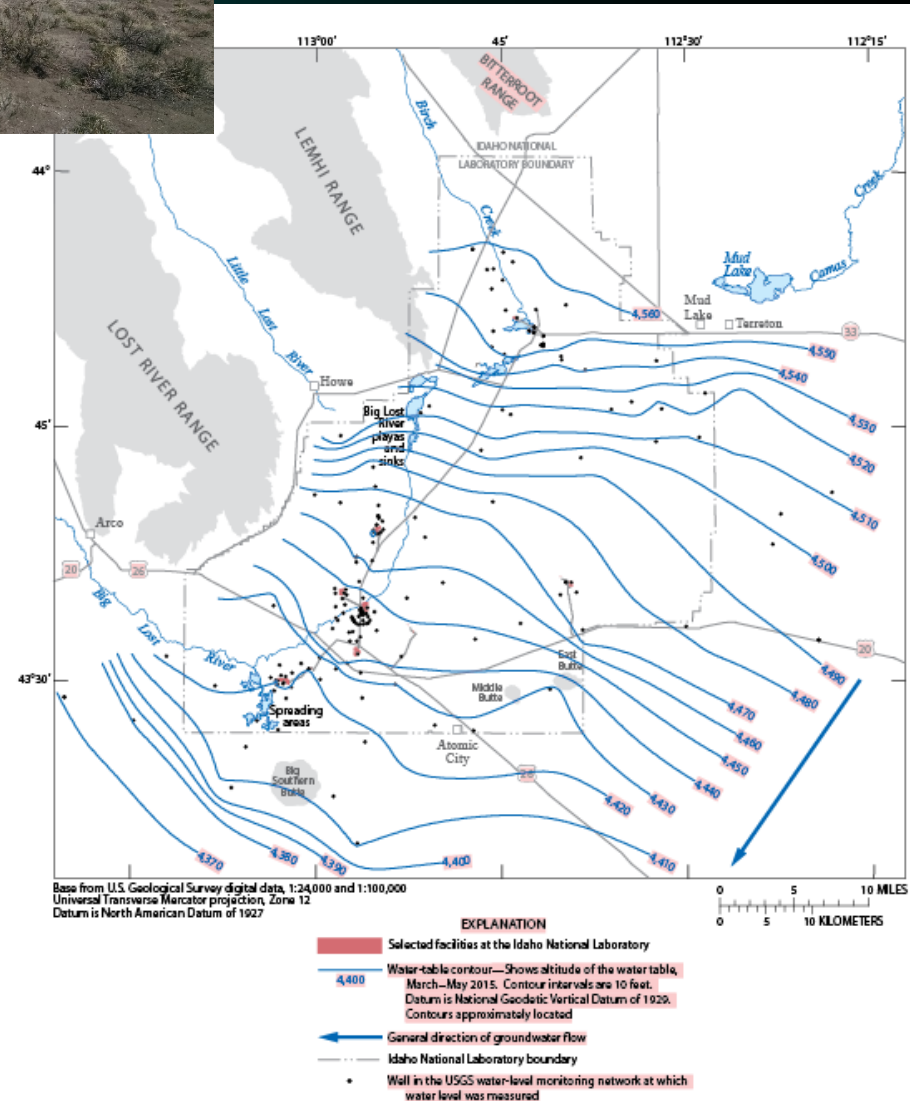
Water-level Monitoring



Water levels – monthly to annually at 213 wells
(8 continuous recorders-2 real-time)

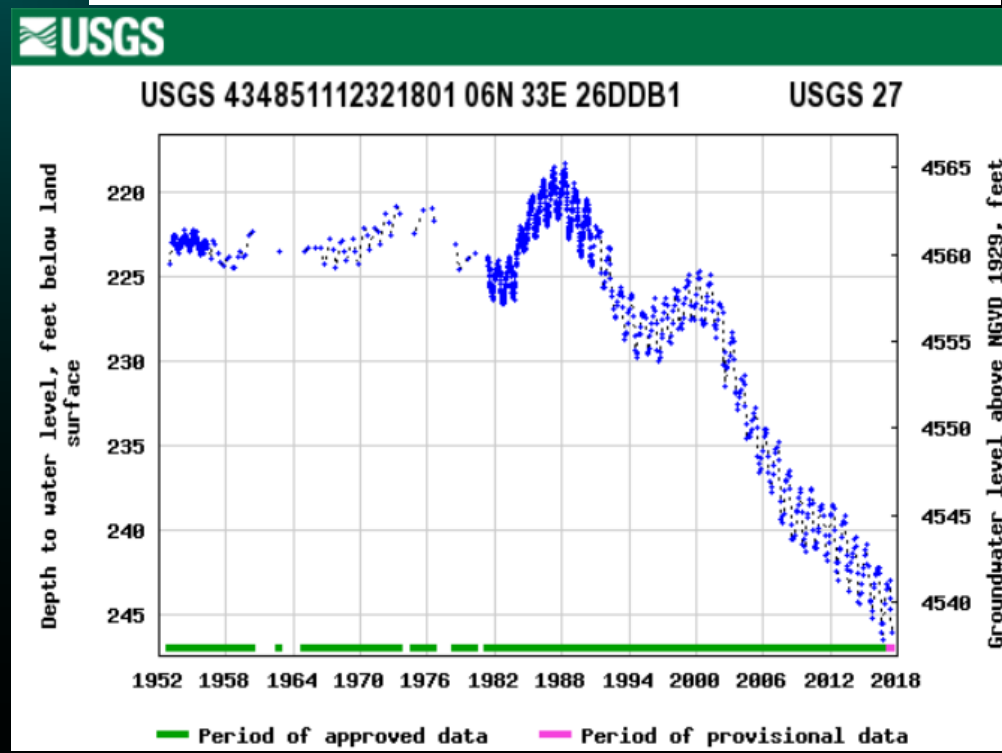
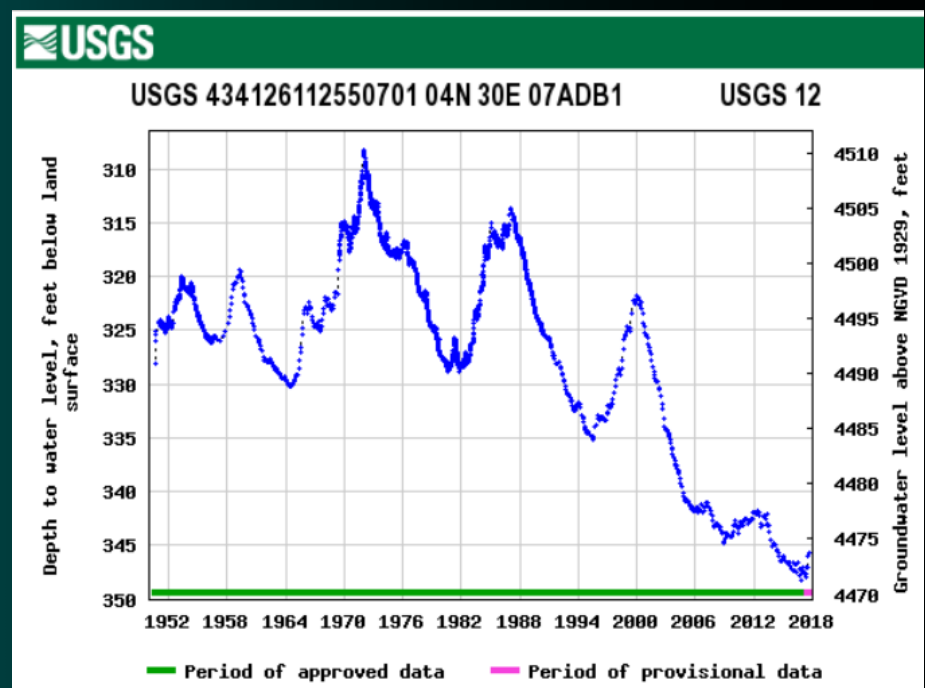
Measurements needed for water availability and model re-calibration

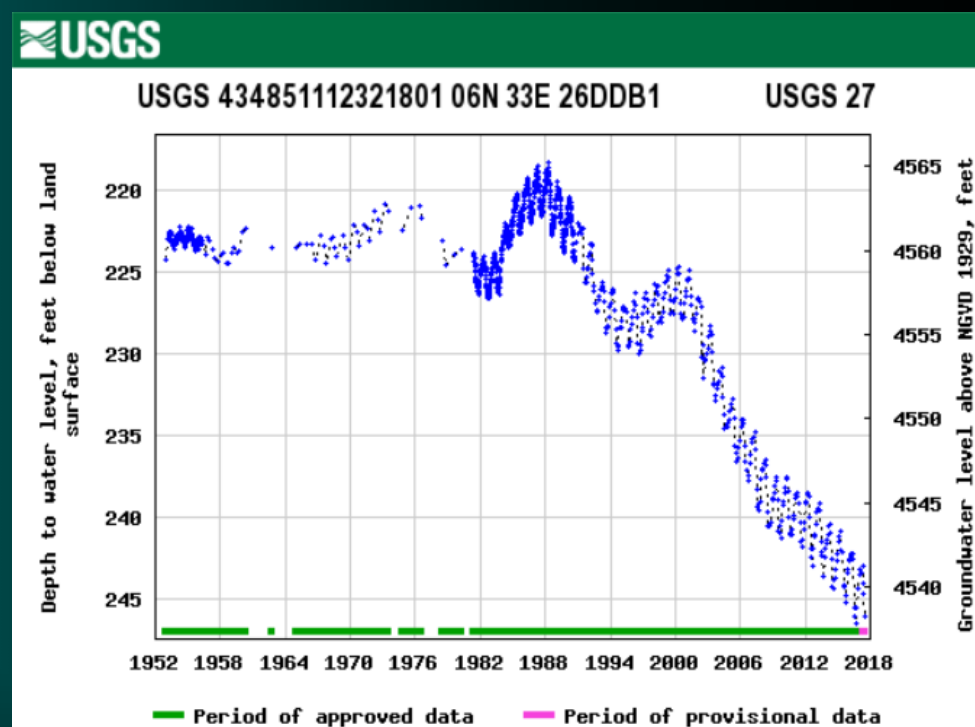
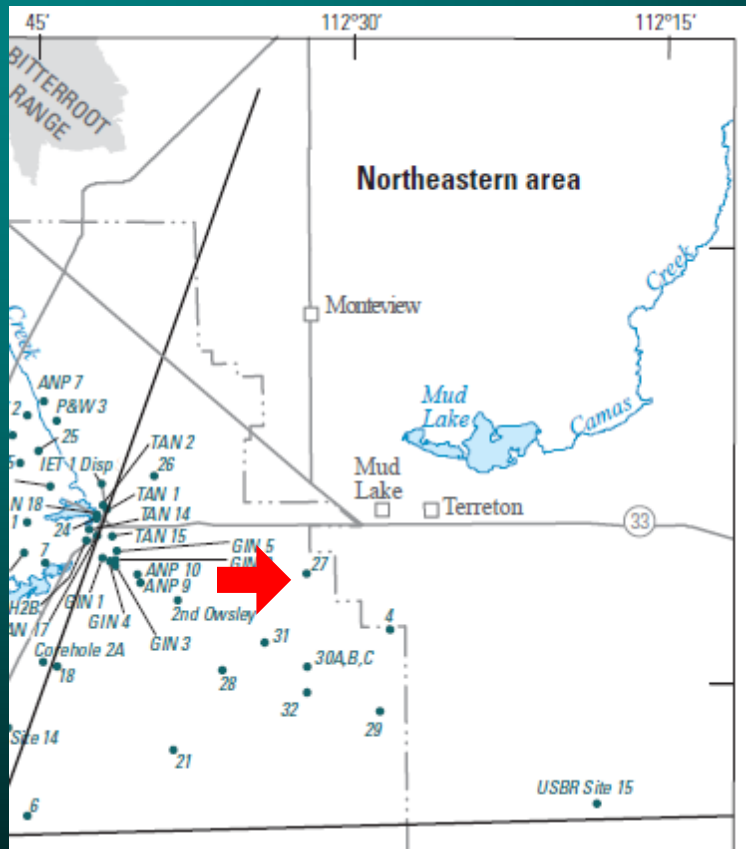
Water levels are cyclical, but are trending downwards. Some wells are going dry



