NYE COUNTY TRITIUM SAMPLING AND MONITORING PROGRAM

Nye County Nuclear Waste Repository Project Office
John Klenke
Sept 28, 2017

Overview

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- Background
- Population
- Responsibilities
- Other NNSS Sampling Programs
- TSaMP Past Locations and Results
- 2017 Proposed Sampling Locations
- Future Years
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Meeting Objective

- Describe the Nye County Tritium Sampling and Measurement Program
- Solicit public recommendations on sampling locations for monitoring downgradient of the Nevada National Security Site (NNSS)

Nye County Tritium Sampling and Monitoring Program (TSaMP)

- Nye County entered into a five-year grant with the Department of Energy (DOE) in 2015 to conduct water sampling and analysis at locations downgradient from areas formerly used for nuclear weapons testing
- Supplements the continued Desert Research Institute (DRI) community environmental monitoring program (CEMP) at communities in the down-gradient areas
- Grant also supports Nye County's involvement in technical reviews of the DOE Underground Test Area (UGTA) Activity corrective action program

Background – Why Are We Here?

- Nye County has the duty to protect the health and safety of citizens
- Through its Nuclear Waste Repository Project Office (NWRPO), Nye County conducted scientific characterization of the area between Yucca Mountain and the Town of Amargosa
  - Drilled and completed approximately 50 wells
  - Conducted numerous aquifer and tracer tests, geophysical surveys, water level measurements, and other specialized testing
  - Coordinated many sampling events involving multiple agencies to collect samples for a large suite of chemical parameters
  - Data provided to Department of Energy (DOE) for use in their repository characterization and safety analyses

Background–Why tritium ?

- Tritium is the most mobile radionuclide in groundwater with the greatest potential for impacting groundwater quality at the NNSS (formerly the Nevada Test Site)
  - Radioactive form of hydrogen with a half-life of 12.3 years.
- The only radionuclide known to have exceeded its Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) in sampling locations away from nuclear test cavities.
  - The MCL for tritium in drinking water is 20,000 picocuries per liter (pCi/L)
  - TSaMP employs techniques to measure tritium with a minimum detection level of about 300 pCi/L, or 1.5% of the SDWA limit.

Land Status

- Nye County encompasses 18,199 mi^2
  - Largest county (by area) in the state, and the third-largest in contiguous US.
- Approximately 98% of land in Nye County is federally controlled
  - Bureau of Land Management
  - US Forest Service
  - Department of Defense
  - Department of Energy
- Nevada National Security Site (NNSS; formerly the Nevada Test Site) is entirely within Nye County
- Nye County population of 43,946 (2010 census)

Population

Pahrump:

- Approximately 26 miles south from NNSS
- Population of 38,000 people (2012)
- Possible 73,000 people by 2060 (Water Resource Plan update - 2017)

Amargosa:

- Approximately 9 miles SW from the border of NNSS
- Approximately 50 miles south (potentially downgradient) from Pahute Mesa
- Population of 1,456 (2010 census)

Population – cont

Beatty:

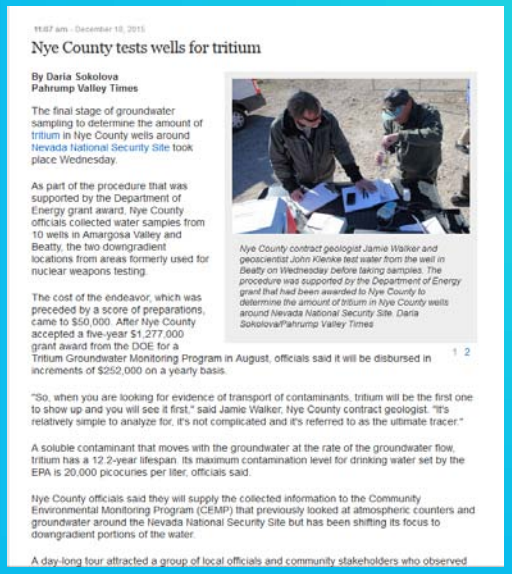
- Approximately 30 miles southwest (downgradient) from Pahute Mesa
  - Tritium detected at 10,600 pCi/L in well (ER-EC-11) located 25 miles northeast of Beatty in 2009 -on NTTR (off NNSS) (53% of EPA standard)
  - Detected at 16,100 pCi/L in 2014 (80% of EPA standard)
- Population of 1,010 people (2010 census)

