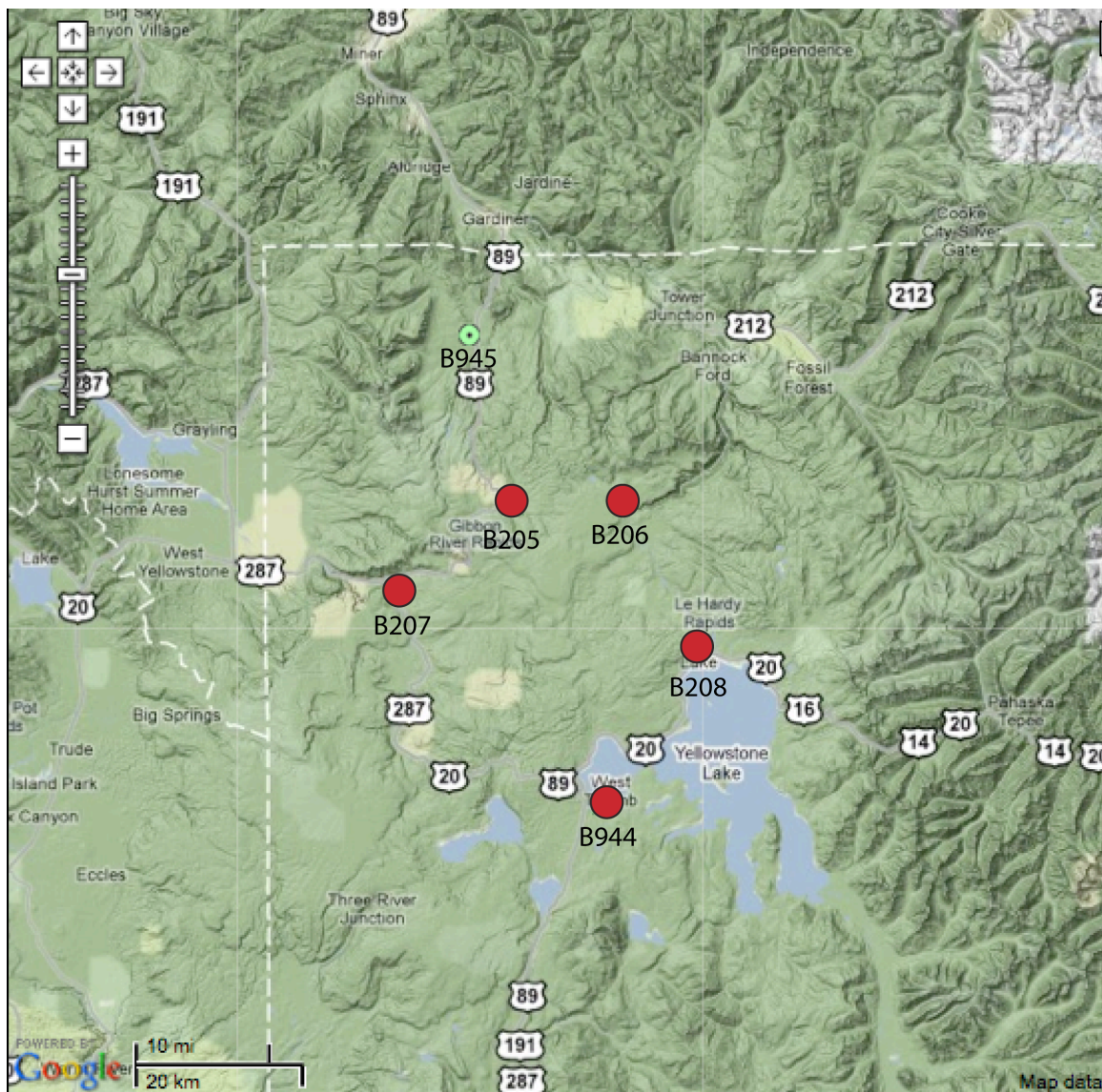


### Station Notes for B208, lakejn208bwy2007

Latitude:	44.5602 (WGS 84)
Longitude:	-110.4015 (WGS 84)
Elevation:	2405.8 m / 7893 ft
Install Depth:	163.1 m / 535 ft
Orientations:	CH0=292.4, CH1=232.4, CH2=172.4, CH3=142.4
Install Date:	October 31, 2007
GTSM Technologies #:	US57
Executive Process Software:	Version 1.14
Logger Software:	Version 2.02.2
Home Page:	<a href="http://www.unavco.org/instrumentation/networks/status/pbo/overview/B208">www.unavco.org/instrumentation/networks/status/pbo/overview/B208</a>
Notes Last Updated:	October 19, 2017

• Install depth is from the top of the casing to the bottom of the strainmeter.