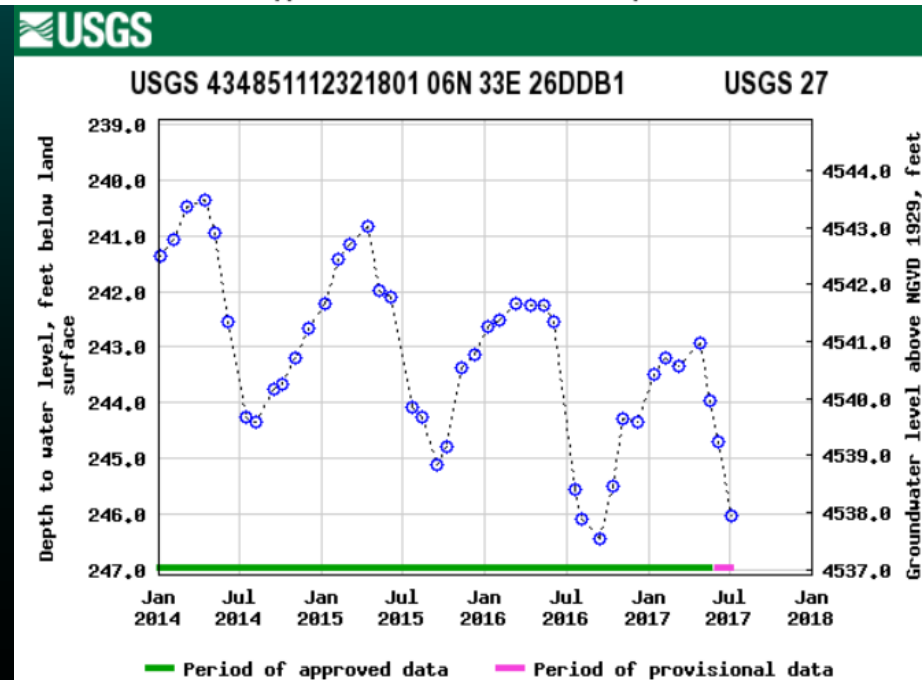
Cyclical nature of the Aquifer

- 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 periods
- 2016 had new record low levels in most of our wells

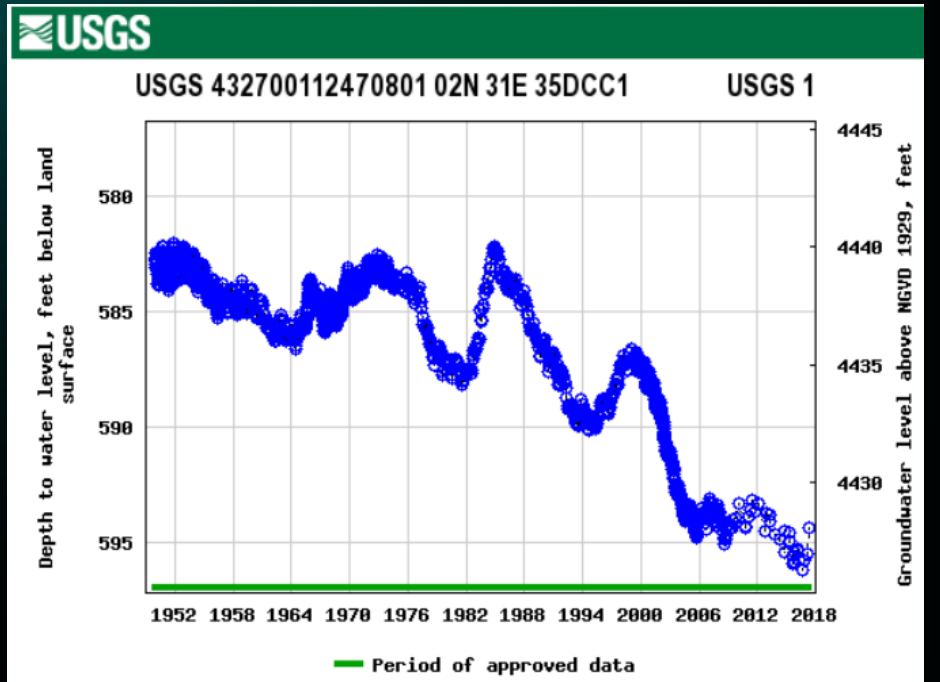
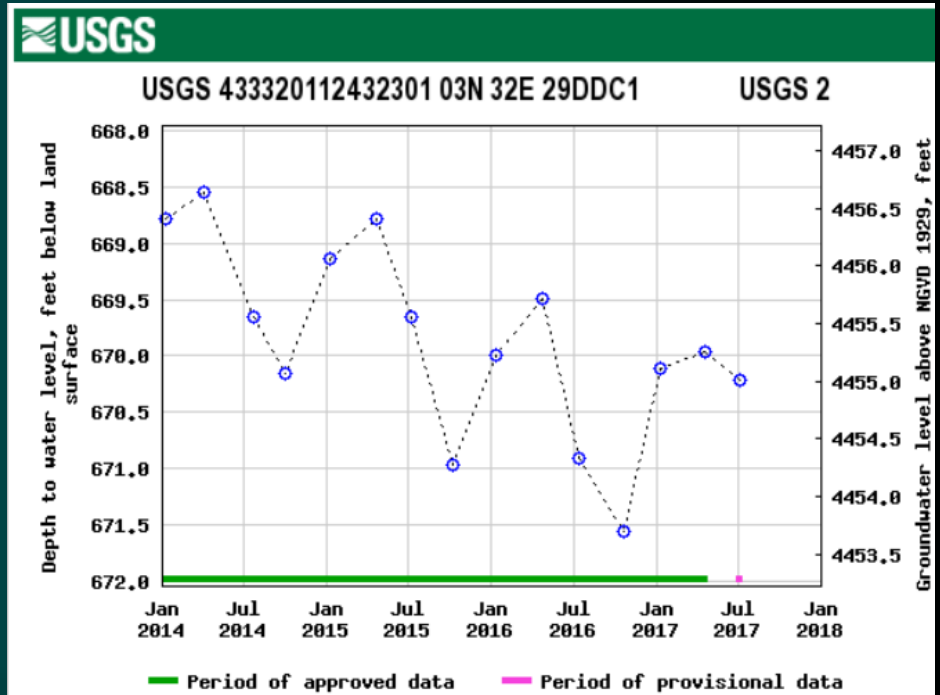
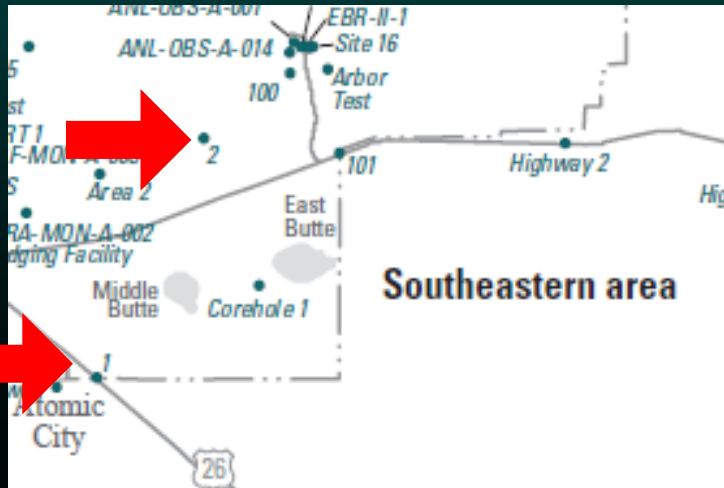


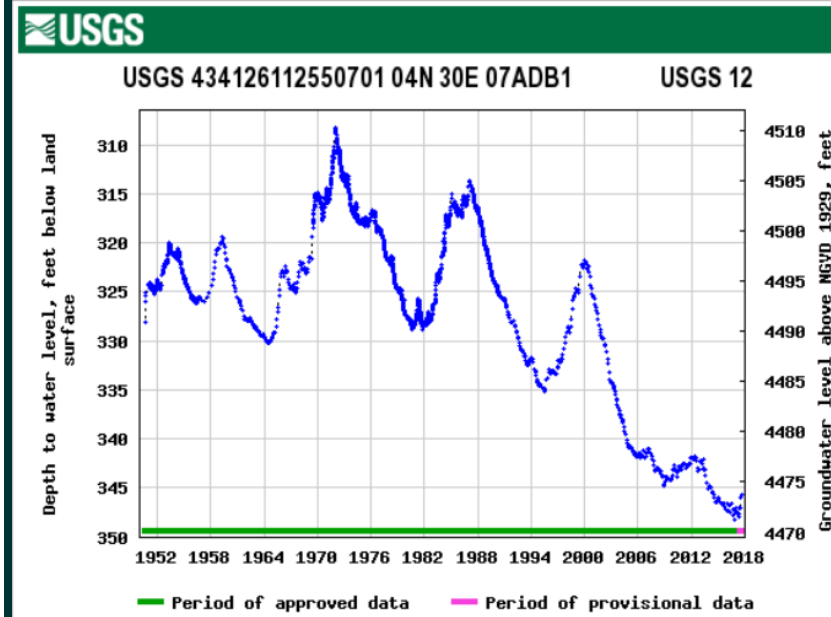
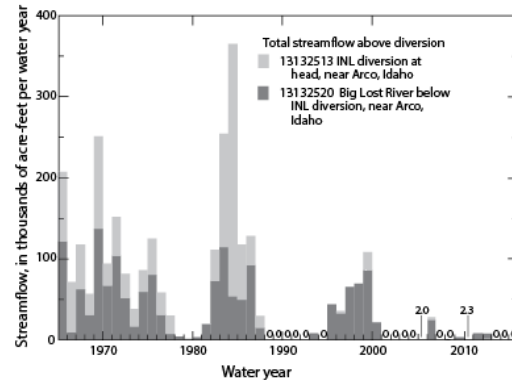
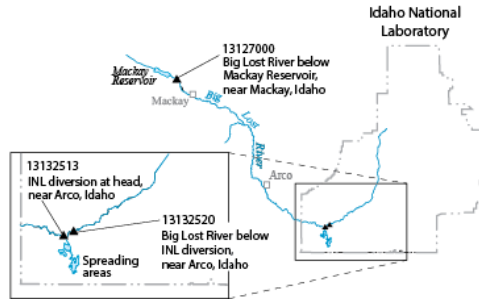
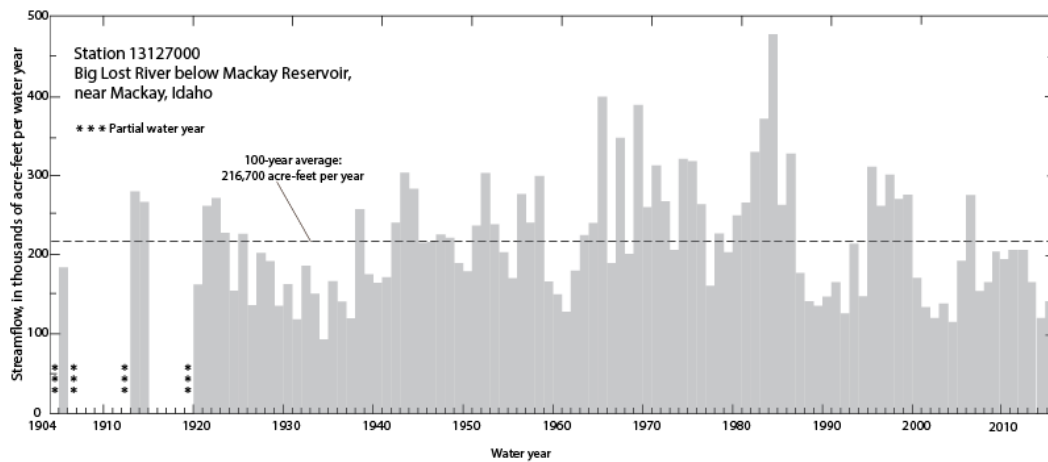