Responsibilities

- Nye County is responsible for:
  - Identification of sampling locations
  - Developing sampling plans and procedures – ensures systematic, consistent sampling methodology
  - Collecting water samples and submitting samples for tritium analysis to independent laboratories certified by the State of Nevada
  - Checking the data to ensure quality
  - Providing sampling methodology, data, and quality check results to DOE for inclusion in the Annual NNSS Site Environmental Report
- Distributing results to the public
  - Public media, fact sheets, brochures or handouts
  - Local government awareness
  - Public meetings and community events
- Ensure public's perspective is represented

TSaMP Public Outreach

- Articles ran in the local newspaper (PVT) on 12/18/15, 4/29/16, and 3/10/17
- Tour for the NSSAB and CEM's (12/16/15)
- Supplied sampling results to the DOE for inclusion in the 2015 and 2016 NNSSER
- Presented poster of results at the 2016 DOE Groundwater Open House - Amargosa July 26, 2016
- Presented results at CEMP meeting in Tonopah , Nevada on July 30, 2016



Nye County tests wells for tritium

By Daria Sokolova
Pahrump Valley Times

The final stage of groundwater sampling to determine the amount of tritium in Nye County wells around Nevada National Security Site took place Wednesday.

As part of the procedure that was supported by the Department of Energy grant award, Nye County officials collected water samples from 10 wells in Amargosa Valley and Beatty, the two downgradient locations from areas formerly used for nuclear weapons testing.

Nye County contract geologist Jamie Walker and geoscientist John Klenke test water from the well in Beatty on Wednesday before taking samples. The procedure was supported by the Department of Energy grant that had been awarded to Nye County to determine the amount of tritium in Nye County wells around Nevada National Security Site. Daria Sokolova/Pahrump Valley Times

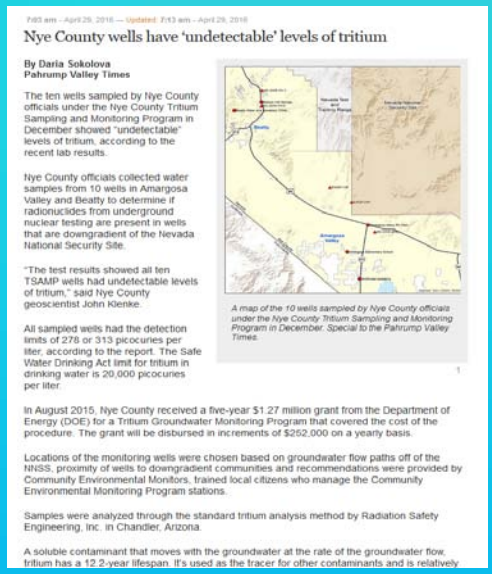
The cost of the endeavor, which was preceded by a score of preparations, came to $50,000. After Nye County accepted a five-year $1,277,000 grant award from the DOE for a Tritium Groundwater Monitoring Program in August, officials said it will be disbursed in increments of $252,000 on a yearly basis.

"So, when you are looking for evidence of transport of contaminants, tritium will be the first one to show up and you will see it first," said Jamie Walker, Nye County contract geologist. "It's relatively simple to analyze for, it's not complicated and it's referred to as the ultimate tracer."

A soluble contaminant that moves with the groundwater at the rate of the groundwater flow, tritium has a 12.2-year lifespan. Its maximum contamination level for drinking water set by the EPA is 20,000 picocuries per liter, officials said.