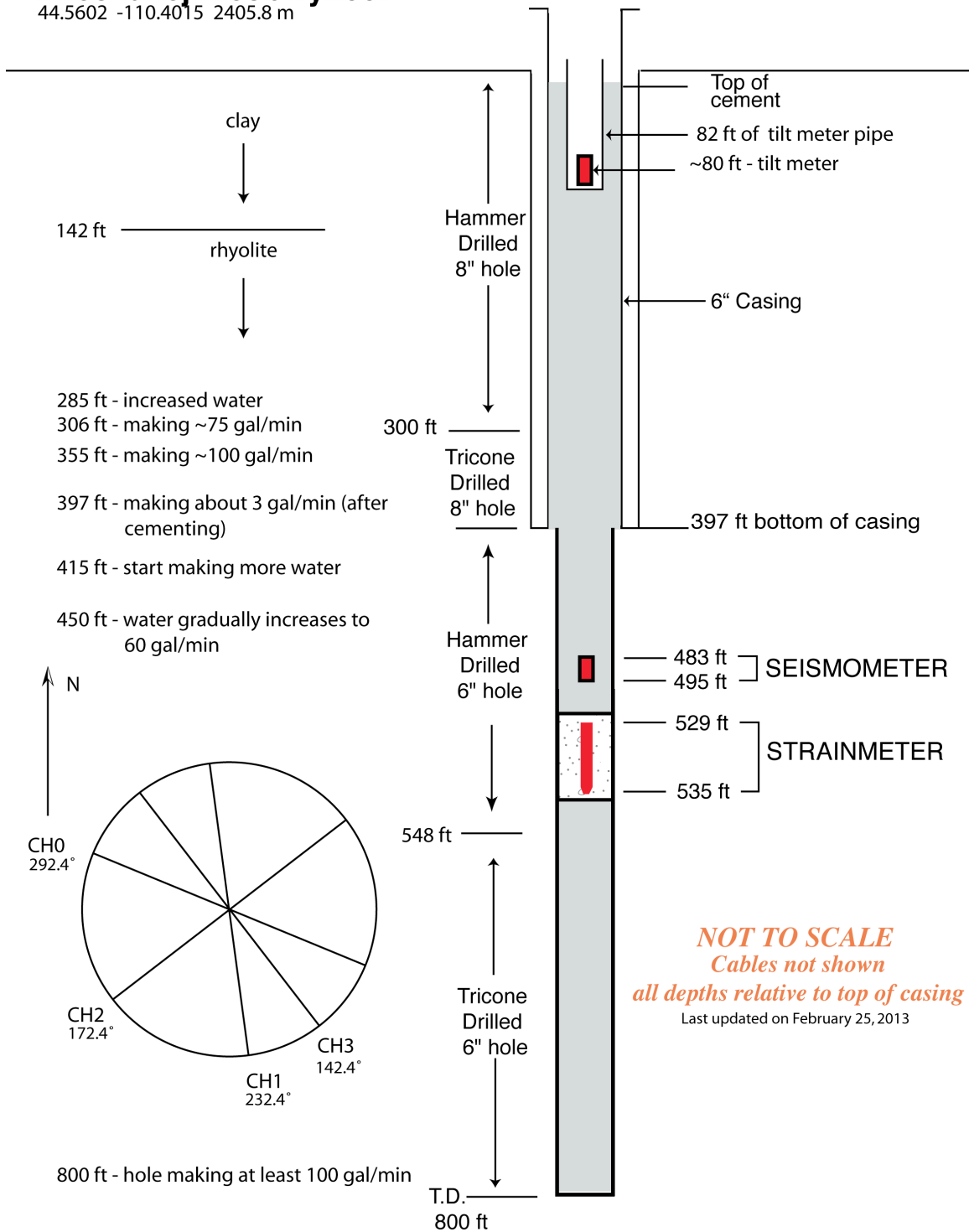
• Orientations are in degrees East of North.