Northeast-we see influence of groundwater irrigation and larger seasonal variation (4 to 5 ft change)



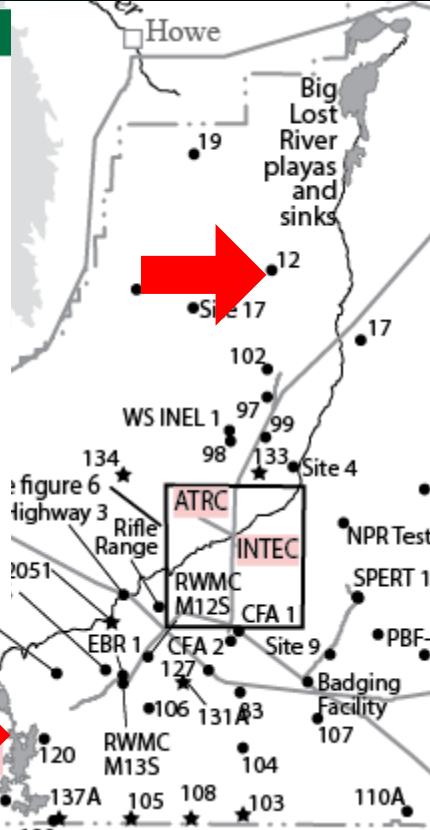
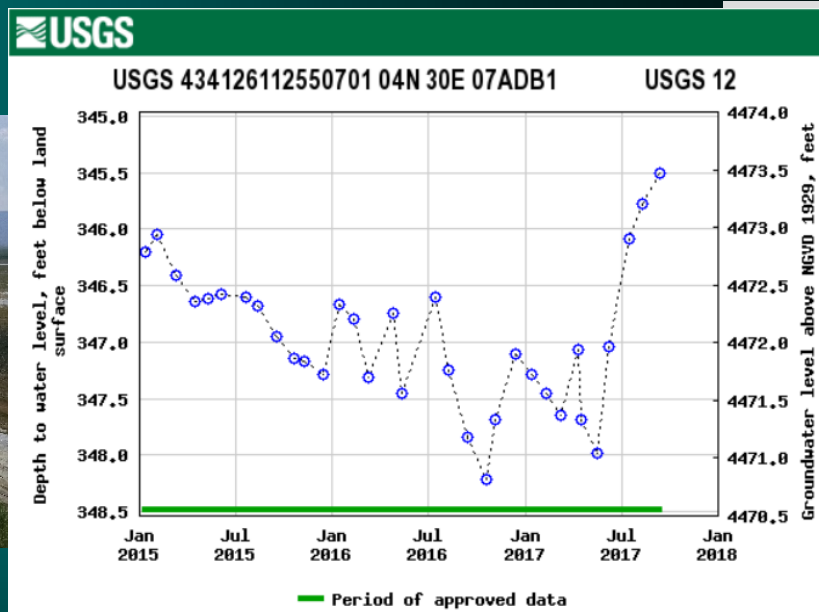
Southeast-see less influence of irrigation or flow in the Big Lost, less seasonal variability (1 to 2 ft change) and less overall decline



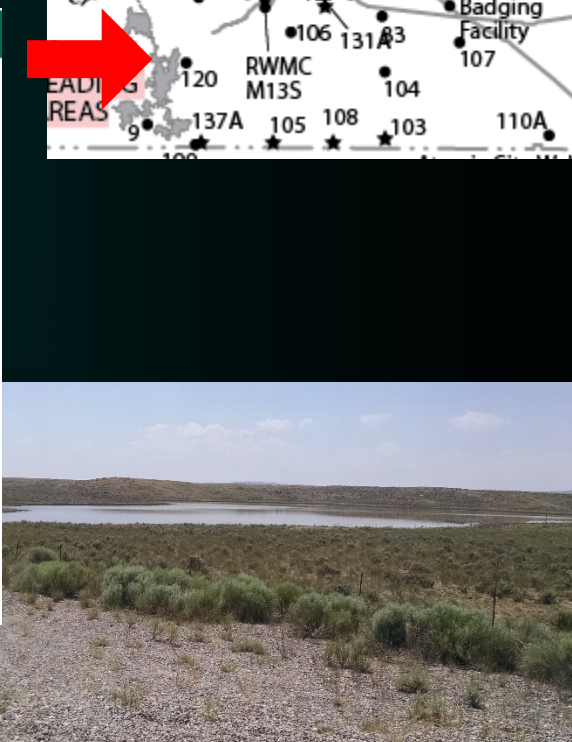
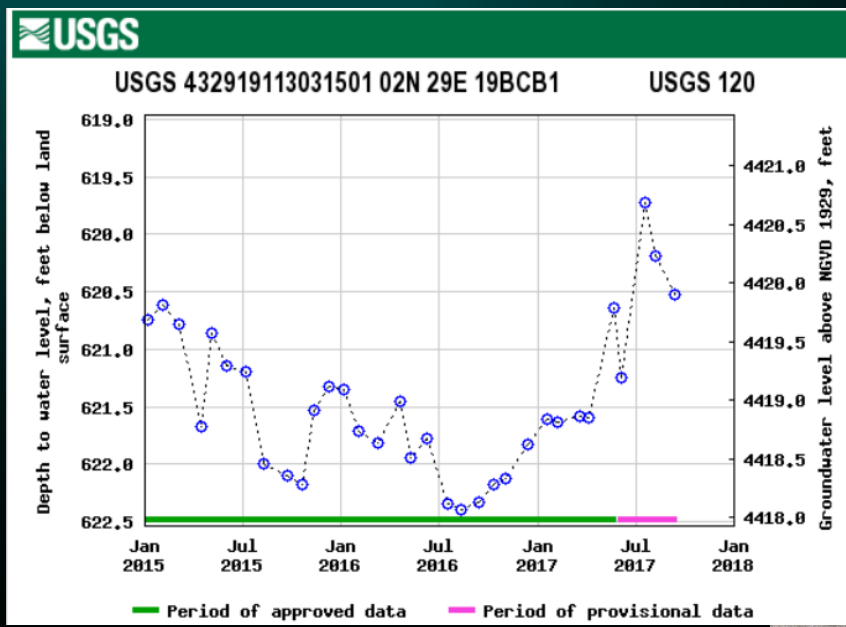


Western part of INL
more affected by surface
water recharge from Big
Lost River





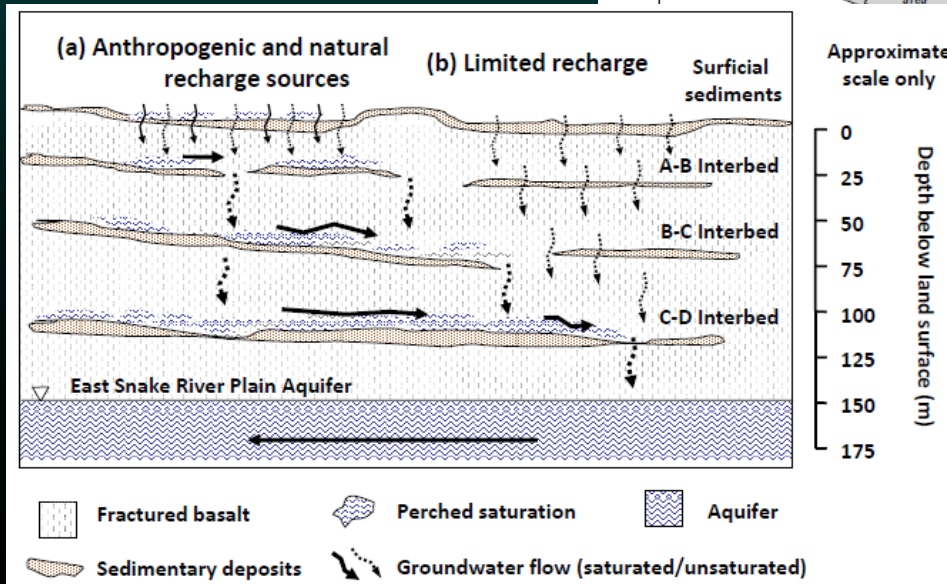
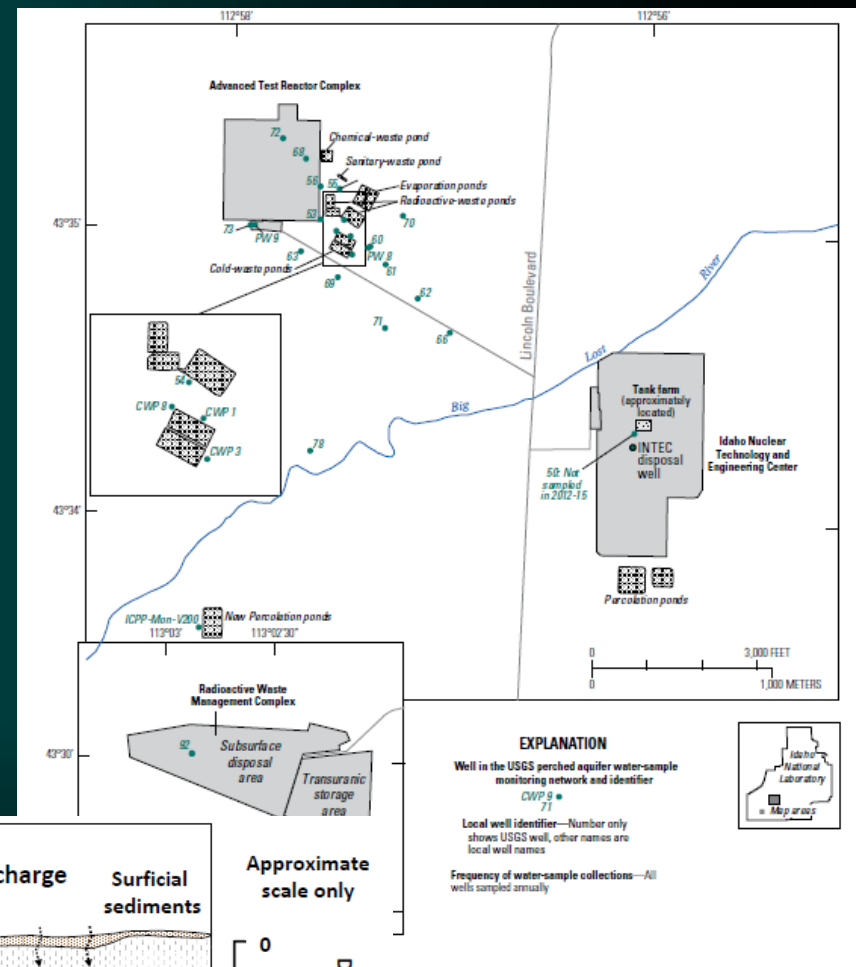
2017 we saw
two to three ft
rises in wells
in the western
INL