Nye County officials said they will supply the collected information to the Community Environmental Monitoring Program (CEMP) that previously looked at atmospheric counters and groundwater around the Nevada National Security Site but has been shifting its focus to downgradient portions of the water.

A day-long tour attracted a group of local officials and community stakeholders who observed



Nye County wells have 'undetectable' levels of tritium

By Daria Sokolova
Pahrump Valley Times

The ten wells sampled by Nye County officials under the Nye County Tritium Sampling and Monitoring Program in December showed "undetectable" levels of tritium, according to the recent lab results.

Nye County officials collected water samples from 10 wells in Amargosa Valley and Beatty to determine if radionuclides from underground nuclear testing are present in wells that are downgradient of the Nevada National Security Site.

"The test results showed all ten TSAMP wells had undetectable levels of tritium," said Nye County geoscientist John Klenke.

A map of the 10 wells sampled by Nye County officials under the Nye County Tritium Sampling and Monitoring Program in December. Special to the Pahrump Valley Times

All sampled wells had the detection limits of 278 or 313 picocuries per liter, according to the report. The Safe Water Drinking Act limit for tritium in drinking water is 20,000 picocuries per liter.

In August 2015, Nye County received a five-year $1.27 million grant from the Department of Energy (DOE) for a Tritium Groundwater Monitoring Program that covered the cost of the procedure. The grant will be disbursed in increments of $252,000 on a yearly basis.

Locations of the monitoring wells were chosen based on groundwater flow paths off of the NNSS, proximity of wells to downgradient communities and recommendations were provided by Community Environmental Monitors, trained local citizens who manage the Community Environmental Monitoring Program stations.

Samples were analyzed through the standard tritium analysis method by Radiation Safety Engineering, Inc. in Chandler, Arizona.

A soluble contaminant that moves with the groundwater at the rate of the groundwater flow, tritium has a 12.2-year lifespan. It's used as the tracer for other contaminants and is relatively

DOE Awards Nye County Grant for Community-Based Groundwater Monitoring

December 29, 2015 - 12:25pm

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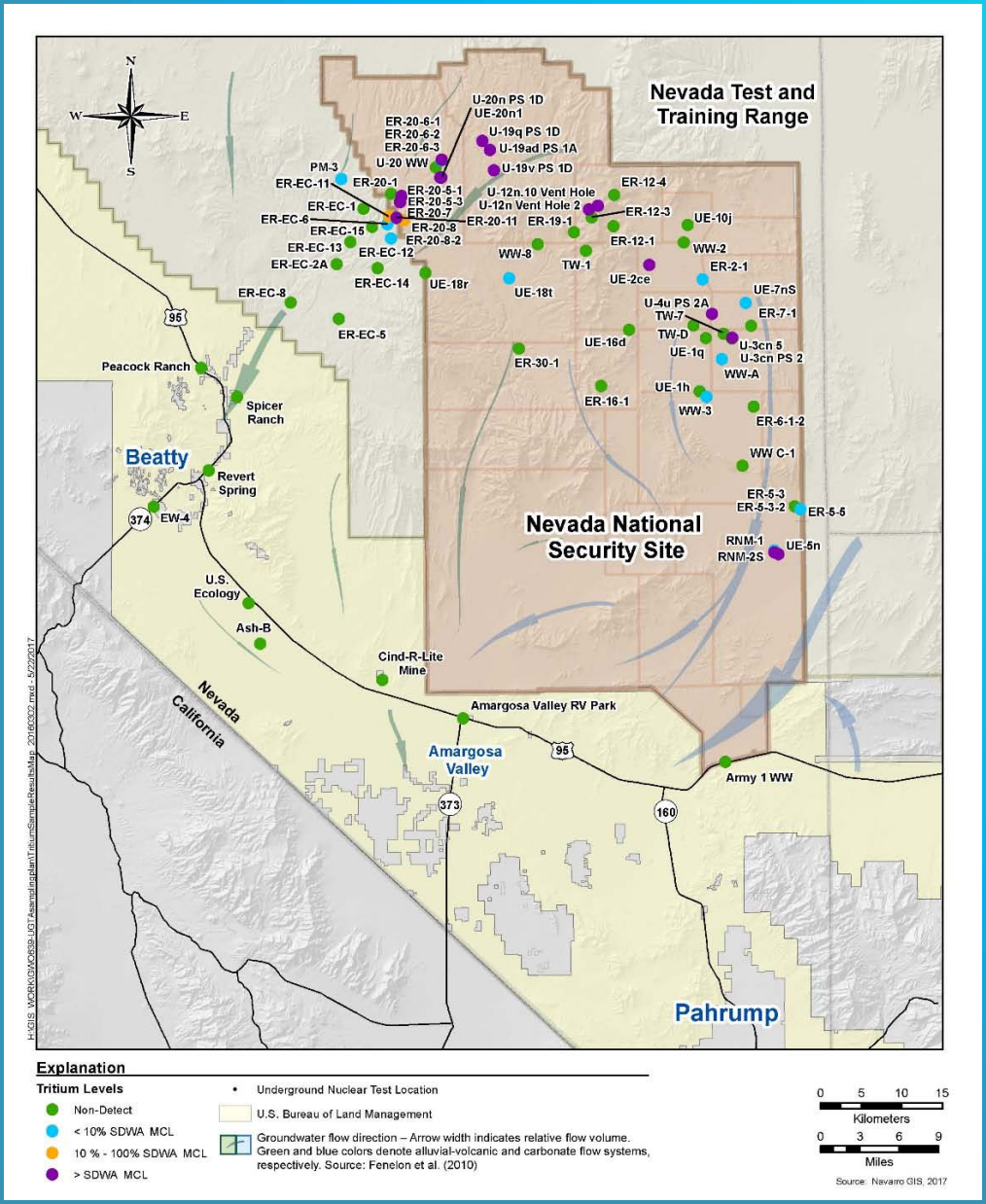
CEMP Stations and Focus Area