Yellowstone PBO strainmeters, October 2008. Green dots represent boreholes that only have a seismometer.

# B208 lakejn208bwy2007

44.5602 -110.4015 2405.8 m



### Instrumentation at Strainmeter

Instrument	Units	Bottle/ASCII Scale Factor	SEED Scale Factor
Pore Pressure	Hecto Pascals	None Installed	---
GTSM Barometer	Kilopascals	1.0	0.0001
Rain Gauge	Millimeters/hour	1.0	0.252
Down hole Temperature Sensor	Degrees Celsius	1.0	0.0001
Logger Temperature Sensor	Degrees Celsius	1.0	0.0001
Setra Barometer	Hecto Pascals	None Installed	

### 1. Installation notes

October 26, 2007

The original install zone the installation crew was shooting for was 540-550 feet. In the process of trying to plug up a huge blowout at 660 feet they used 5 sacks of bentonite and then capped the bentonite with cement.

October 27, 2007

The engineers discovered the hole was at 552-559 feet with 9 feet of soft material on the bottom. They could not get the dump baler to dump. There was bentonite mixed into the soft material. They decided to put strainmeter US54 on test and regroup on Monday after they came up with a plan to fix the hole. While putting together US54 they found a dent on the cable head that would prevent a good seal when the cable is attached to the strainmeter.

October 29, 2007

The engineers picked up US57. When they got to the site and sounded the hole the bottom was at 541 feet. They decided to shoot for a back up install zone between 520-530 feet. They used trimmy pipe to gravity feed 1 92lb bag of cement into the hole. This should have brought the hole up 5 feet. They cemented the hole up from 535 ft.

October 30, 2007

The hole was sounded at 530'10". When they used a closed ended baler the hole was at 530'7", which indicates 3" of soft material from the last cement job. They decided to leave the hole alone and to install on bottom. They put US57 on test at 18:00 UTC. The system looked good for install.

October 31, 2007 UTC

Installation was a very difficult install due to the weather. Before the install, they flushed the hole with 500 gallons of water to make sure the hole was clean. Due to lines freezing up this took a lot longer than it should have. US57 looked good before the install. All channels were responding properly

Compass calibration test X: 0.956, 1.850 Y: 0.582, 1.4

Install time line:

21:45 - Begin mixing grout.

21:47 - Last bag of grout added.

21:48 - Last water added (Total of 16 gallons of distilled water).

21:57 - Begin loading dump baler.

22:00 - Dump baler loaded up.  
 22:09 - Dump bailer on bottom. Hit bottom 6" below test trip mark.  
 22:14 - Pulled out of grout. Good trip.  
 22:16 - Out of the hole.  
 22:20 - Strainmeter in hole, begin trip down hole.  
 22:50 - Strainmeter on the bottom. Strainmeter on the bottom 25" earlier than expected. Could be cable stretch, still well within grout plug. Only issue is that the last knot in the tie off line is above the hole. Spend extra time securing strainmeter cable to well head.  
 23:00 - Strainmeter on test. So far it looks good and the temperature is rising,  
 23:05 - Compass results: X: 1.840 Y:1.059.  
 23:06 - All channels getting to G2OOB (this indicates that the strainmeter can get to it max gain, but is staying at gain to for greatest bandwidth).  
 23:07 - Adjust quadrature.  
 23:15 - Installation call good.  
 23:20 - Rename GTSM to B208.  
 23:59 - Off site.

## **2. General Information**

- Sensitivities for all EH channels corrected on March 4, 2010.