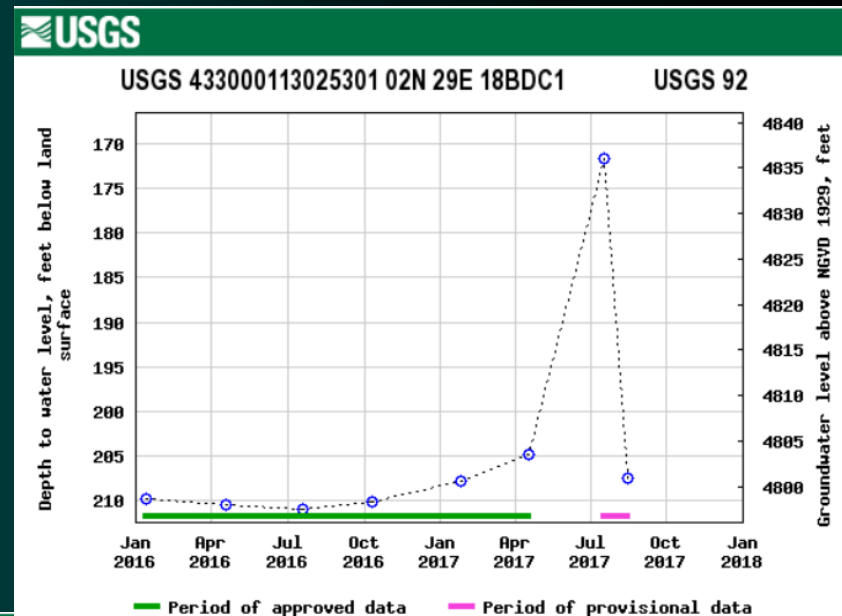
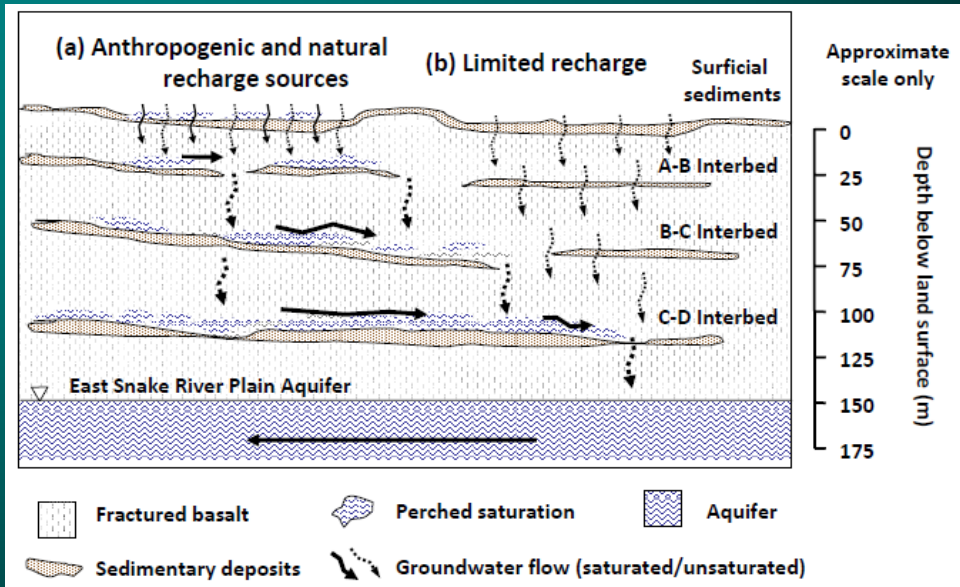


Perched Groundwater Site Locations

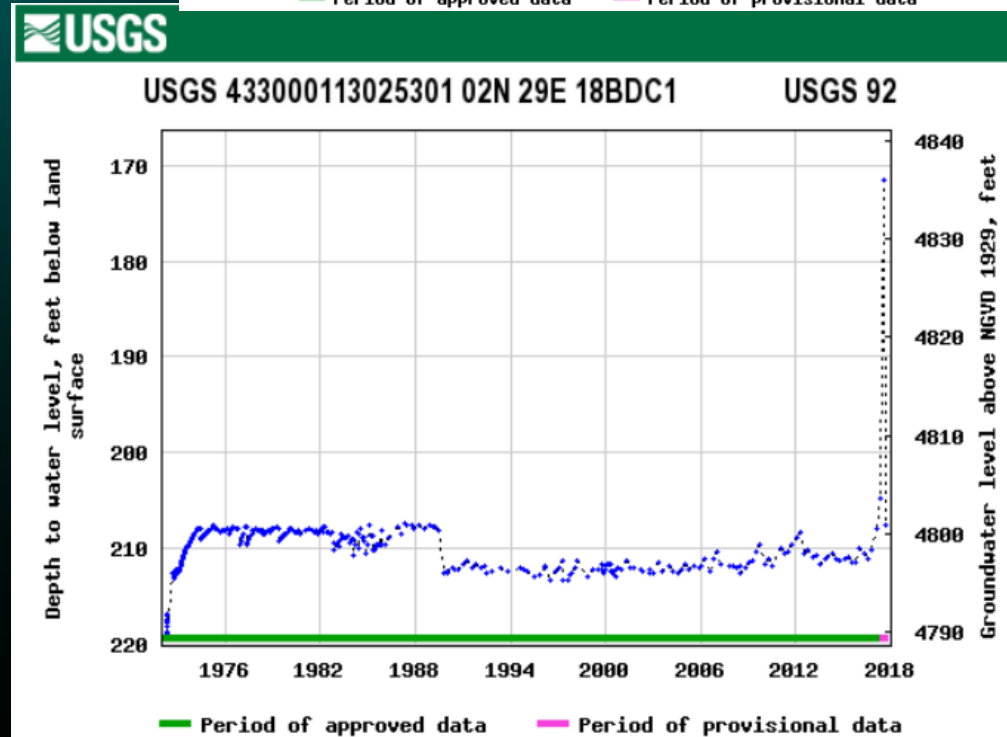
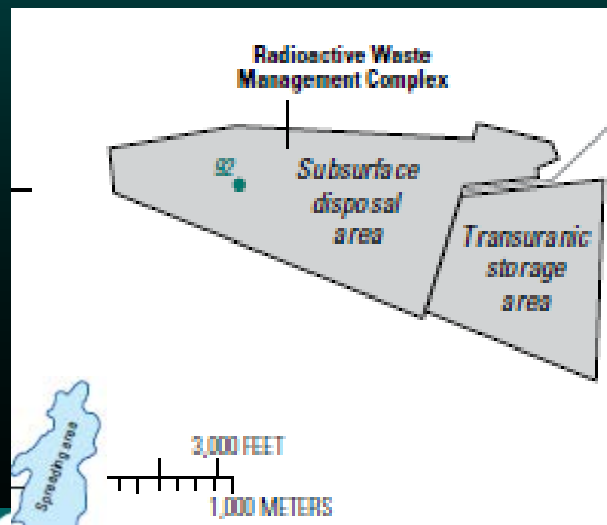
Perched groundwater forms above the eastern Snake River Plain aquifer from infiltrating water ponding on sedimentary interbeds

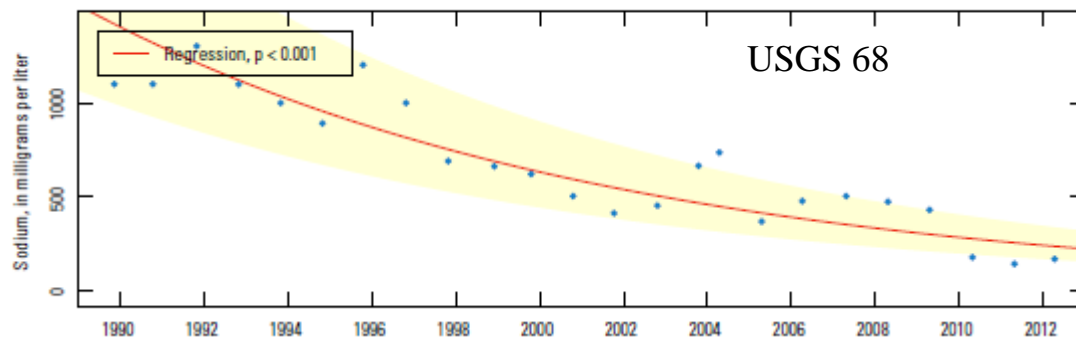
We sample 23 perched water wells for a variety of constituents including: tritium, strontium-90, cesium-137, sodium, chloride, sulfate, chromium, and purgeable organic compounds



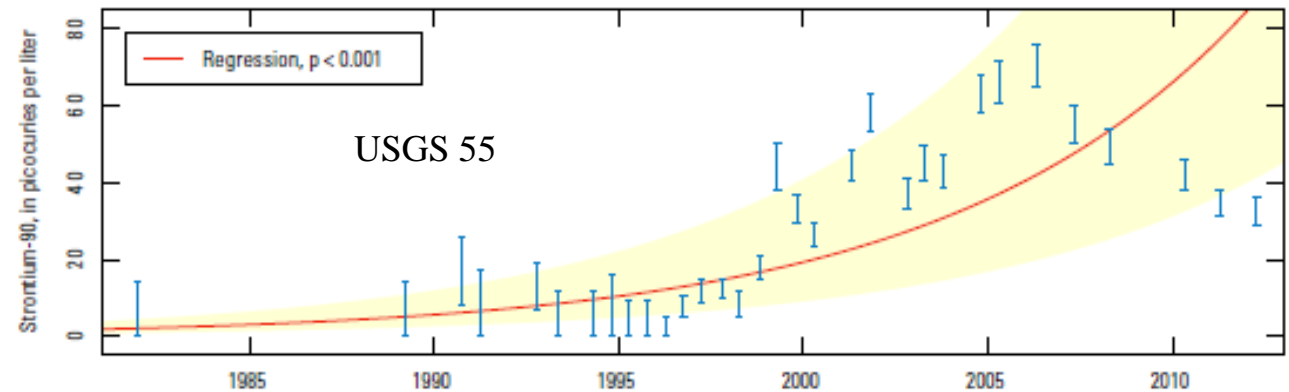
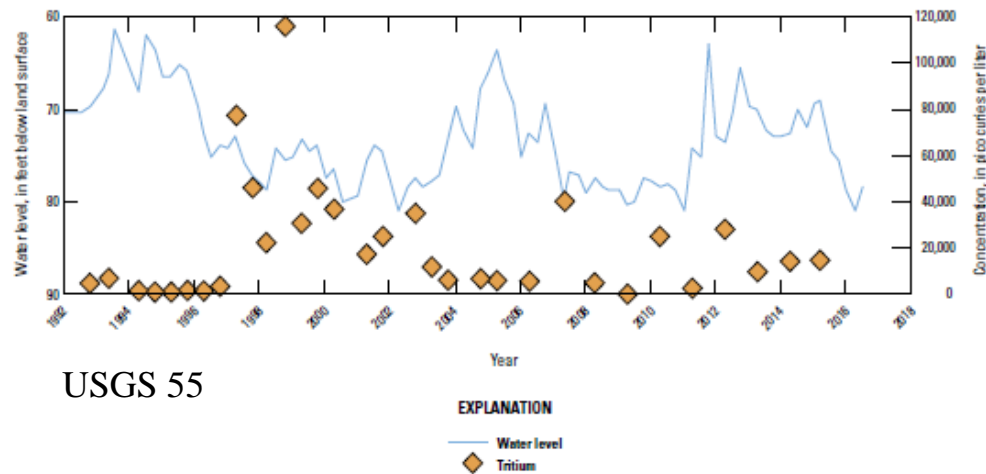
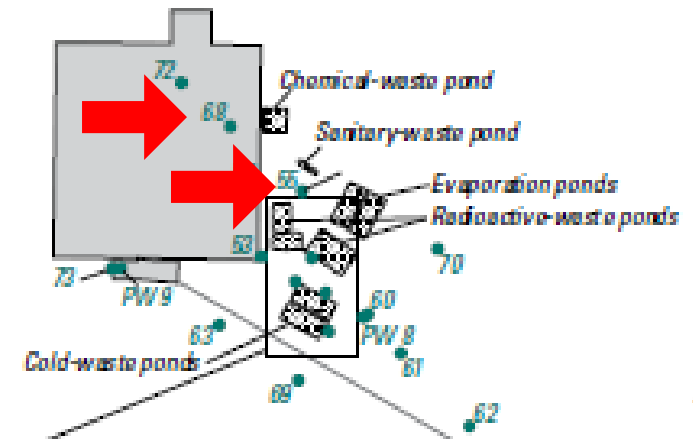