- Map at right shows CEMP stations (www.cemp.dri.edu)
- Regional groundwater flow direction is predominantly north to south
- Downgradient areas outlined in blue
- Note that we are characterizing conditions in offsite areas only

Locations Sampled By DOE



- Map shows sampled sites under the NNSS Integrated Groundwater Monitoring Program on and off the NNSS and NTTR
- Tritium results are represented as a percentage of the 20,000 pCi/L, (SDWA MCL)
- Note localized variations in the groundwater flow directions
- Focus area for this study is primarily south and southwest of the NNSS and NTTR

- Indicates levels > SDWA MCL

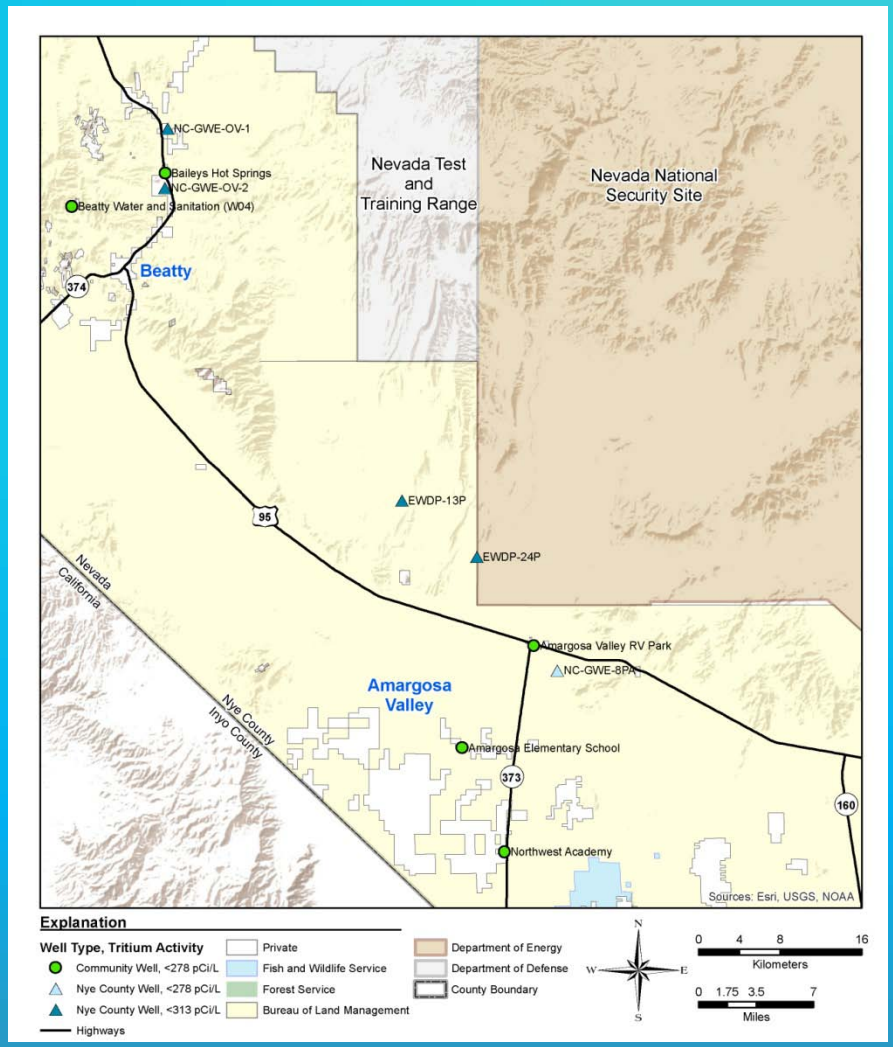
Determining Nye County Sample Locations

- Location selection considers input from the Community Environmental Monitors [CEMs] and the public.
  - CEM's water sampling program will allow us to learn more about the water quality (tritium) adjacent to and downgradient from the NNSS and NTTR and about changes in water quality (tritium) with time.
- Initial screening of candidate sites was based on the following criteria:
  - Proximity to population centers
  - Groundwater gradient (flow directions)
  - Potential contaminant transport pathways considering geology/hydrology, faults, and rock/soil types
  - Availability/Access to sampling location
    - Screened intervals
    - Casing type and diameter
  - Desire to broaden baseline from locations previously sampled, to include some of the wells drilled by Nye County as part of past scientific characterization programs

