State Board of Examining Water Well Drilling Contractors and Pump Installation Contractors

August, 2017

Wyoming Water Well Contractor's Newsletter

NEWS FROM THE DIRECTOR'S DESK

In this month's newsletter I am sharing an article that was published in the July's State Engineer's Office monthly newsletter. The article doesn't necessarily deal with the construction of a water well or the installation of pumping equipment, but focuses on the contamination of ground water at a missile site and some of the technology used to help clean up the site. Unfortunately, aquifer contamination is common and one of the reasons the State Engineer's Office has rules and regulations for the construction of a water well and the disinfecting of tools, drilling equipment, pumping equipment, etc. Remember good housekeeping practices could help prevent contamination incidents.

IN THIS ISSUE:

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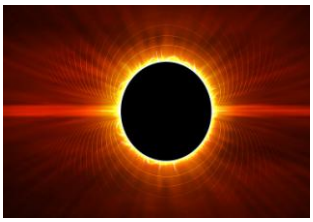

Ancient Explanation for Solar Eclipse

Ancient cultures tried to understand why the Sun temporarily vanished from the sky, so they came up with various reasons for what caused a solar eclipse.

In many cultures, the legends surrounding solar eclipses involve mythical figures eating or stealing the Sun. Others interpreted the event as a sign of angry or quarreling gods.

Congratulations to the New Licensees!

WELL

Victor Oliver
Snowy River Water Well Drilling
Bairoil, WY

PUMP

Todd Taylor
Eagle Drilling, Inc
Glendo, WY

Airborne Electromagnetic (AEM) Survey

This article, written by James Neely, Wyoming State Engineer's

On May 31, 2017, the State Engineer, Jeremy, Charlie, Adam, Josh, and I gathered at the Belvoir Ranch, a site approximately 18 miles southwest of Cheyenne, to witness the Airborne Electromagnetic (AEM) Survey. The survey was performed by Aqua Geo Frameworks out of Nebraska, using the helicopter-assisted SkyTEM304 survey system, designed by SkyTEM out of Denmark (Figure 1). The survey is part of a project to map the groundwater aquifers and subsurface geology beneath the former Atlas "D" Missile Site 4 area (Figure 2) and will hopefully give us a better understanding about the leading edge and perhaps depth of the trichloroethylene (TCE) plume that's been detected in this area.

Before we jump into all the survey stuff, it might be best to provide you with a brief history of the area. The Atlas "D" Missile Site was one of many sites used for housing nuclear missiles during the Cold War. Occasionally, the rockets were fueled and defueled and during routine readiness exercises, corrosion could build up on the parts due to the liquid/oxygen fuel being used (unlike today's solid fuel system which is safer and cheaper, but less efficient than liquid fuel). After each readiness test, the fuel lines and tanks were cleaned out using the solvent trichloroethylene or TCE.

Unfortunately, the TCE was then flushed into unlined burnout pits, which contaminated the groundwater both beneath and downgradient from the site. More information on the Atlas "D" Missile Site 4 can be found at www.atlassite4.com/. Information on TCE can be found at www.epa.gov. **Continue on Page 4**

Photo of the helicopter-assisted SkyTEM304 performing the AEM survey above the Belvoir Ranch. May 31, 2017.

TEST YOUR KNOWLEDGE *answers on Page 3*

1. According to Franklin Pumps, excessive cycling affects the life of which of the following control components: (A) Pressure Switches (B) Starters (C) Relays (D) Capacitors (E) All
2. The screen slot size is determined by? (A) Gravel pack size (B) Formation sand size (C) Entrance velocity (D) All
3. It is the responsibility of the driller to properly fill in and seal (destroy) any test well not converted into a permanent water well: True or False

Calendar of Events:

The codes in the first column are as follows:

WWWA – Wyoming Water Well Association

NGWA – National Ground Water Association

NWDA – Nebraska Well Drillers Association

CWWCA – Colorado Water Well Contractors Association

WARWS – Wyoming Association of Rural Water Systems

WWA- Wyoming Water Association

WWQ & PCA – Wyoming Water Quality & Pollution Control Association

WWWCB – Wyoming Water Well Contractors Licensing Board

BIDP – Baroid Industrial Drilling Products

AGWT – American Ground Water Trust

SEDC – Shallow Exploration Drillers Clinic

ISWD – International School of Well Drilling

CPS - CPS Distributors

Goulds - Goulds Water Technology Factory School WebEx Training

For continuing education opportunities please refer to each respective association's website for additional information.

