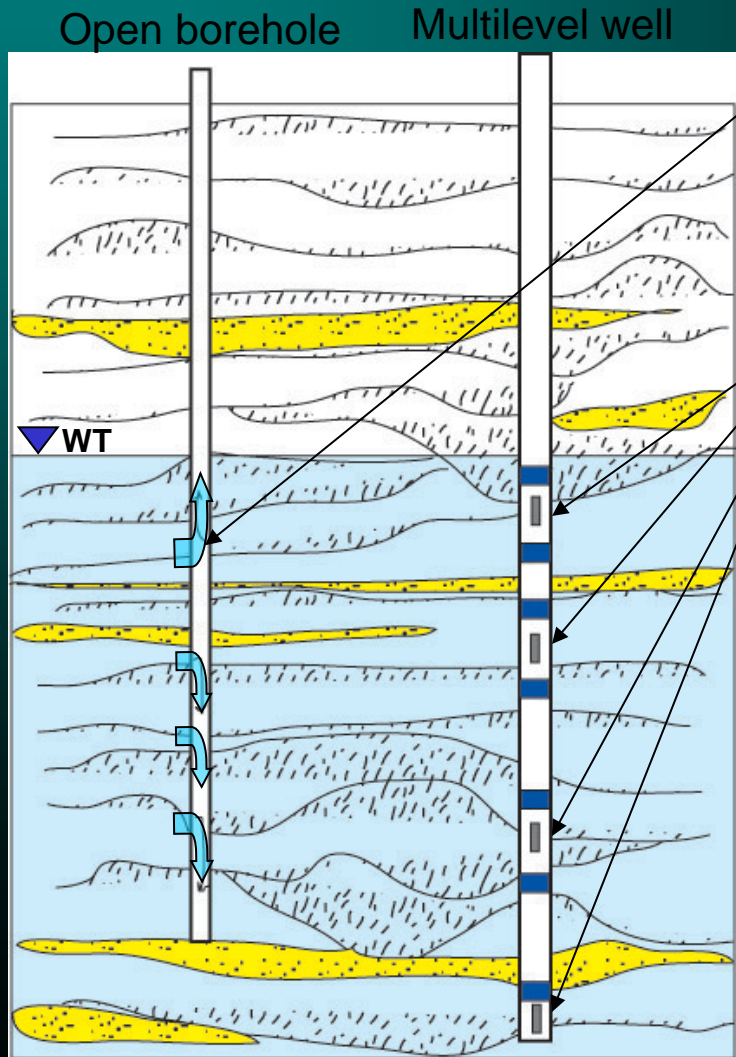


Roy Bartholomay



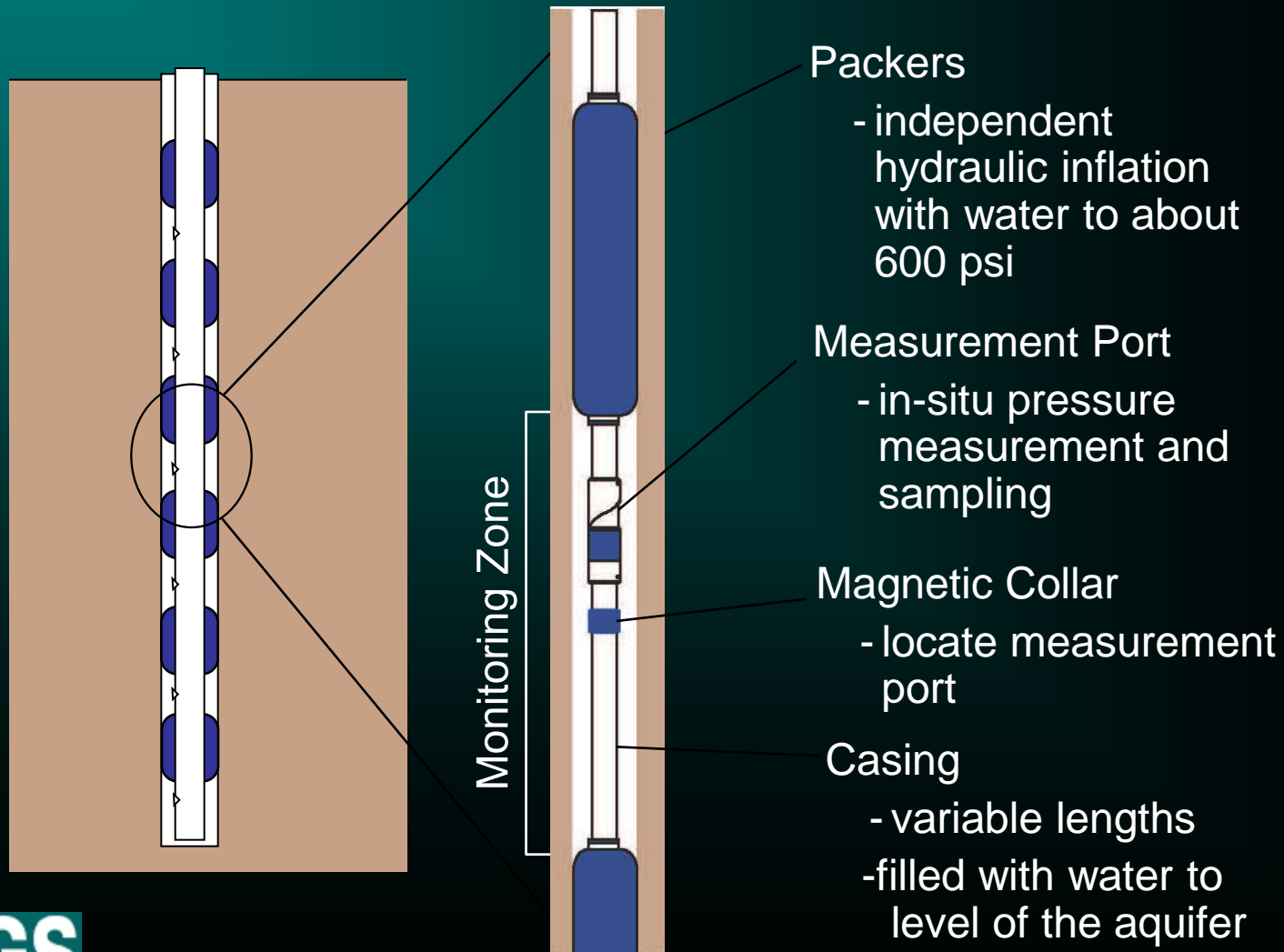
Findings and Future USGS work

Advantages of Multilevel Systems



- Eliminates vertical mixing from open boreholes.
- Allow for discrete water sampling and piezometric