2015 Sampling locations

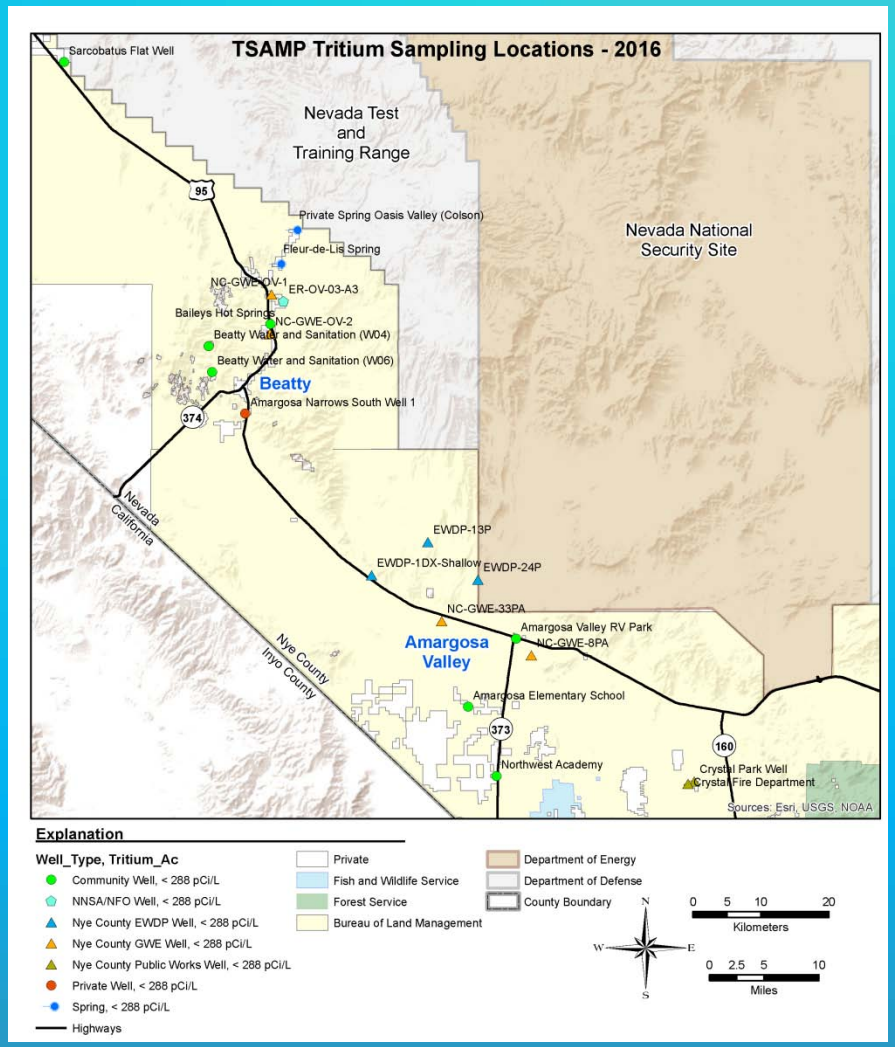
- Location of 10 core wells
  - Sampled every year
  - 2015 test results showed all ten wells had undetectable levels of tritium (below MDL of ≈ 300 pCi/L)

- NC-GWE-OV-1
- NC-GWE-OV-2
- NC-EWDP-13P
- NC-EWDP-24P
- NC-GWE-8PA
- Amargosa Elementary School
- Amargosa Valley RV Park
- Beatty Water and Sanitation (W04)
- Northwest Academy
- Baileys Hot Springs