We saw about a 6 ft rise in perched water at RWMC in 2017 along with cascading water in July





Advanced Test Reactor Complex



Water Sample Monitoring at INL

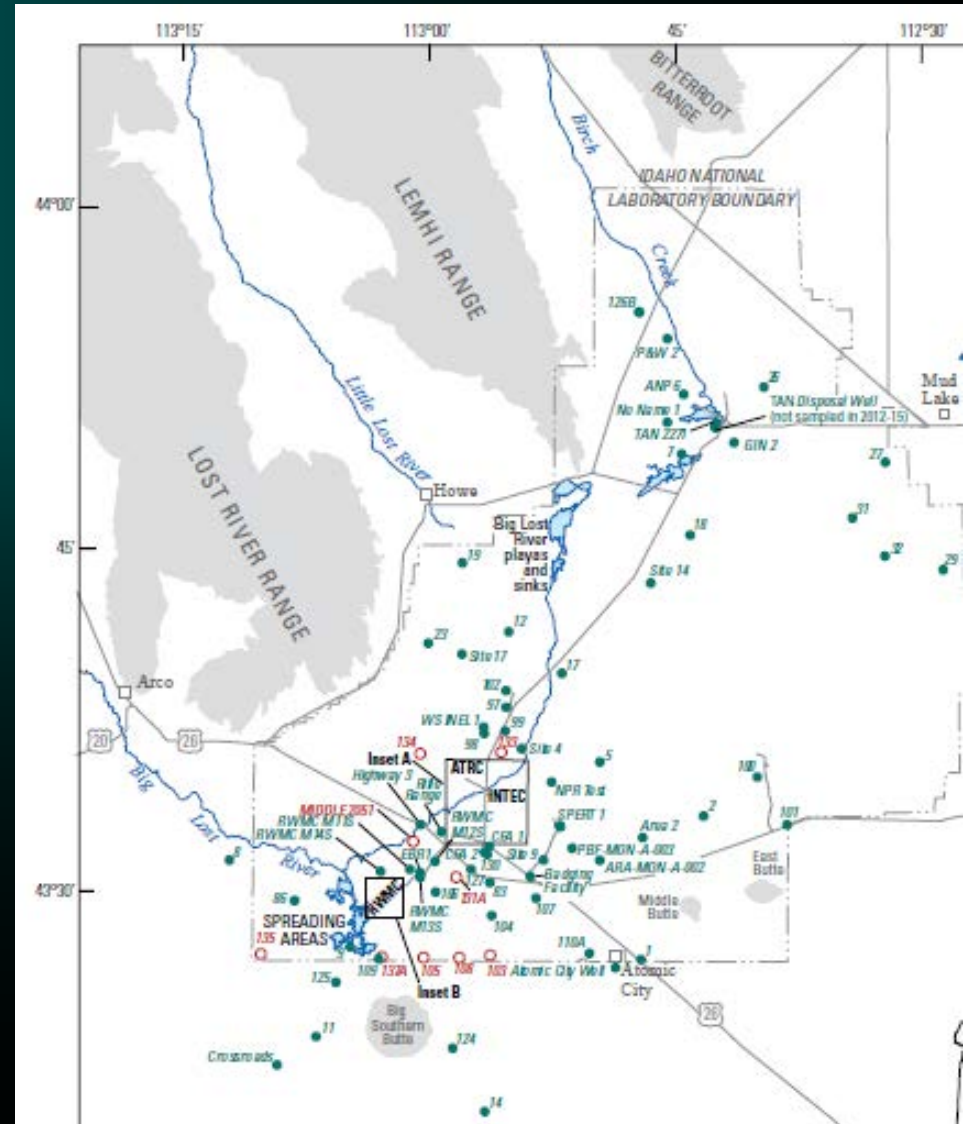


Water quality – annually at 152 sites-includes 7 surface water sites

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

Sample all sites for tritium and chloride

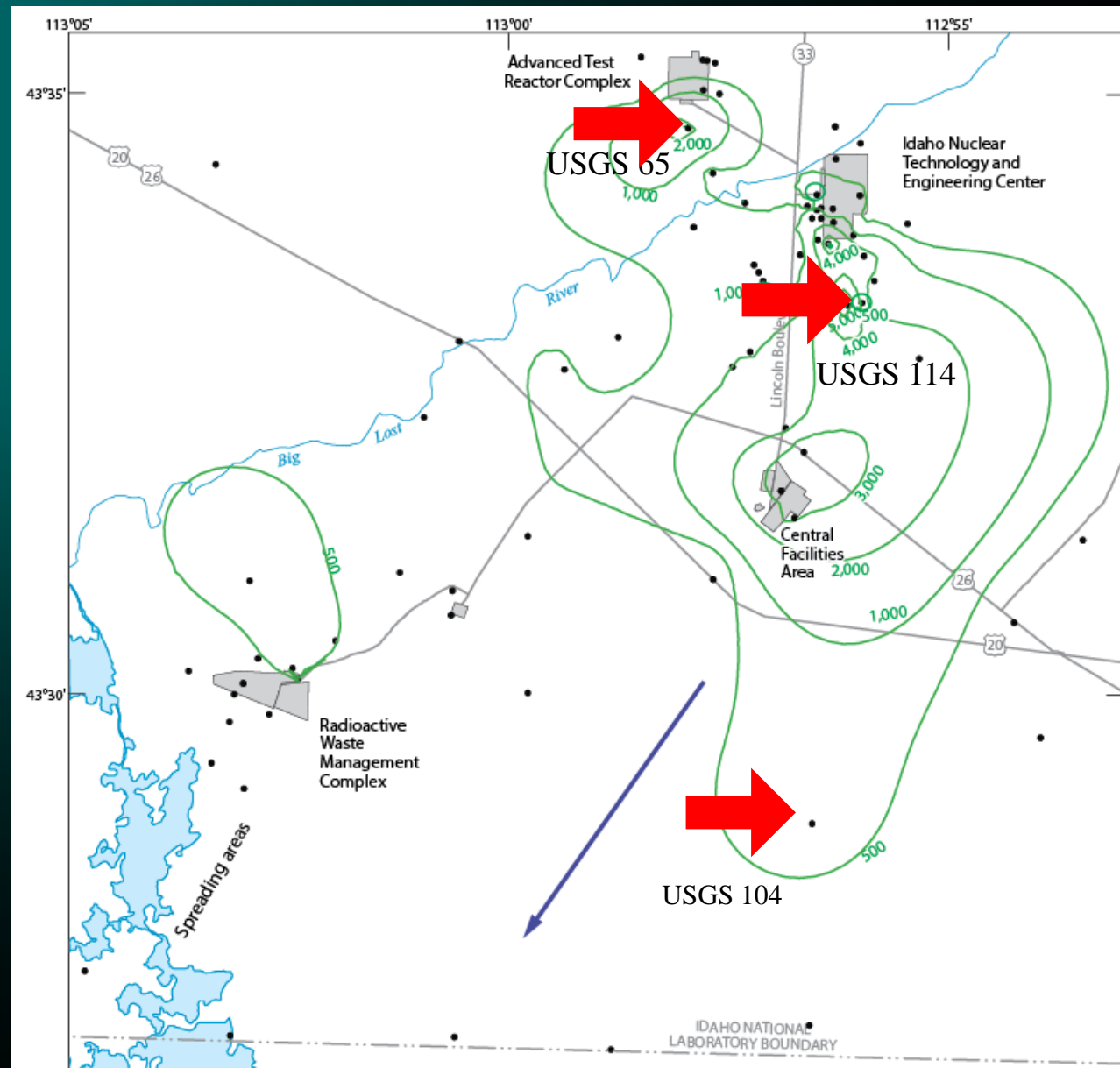
Selected sites for sulfate, sodium, fluoride, chromium, Sr-90, Pu, Am, alpha, beta, gamma, VOC's, suite of trace elements



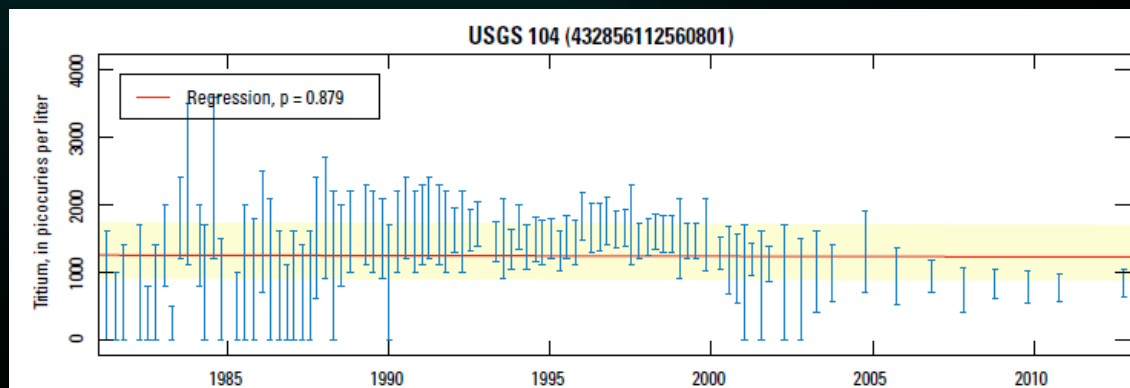
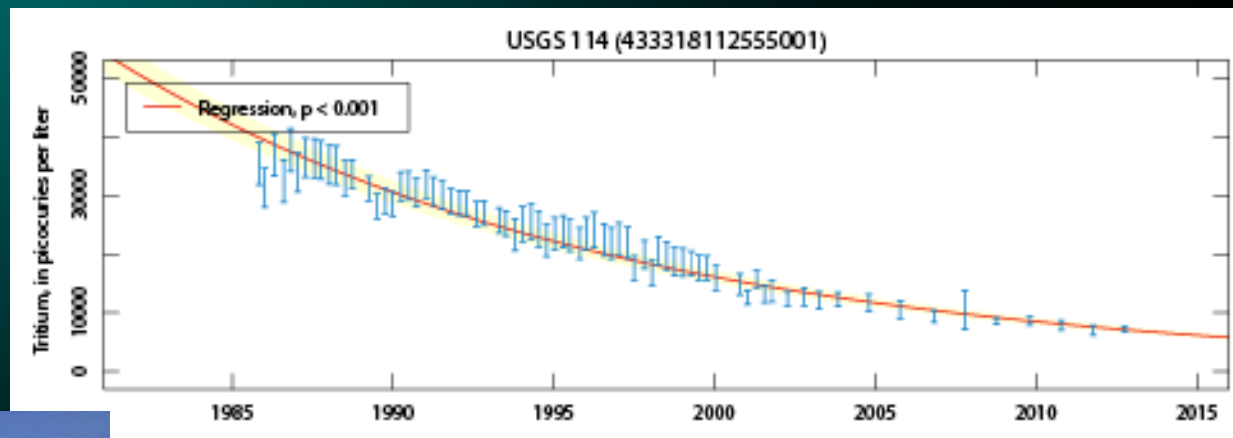
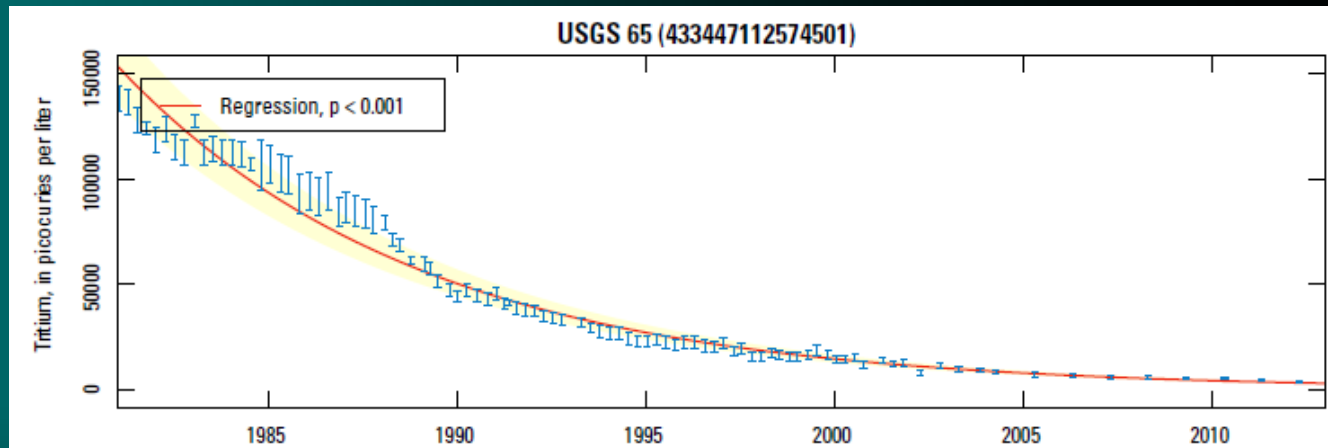
Tritium-2015