head profiles without drilling multiple boreholes.
- Monitor data trends with time (contaminant movement, recharge waters).

Multilevel Monitoring System Components



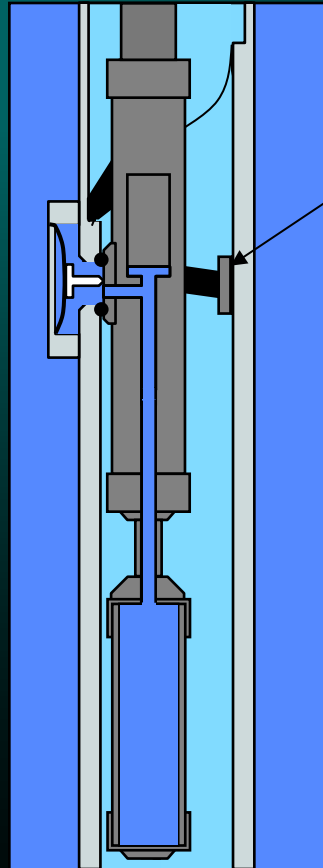
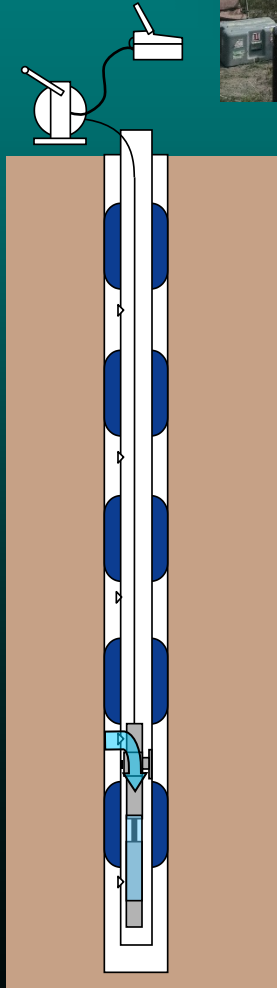
Well Installation