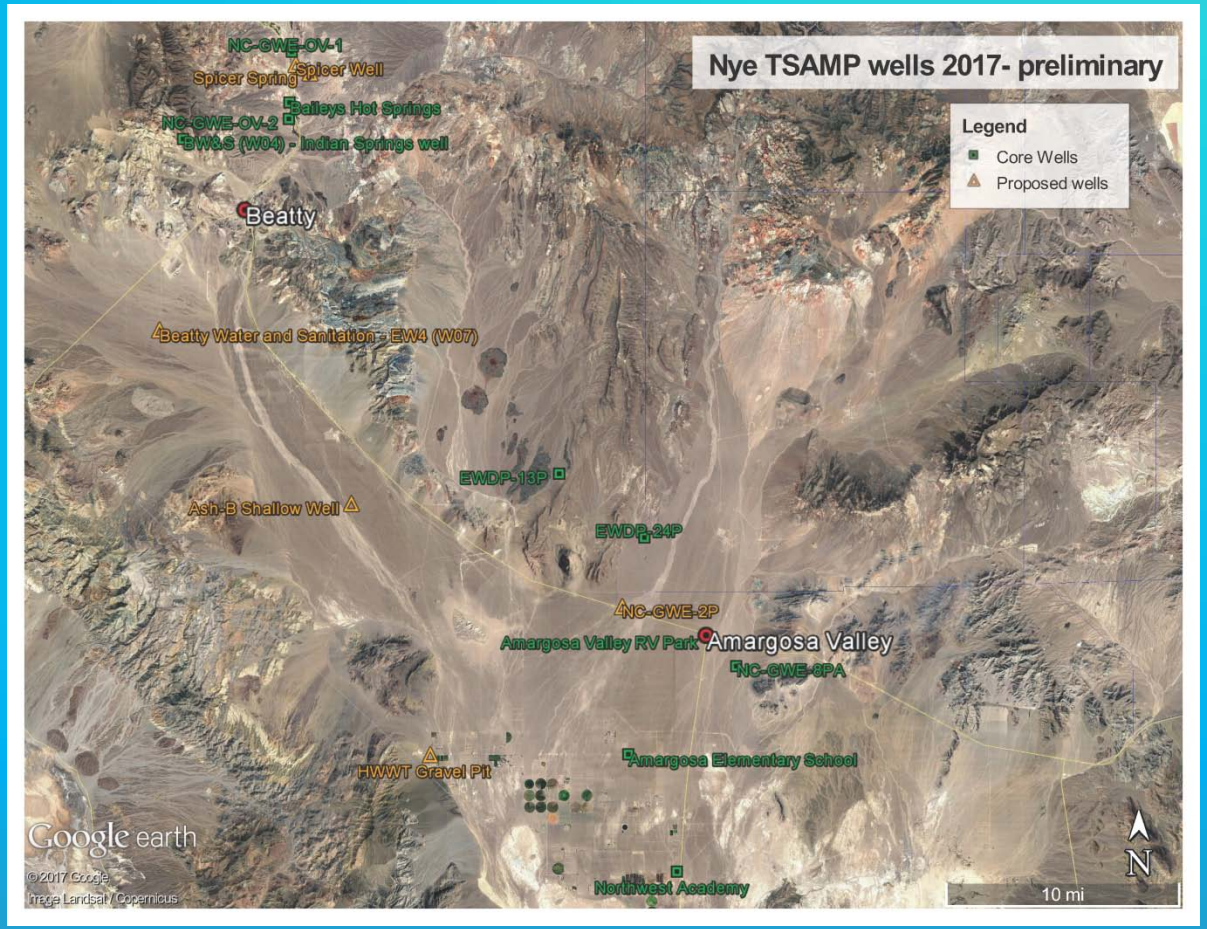
2016 Sampling locations

- Nye County sampled 18 wells and 2 springs
- Included 10 core wells plus 10 additional locations
  - NC-EWDP-1DX-Shallow
  - NC-GWE-33PA
  - ER-OV-03-A3 (NNSA/NFO well)
  - Beatty Water and Sanitation (W06) – Summit well
  - Amargosa Narrows South Well 1
  - Crystal Fire Department
  - Crystal Park Well
  - Fleur-de-Lis Spring
  - Sarcobatus Flat Well
  - Private Spring Oasis Valley (Colson)
- 2016 test results showed all 20 wells had undetectable levels of tritium (below MDL of ≈ 300 pCi/L)



2017 Proposed Sampling locations

- Will include 10 core wells plus an additional 10 locations
- Preliminary picks
  - NC-GWE-2P
  - Spicer Spring
  - Spicer Well *
  - Beatty Water and Sanitation -EW4 (W07) –
  - Ash-B Shallow Well
  - HWWT Gravel Pit
- Need an additional 4 to 5 well locations to sample