Largest concentration in the aquifer in 2015 was 5,760 +/-120 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



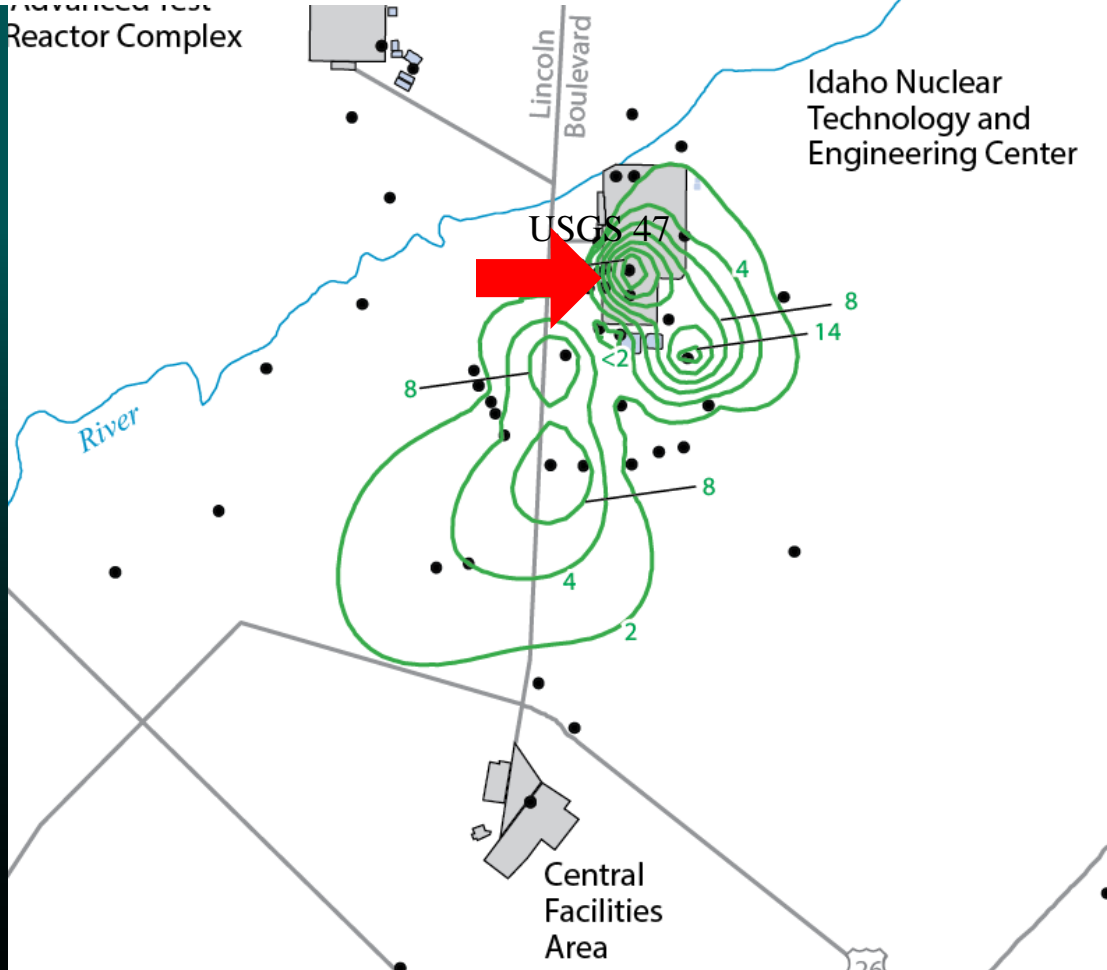
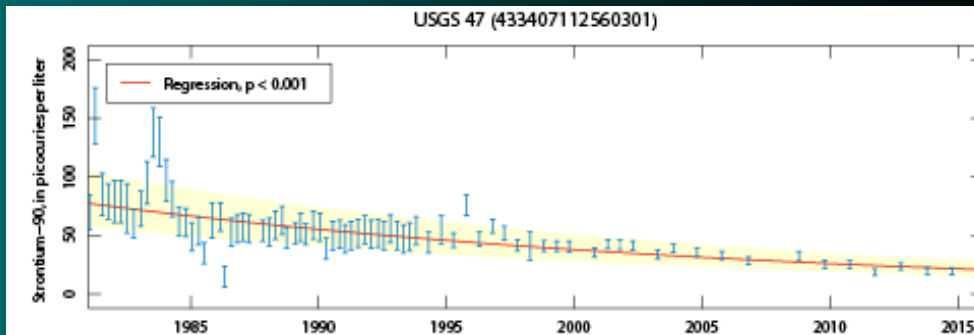
From Bartholomay and others, 2017 (DOE/ID-22242)



Strontium-90-2015

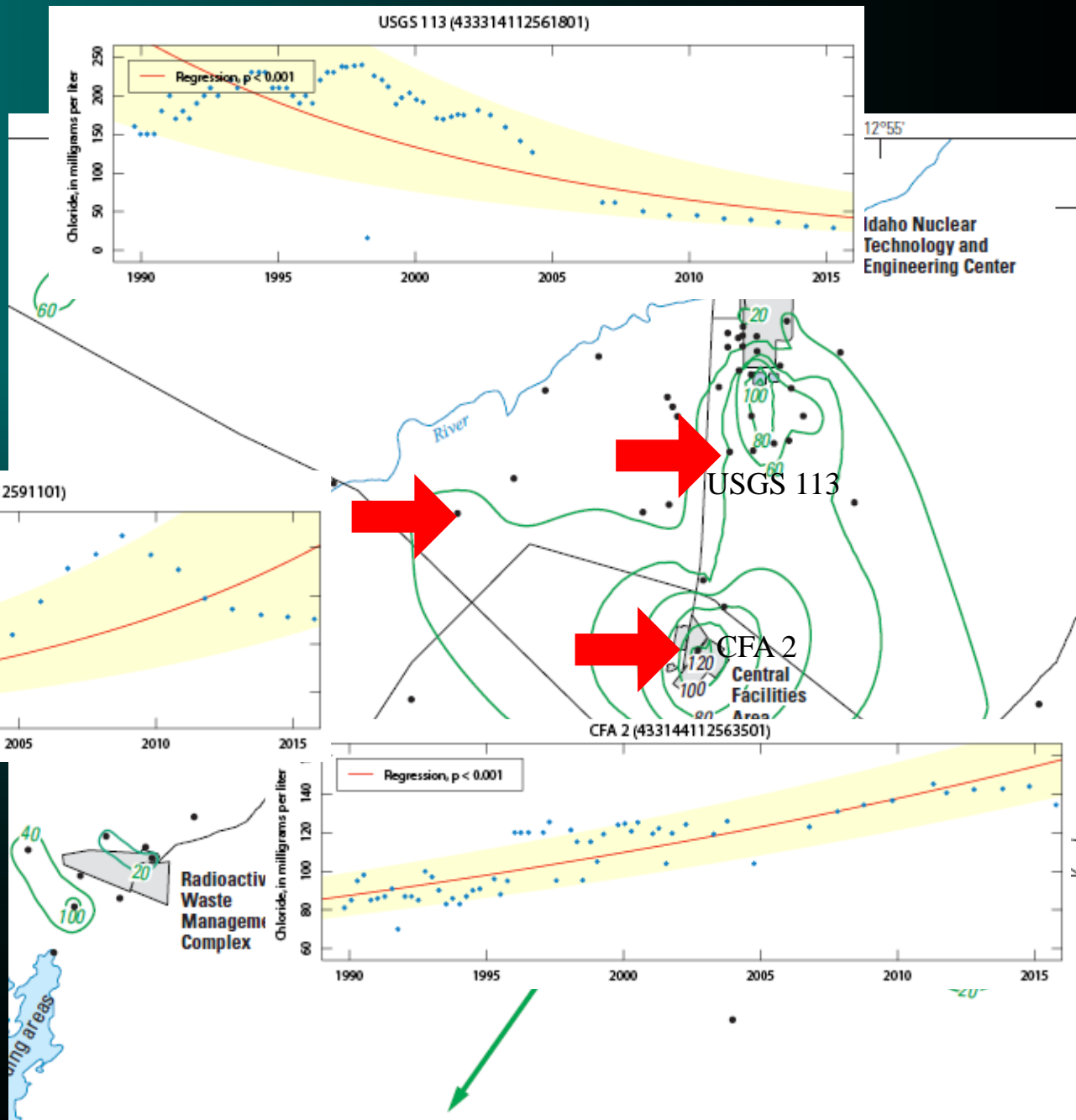
Still have eight wells with concentrations above the drinking water standard of 8 pCi/L.

Largest concentration in 2015 was 17.6+/-0.9 pCi/L in USGS 47



Chloride-2015
2015 concentration in
USGS 113 was 29
mg/L.