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Upcoming Events

AGWT	Educational Videos and Books	Website	WWW.AGWT.org
ISWD	International School of Well Drilling Online Courses	Website	welldrillingschool.com
NGWA	Introduction to Groundwater Resources (#1012)	Website	Online self-paced course
NGWA	Selection and Operation of Meters for Safe and Successful Electrical Troubleshooting for Water Well Pump Systems (#7132-1)	Website	Online self-paced course
WWCB	**Board Meeting**	**Cheyenne, WY**	**September 6, 2017**
WWWA	Board Meeting	Casper, WY	October 13, 2017
WWQ & PCA	47th Annual Conference	Casper, WY	October 23, 2017
2017 Groundwater Foundation, National Conference		Boise, ID	October 24-26, 2017
NGWA Summit		Nashville, TN	December 4-7, 2017
NGWA Groundwater Week		Nashville, TN	December 5-7, 2017
WWWA	2018 Convention	Casper, WY	January 24-26, 2018

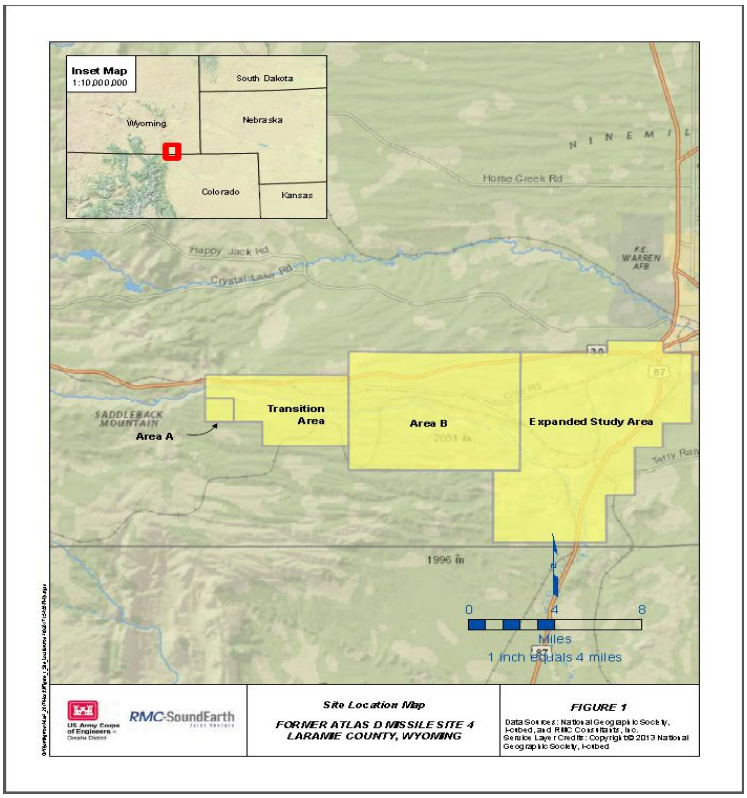
Answers to Test Your Knowledge from page 2

1. D. All
2. D. All
3. True

To determine the extent of the TCE contamination at the Atlas "D" Missile Site, the United States Army Corps of Engineers (COE) has drilled many monitor wells, many of which show a large concentration of TCE in the White River Formation/Aquifer. Residents of Cheyenne and Laramie County obtain their drinking water from this aquifer. Water contaminated with TCE needs to go through a treatment process before it is suitable for drinking. The Board of Public Utilities (BOPU) operates two treatment plants, the Sherard Water Treatment plant and the Round Top facilities. TCE-contaminated water from the Atlas "D" Missile Site is piped to the Ground Water Treatment Facility, at the Sherard Water Treatment plant, where TCE is removed with air strippers before the water is then blended with other water sources for chlorination. Water from private wells completed/drilled in the area must be filtered through a granulated-activated carbon system before it is suitable for drinking.

Data from the monitor wells show that the current TCE plume extends approximately 10 miles east of the former Atlas "D" Missile Site and has an approximate width of three miles. The AEM survey is being conducted to learn more about the leading edge (the area beyond Area B in Figure 2) and depth of the plume.