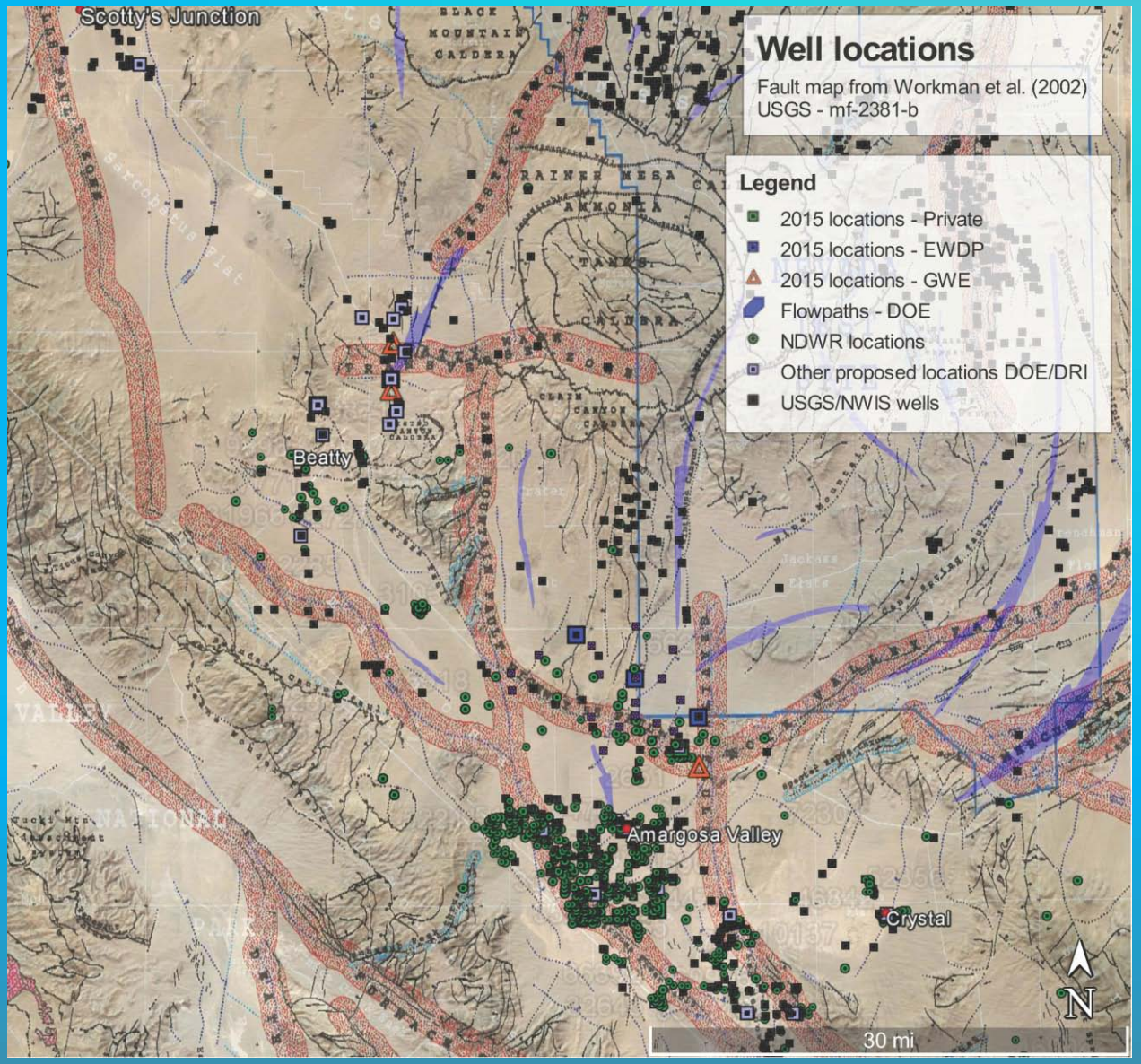


Sampling Recommendations

- Need an additional 4 to 5 sampling locations for 2017
  - What are the priorities for well sampling locations?
    - Wells used by communities?
    - Wells that provide early detection but may not be portable water sources?
  - What wells or other locations does the public consider to be of highest priority?
  - What locations do you feel should be sampled?
    - 2017
    - In future years (2018- 2019)
  - When making your recommendations, please consider:
    - Past sampling results (e.g., historical tritium detections)
    - Groundwater Age -Tritium will decay to less than 1% of its present level in 7 half-lives (86 yrs)

Sampling Recommendations – cont

- Well locations in the vicinity of Beatty and Amargosa
  - Sources:
    - USGS/NWIS
    - NDWR
- Note localized variations in the groundwater flow directions



Future Years

- We would like to continue working with the CEMs and the public through face-to-face meetings, community events, and other opportunities to identify locations of interest for sampling
- We need your help to ensure data are collected in the areas of greatest concern for the communities!

Acknowledgements

- Nye County would like to thank the DOE for staff support and funding for the TSaMP program.
- Nye County would like to thank the DRI for the opportunity to corroborate with the CEMP and share ideas and results.

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