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

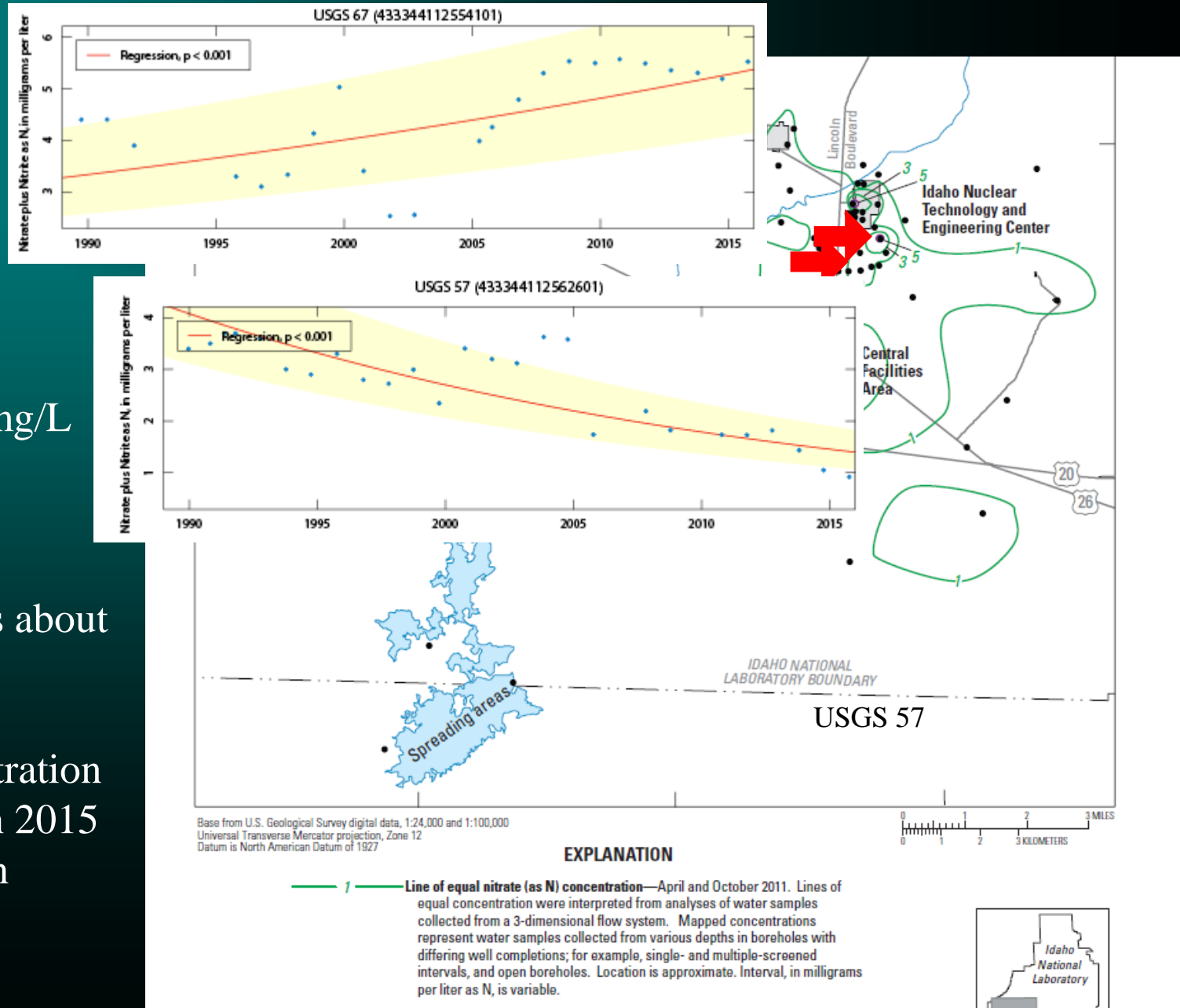


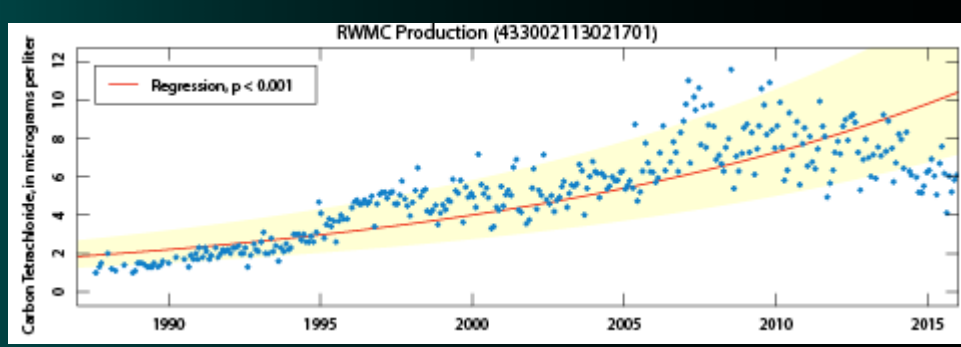
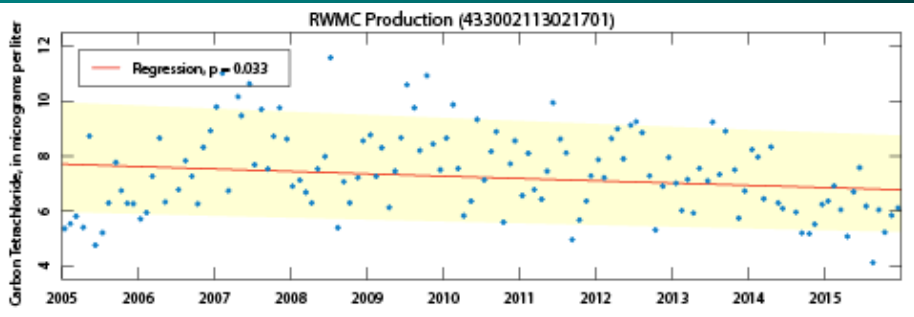
Nitrate

Drinking water standard is 10 mg/L as Nitrogen

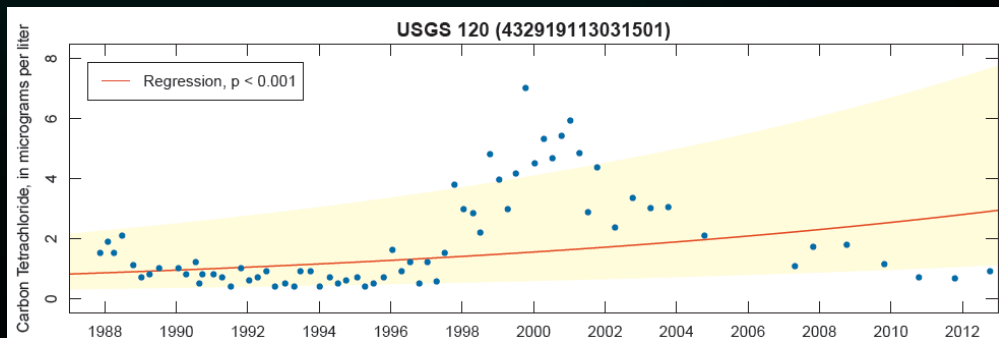
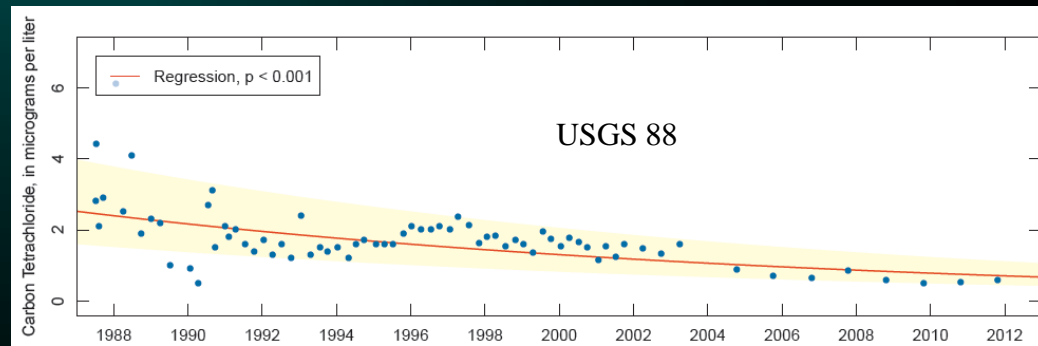
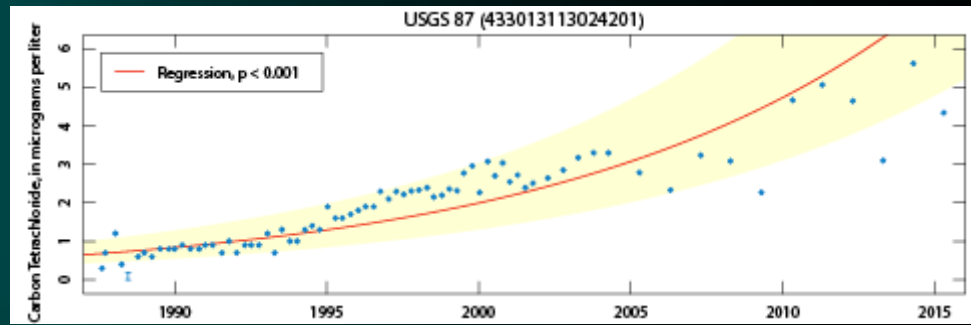
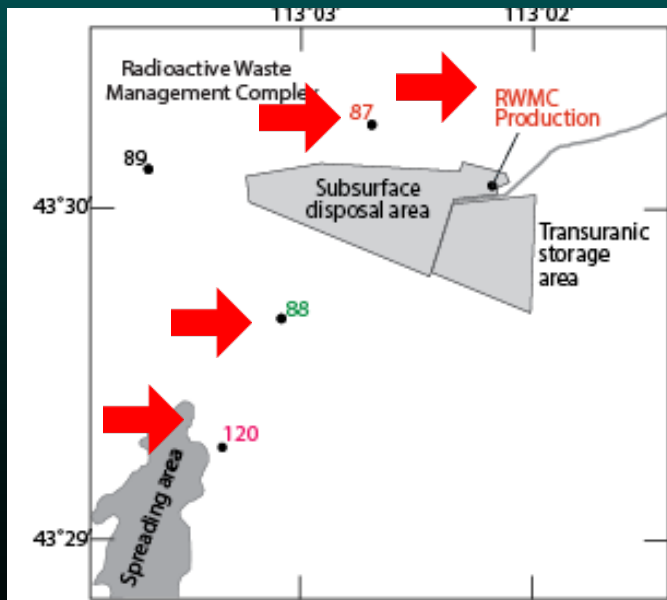
Background concentration is about 0.7 mg/L

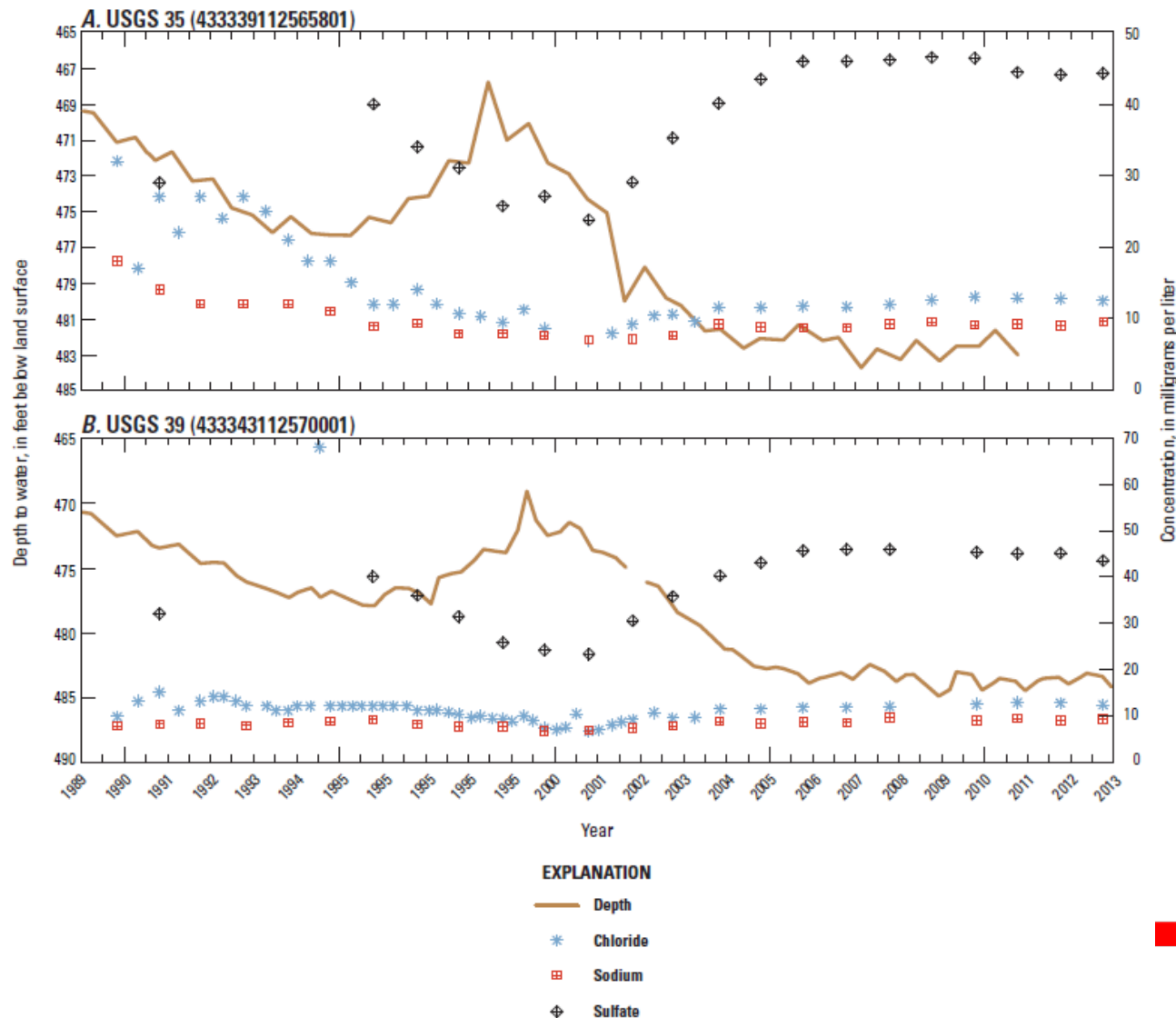
Largest concentration in the aquifer in 2015 was 5.5 mg/L in USGS 67