MP 55 Packer

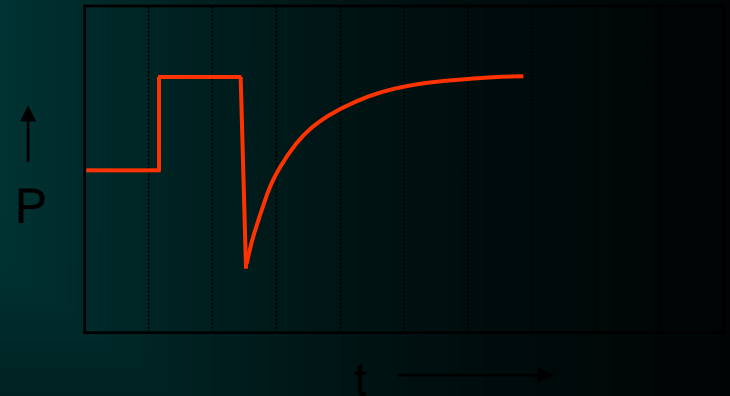
MP 55 Pressure
Port



How Multilevel Sampling Works



Shoe Out



Sampler and bottles

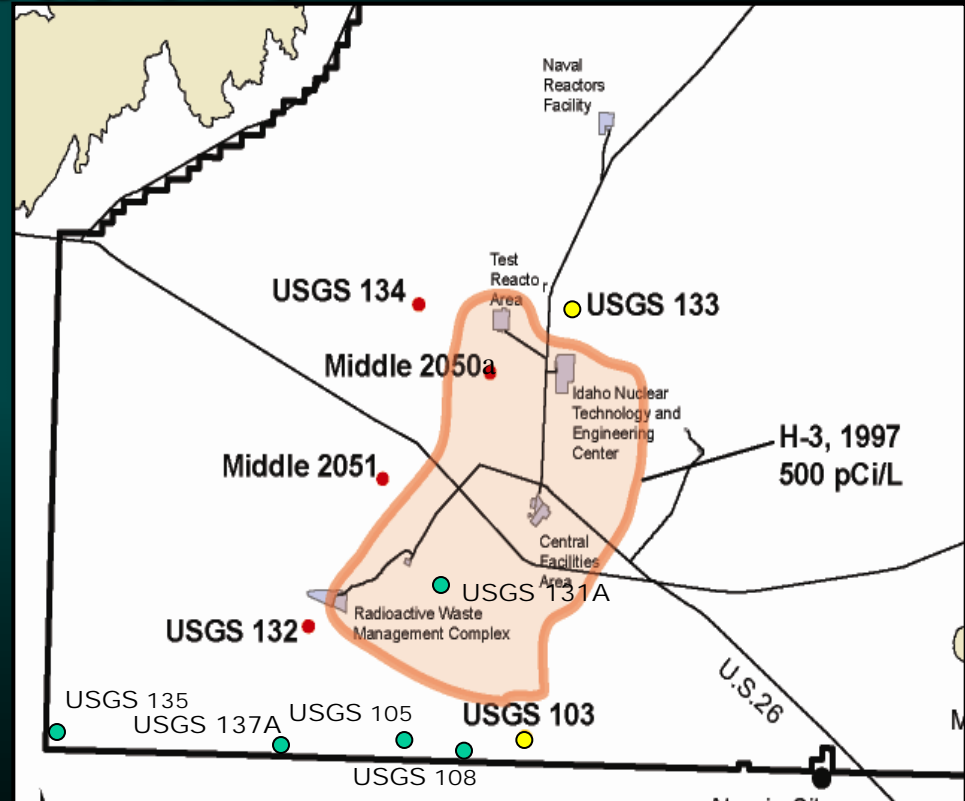


Multilevel Monitoring Site Locations



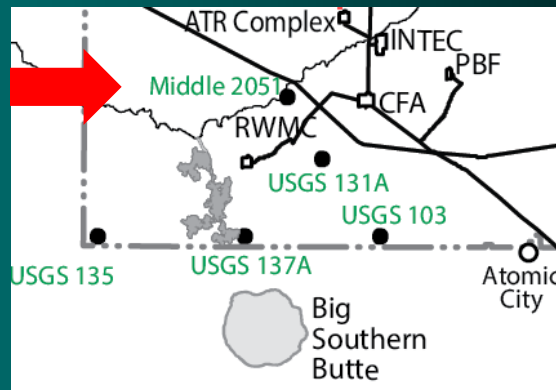
Monitor zones from 11 wells

Each well has from 4 to 7 sample ports



Different well dot colors represent timing of installation

Middle 2051



2008 tritium

52 \pm 3 pCi/L

2012 Iodine-129



0.00057 \pm 0.000086 pCi/L

475 \pm 13 pCi/L

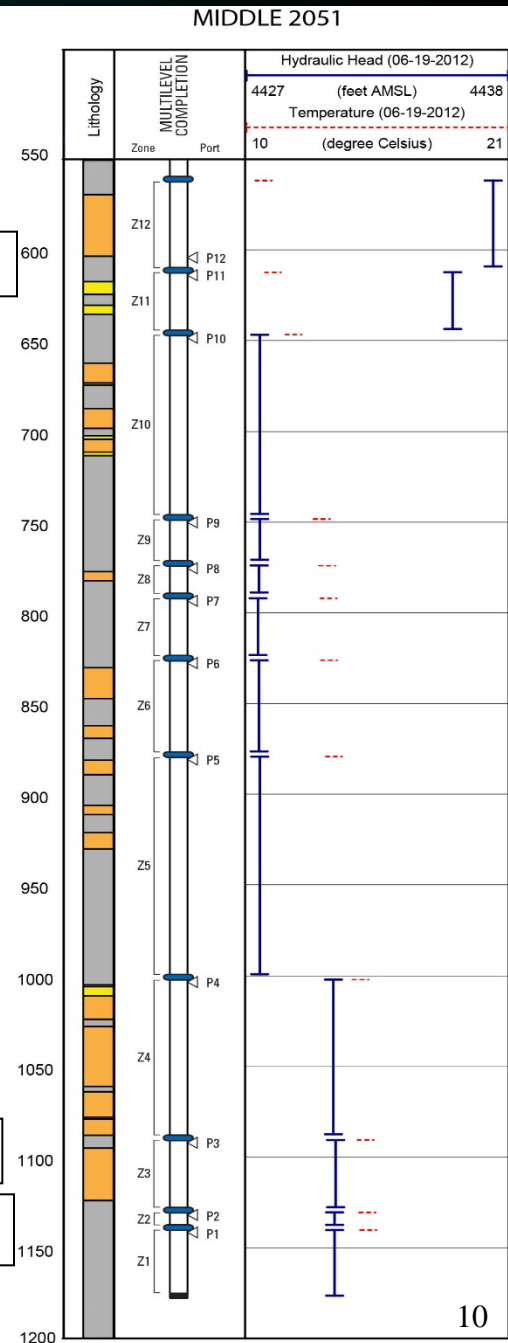
635 \pm 19 pCi/L

0.00507 \pm 0.00021 pCi/L

292 \pm 8.6 pCi/L

300 \pm 8.9 pCi/L

Depth, in feet below land surface



History of PCE sampling

2005, 2006-All zones