The COE, Omaha District is responsible for cleanup of the site. The COE has a general contract with Aqua Geo Frameworks (in coordination with AMEC Foster Wheeler (AMEC) – the hydrologists that oversee the surveys) to fly flight lines using a helicopter mounted with the SkyTEM 304 system.



RMC+SoundEarth, LLC, 2017. Draft Work Plan for Acquisition, Processing, and Interpretation of Reflection Seismic Data and Airborne Electromagnetic Data. Area-Wide Remedial Investigation, Atlas "D" Missile Site 4, Laramie, Wyoming. April 2017.

The SkyTEM 304 is a hexagonal frame equipped with a dual-moment transient electromagnetic transmitter, typically used in mapping the water bearing subsurface. The frame is also equipped with a magnometer, a receiver, multiple global positioning sensors, tilt meters, laser altimeters, and a digital camera. The survey module with equipment is towed about 100 feet above the ground surface at approximately 60mph, with evenly spaced flight line patterns perpendicular to the direction of groundwater flow while measuring the differences in subsurface resistivity and other general data. An example of the flight line patterns is shown in Figure 3. Deviations from the flight path could be made due to changes in the weather, fuel usage or obstacles. Some of these obstacles are also sources of noise, or disturbances, in geophysical electromagnetic surveys, such as power lines, radio towers

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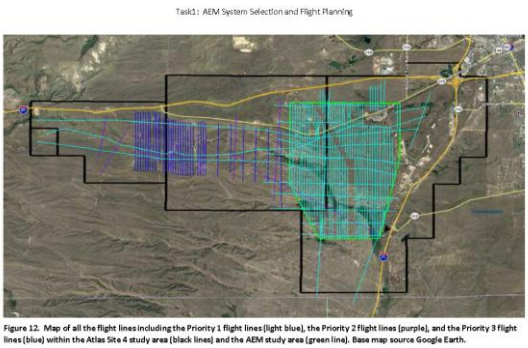

Figure 12. Map of all the flight lines including the Priority 1 flight lines (light blue), the Priority 2 flight lines (purple), and the Priority 3 flight lines (blue) within the Atlas Site 4 study area (black lines) and the AEM study area (green line). Base map source Google Earth.

RMC+SoundEarth, LLC, 2017. Draft Work Plan for Acquisition, Processing, and Interpretation of Reflection Seismic Data and Airborne Electromagnetic Data. Area-Wide Remedial Investigation, Atlas "D" Missile Site 4, Laramie, Wyoming. April 2017.

or factories. Noise caused by electromagnetic sources increases the error rate of the survey data. Other sources of noise include railroads, pipelines and residential areas.

Data collected from the SkyTEM304 is then processed and inspected to verify validity and system accuracy. Along with ground based two-dimensional reflection and refraction seismic survey data, the AEM data will hopefully provide subsurface structure information which will assist in detecting the current and future path of the TCE plume direction, features in the White River Formation, the Ogallala formation/White River Formation interface, and possible detection of paleochannels and fracture zones.

RMC+SoundEarth, of Wheat Ridge, Colorado, co-drafted the work plan for the seismic/AEM survey with AMEC of Laramie, Wyoming. RMC+SoundEarth contracted with Bird Seismic Services of Globe, Arizona to collect the 2D seismic data, and AMEC to accept, process and interpret the AEM data. AMEC will conduct the final processing, interpret the data, and complete the conceptual site model.

The preliminary AEM data is expected to take a few months to complete and is to be presented to the COE in September, 2017. The subsurface model should help define the leading edge of the TCE plume and hopefully the depth of the TCE plume, assist in the placement of future monitor wells, and provide additional information that will guide the COE's future activities in continuing to clean up the Atlas "D" Missile Site.

To say the least, there is a whole heck of a lot more that goes into these AEM surveys than this, but I thought I would at least share a little bit about what I learned and how you can learn more about it and other new topics too.

So, get out there, and learn something new - enjoy!

For more Information about SkyTEM go to www.skytem.com . Related AEM survey material can be found on a similar AEM project completed in Nebraska @ www.lpsnrd.org/Programs/gwaem.htm .

Ruby Drilling 2017