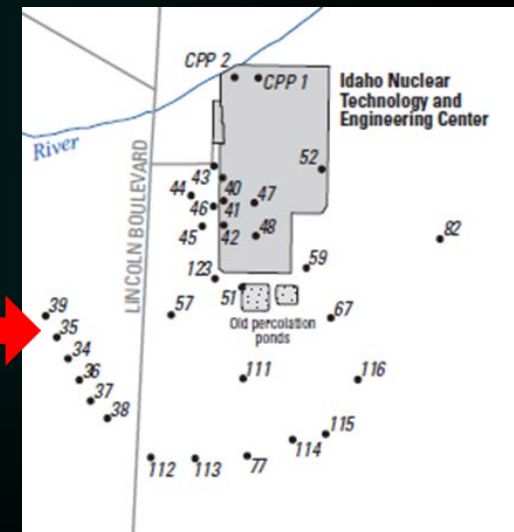


Carbon tetrachloride
Drinking water standard is 5 $\mu\text{g/L}$





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



Summary

- Water levels in the aquifer at the INL have been mostly decreasing over the past 16 years; small increases in 2017.
- 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
- Nitrate concentrations are mostly decreasing from wells influenced by wastewater, but have been increasing in 2 wells Southeast of INTEC



Summary

- Volatile organic compounds are decreasing in past 10 years at RWMC Production
- Volatile organic compounds are increasing at 1 well to the north and one well to the south of RWMC, and decreasing in one well to the south
- Several wells have concentration changes that appear to correspond to wet and dry cycles of recharge.



https://id.water.usgs.gov/INL/Science/W-M/index.html

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In cooperation with the U.S. Department of Energy, we monitor [groundwater and surface-water quality](#) as well as [streamflow at seven surface water sites](#). Stage information at [Mackay Reservoir](#) is also available through other funding partners.

Water samples are collected and analyzed for selected common ions, trace elements, nutrients, radiochemical constituents, and organic compounds. Samples are analyzed by the [Radiological and Environmental Sciences Laboratory](#) and the [USGS National Water Quality Laboratory](#).



USGS technician sampling for dissolved gases, photo by USGS


<https://id.water.usgs.gov/projects/INL/Science/W-M/index.html>


National Water Information System: Mapper


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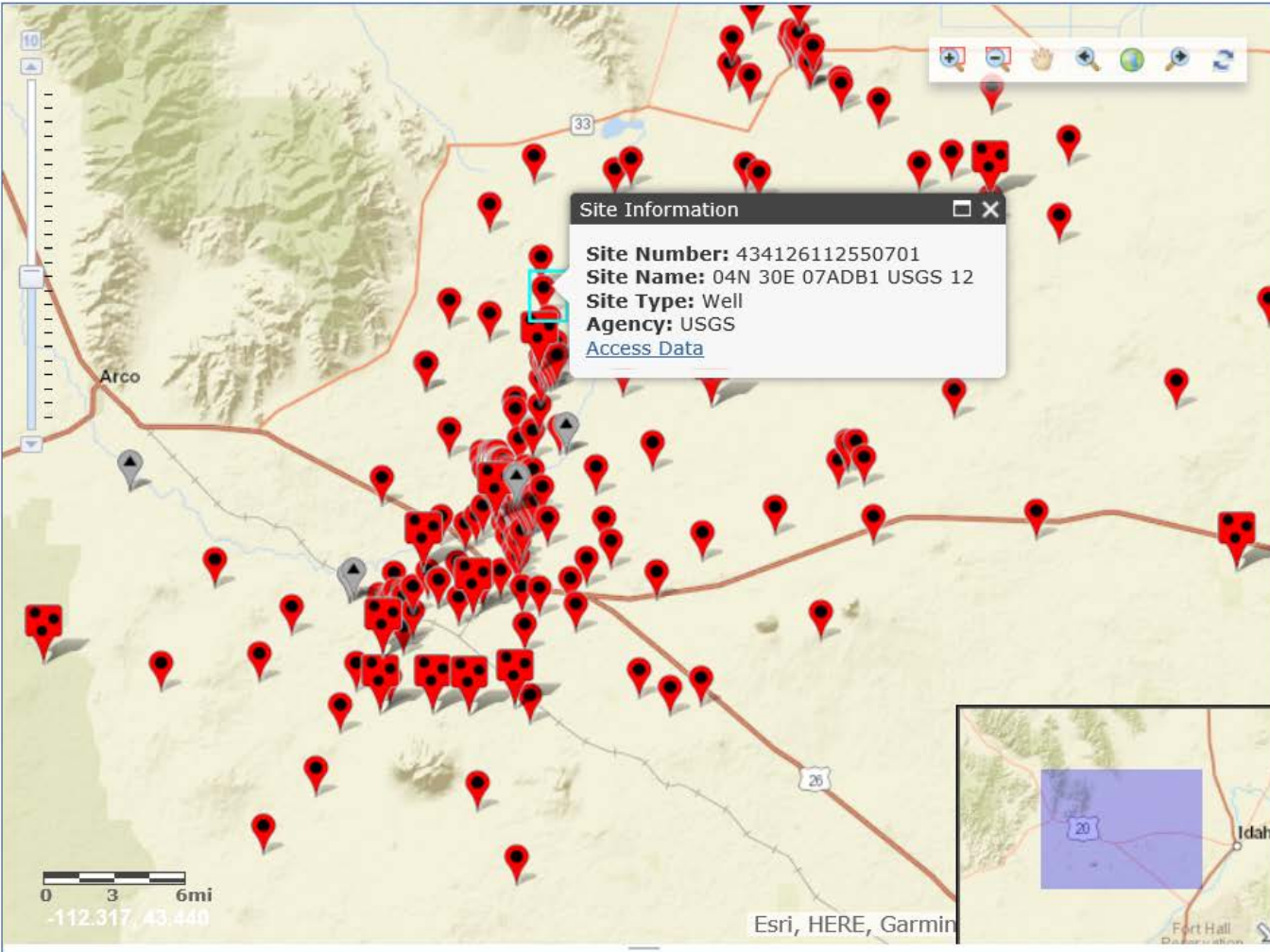
 Surface-Water Sites

 Groundwater Sites

 Springs

 Atmospheric Sites

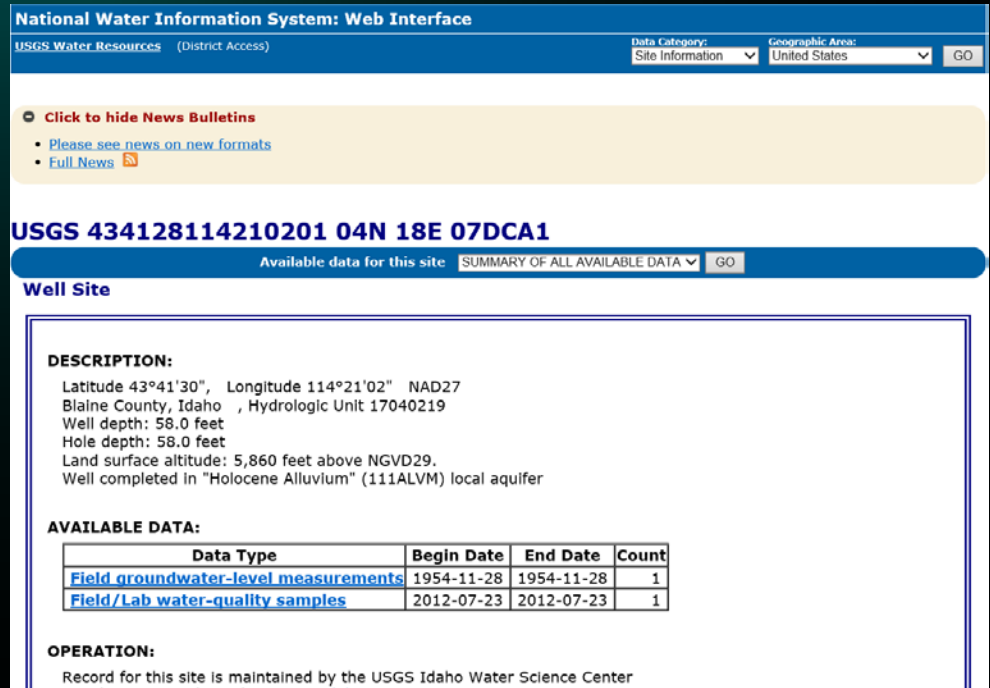
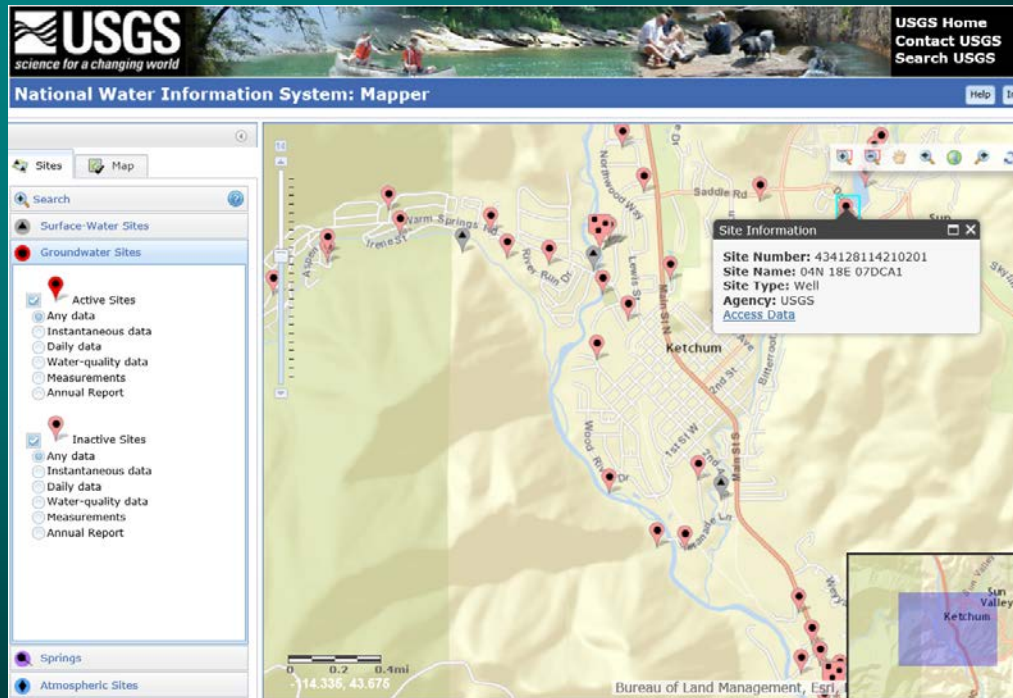
 Other Sites



Site Information

Site Number: 434126112550701
Site Name: 04N 30E 07ADB1 USGS 12
Site Type: Well
Agency: USGS
[Access Data](#)

Esri, HERE, Garmin





ANY QUESTIONS?