no detections

2013-top two zones
No detections

Maximum Contaminant
Level for Drinking water is
5 micrograms per liter



Figure 1 courtesy of
Fluor

Levels of PCE Detection @ Depth		
*non-validated data		
MCL for PCE is 5 $\mu\text{g/L}$		
11/10/2015	3/28/2016	June 2016
5.84 $\mu\text{g/L}$	0.46 $\mu\text{g/L}$	6/8 6/30
2.78 $\mu\text{g/L}$	0.85 $\mu\text{g/L}$	*0.1835 $\mu\text{g/L}$
		*0.3671 $\mu\text{g/L}$
		*0.6424 $\mu\text{g/L}$
		*824 $\mu\text{g/L}$
		*744 $\mu\text{g/L}$
		*0.774 $\mu\text{g/L}$

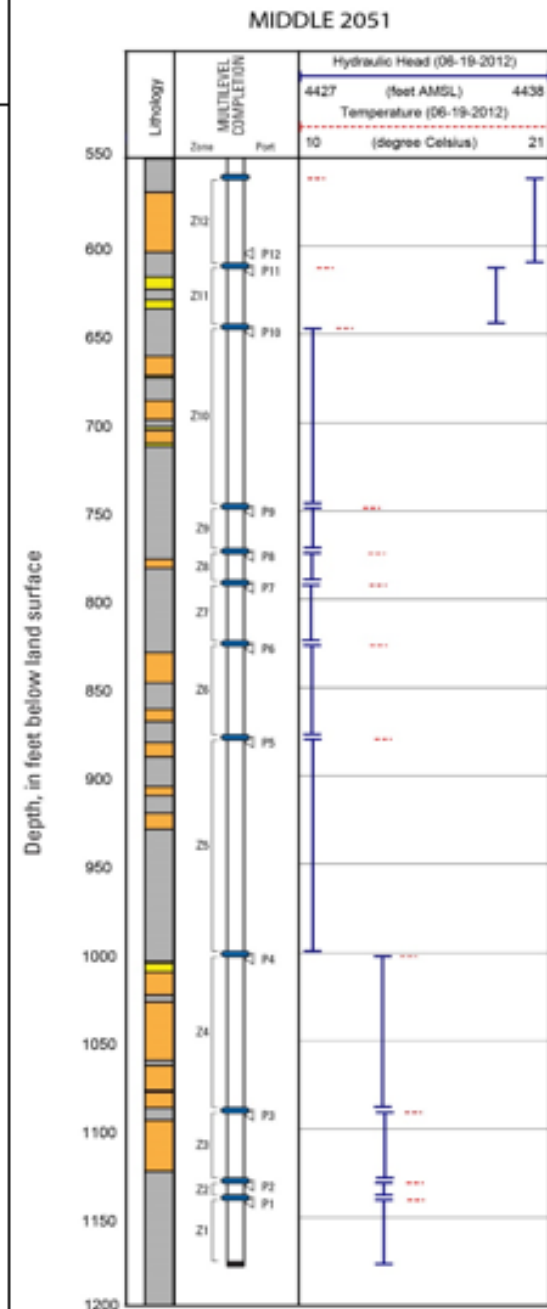


Figure 1. PCE results at sampling depth.

- After the results of the re-sample on June 30 indicated minimal concentration in the deep zone; the USGS ran a video log of the inside of the casing on July 18, 2016: publically located at:
<ftp://ftpext.usgs.gov/pub/wr/id/scoville/>



*At sample
port depth
see grease
and dark
growth on
side of
casing*



*Further
down we
see more
growth and
many
floating
particles*



1178.4F
18JUL16
MJG CJJ
Mid 2051

*Lots of
settled
material
in
bottom*



On July 19, 2016 USGS sampled the water inside the casing

- Concentration was 622 micrograms/liter
- This information along with field notes indicating a leaking connection lead us to believe that all the contamination was from water from inside the casing.



Future USGS work-Improve our sample collection techniques and determine if the water inside other well casings is contaminated