## **3. Strainmeter Maintenance**

- February 17, 2008 UTC – Steve Smith and Karl Feaux visited the site do perform some maintenance.  
 17:00am - Onsite, dig out enclosure.  
 17:09 - South door open.  
 17:15 - North door open.  
 17:25 - GTSM Off.  
 17:49 - 3 batteries on GTSM side replaced. Old batteries were split very badly on the ends, innards leaking out.  
 18:01 - US54 power box installed, US56 power box removed.  
 18:22 - GTSM On.  
 18:28 - North door shut.  
 18:45 - Snow cleared off top of hut, checked in site with Warren G.  
 18:50 - "GPS on a stick" installed, South door shut.  
 19:00 - Offsite.
- July 3, 2008 UTC  
 22:01 Dave Mencin and Mike Jackson arrived onsite. Sounded tiltmeter hole at 82.0 ft from top of the tiltmeter casing. Drilled hole in roof of enclosure to lower tiltmeter. Measured casing orientation and dropped in a small bottle of fine sand, raising the bottom several inches. Lowered tiltmeter to bottom of hole. Wired up tiltmeter to power and Marmot, but could not establish reliable communications with tiltmeter. Tiltmeter acted like it was exceeding specifications of the RS232 cable. It was possible to get information from the tiltmeter, but commands could not be sent. Pulled tiltmeter back to surface and tested power and cable, no change in behavior. Replacement cables ordered.

00:30 Offsite.

- January 1, 2009 - The tiltmeter was leveled at 21:55 UTC.
- April 1, 2009 – Logger software upgraded to 2.02.2
- April 19, 2010 – Marmot rebooted and patch applied. Powerbox was replaced.
- May 3, 2010 – Replaced the GTSM powerbox with a high altitude model. Replaced the Setra barometer with a high altitude model. Checked tiltmeter, it was plugged in correctly, but no communication was possible with it. One line of output was achieved when it was power cycled, but still no response to commands. Tiltmeter probably needs to be replaced.
- August 6, 2010 - Installed a master radio in the BSM hut, so that the VSAT there could serve as data relay for nearby GPS station LKWY. Mounted yagi inside equipment rack, pointed towards LKWY. Installed radio power supply to higher LVD on backpanel, but left the radio powered off.
- September 26-28, 2010 – Temporary broadband seismometer installed.
- July 18, 2011 – EB1 radio link added between PBO GPS enclosure (inside USGS hut) and PBO Borehole strainmeter Lake site (B208).
- July 20, 2011 – The tiltmeter was replaced.
- May 15, 2012 – Mike sent the ColdStart command to try and fix the GPS time.
- July 27, 2012 – The station had not had GPS lock since August 8, 2011 and the GPS clock was ~120 seconds slow. The GTSM powerbox was replaced, and the pressure offset was set to 70 in the strain\_logger.conf file.
- February 5, 2014 - The IDU had failed. Only power and LAN lights were on, could not connect to computer. Replaced with new IDU, new satellite (H1) required repointing the dish. Also reprogrammed the cisco for the new IP. Signal strength was marginal but working, and Mike did not have time to keep adjusting. In the spring some time should be spent repointing this dish to maximize signal.
- May 5, 2014 – Adjusted pointing of VSAT. Moved LKWY to a CDMA, and removed the radio link.
- May 31 – Dave Mencin re-leveled the tiltmeter.
- June 18, 2014 – Tried to fix VSAT but was not able to. Installed a Verizon CDMA and removed the cisco. Tilt meter was recording exceptionally high levels of tilt. Tried to replace it but the spare would not autolevel.
- June 26, 2014 – Mike Gottlieb installed a USGS owned tiltmeter. Baud rate 19200. Installed at a depth of 79' (14" above the previous instrument). Orientation +X is 121 degrees magnetic (109 Degrees true North).

- June 26, 2015 – Adjusted quadrature and chops of all four channels.
- July 20, 2016 – Visited site due to unstable comms. LC3 was offline upon arrival. Reboot brought it back up, but without confidence that will continue to work. Replaced it with RV50 and 4G (black) redbull antenna inside enclosure.
- July 20, 2017 – Adjusted chops and quads. Amp I/P test showed 3V change on all channels as expected. Amp O/P signal showed stable high frequency noise at the trough of each sinusoid on all four channels. Could be a possible Oscillator problem.
- October 3, 2017 – There was a high frequency signal appearing on the rising edge of every period of the amp o/p on all channels. This signal was stable, but clearly not normal. Replacing oscillator removed the signal. Set chops and quadrature. Old unused VSAT dish was removed and pole cut down to ground level.
- September 18, 2019 – Updated RV50 firmware from 4.5 to 4.12, added EQ straps.