

January 10, 2011

U.S. Department of Energy
Office of Legacy Management
ATTN: Art Kleinrath
Site Manager
955 Mound Road
Miamisburg, OH 45342

SUBJECT: Rulison Long-Term Hydrologic Monitoring Program Sampling and Analysis
Results for 2010

Dear Mr. Kleinrath:

The U.S. Department of Energy (DOE) Office of Legacy Management conducted annual sampling at the Rulison, Colorado, Site for the Long-Term Hydrologic Monitoring Program (LTHMP) on May 10 and 11, 2010. The U.S. Environmental Protection Agency (EPA) Radiation and Indoor Environments National Laboratory in Las Vegas, Nevada, analyzed the samples. Samples were analyzed for gamma-emitting radionuclides by high-resolution gamma spectroscopy and for tritium using the conventional and enriched methods.

Site Location and Background

The Rulison Site is located in Garfield County in western Colorado (see enclosed Figure 1). The Rulison test was designed and conducted to evaluate the use of a nuclear detonation to fracture the tight, gas-bearing formations in the Piceance Basin for enhanced natural gas production. A 43-kiloton device was detonated on September 10, 1969, at a depth of 8,426 feet below ground surface within the Williams Fork Formation of the Mesaverde Group.

Sampling locations (see enclosed Figure 2) are a combination of wells and surface water locations. Sampling locations range from within a few hundred feet of surface ground zero (SGZ) to over 4 miles from SGZ. EPA performed the LTHMP sampling from the program's inception in 1972 through 2007. The results of the historical monitoring at Rulison have consistently shown that nuclear-test-related contamination has not impacted groundwater and surface water at the sampling locations. In 2008, DOE reviewed all previous LTHMP data and evaluated future sampling locations. Based on the approximate thirty-five years of groundwater and surface water collection results, the depth to the Rulison shot-point, and limited options for transport, DOE concluded that the monitoring of distant groundwater and surface water locations was not effective to detect detonation-related migration. The evaluation determined that a monitoring program focused on detecting contaminant migration from the detonation zone was warranted. The monitoring program emphasizes the sampling of natural gas production wells, which are considered the most likely pathway for transporting detonation-derived contaminants. The results of the natural gas monitoring program can be found online at www.lm.doe.gov/Rulison/Documents.aspx under the heading "Natural Gas Well Monitoring

Results.” Not only will gas production wells near the site be sampled, but sampling will continue at groundwater and surface water locations near SGZ, as those locations are used to verify the success of surface remediation activities.

Sample Analytical Results

Table 1 shows the sample analysis results. The results demonstrate that no detonation-related contaminants are impacting any of the sampling locations. Four sampling locations were not sampled because the relevant property owners denied access. These locations are noted in Table 1. Three sampling locations yielded a reportable value of tritium activity using the electrolytic enrichment method, and one sampling location yielded a reportable value of tritium activity using the conventional method. The values ranged from 22.9 to 156 picocuries per liter (pCi/L). No surface water samples were analyzed using the electrolytic enrichment method in 2010. Conventional tritium analysis for the balance of the sampling locations resulted in no detectable activity. These results are consistent with background levels for tritium. For comparison, the EPA drinking water standard for tritium is 20,000 pCi/L. Figures 3 and 4 show historical enriched tritium sample analysis results, the EPA drinking water standard, and a line representing the natural decay rate for tritium. In Figure 3, one can see that the historical enriched tritium analysis results parallel the natural rate of tritium decay, an indication that additional tritium from detonation-related contamination is not being detected. All high-resolution gamma spectroscopy results for gamma-emitting radionuclides were below detection limits.

Table 1. Rulison LTHMP Water Sample Analysis Results

Sample Location	Collection Date	Tritium (pCi/L)	Gamma Spectroscopy (pCi/L)
Cary Weldon (private well)	Not Sampled	-	-
Wesley Kent (private well)	Not Sampled	-	-
CER Test (private well)	05/10/2010	25.6 ^{a,b,c}	ND ^d
Daniel Gardner (private well)	05/10/2010	156 ^e	ND
Kevin Whelan (private well)	05/10/2010	ND	ND
Morrissania Ranch (private well)	05/10/2010	22.9 ^{a,b}	ND
Patrick McCarty (private well)	05/10/2010	32.4 ^{a,b}	ND
Tim Jacobs (private well)	05/10/2010	ND	ND
City Springs (spring)	05/11/2010	ND	ND
Spr 300 Yrd N of GZ (spring)	Not Sampled	-	-
Sprg 500 ft E of GZ (spring)	Not Sampled	-	-
Battlement Creek (creek)	05/10/2010	ND	ND
Potter Ranch (spring)	05/10/2010	ND	ND

^a Analyzed using both conventional and enriched tritium methods.

^b Result from enriched tritium analysis method.

^c Conventional tritium detection limit was 146 pCi/L; enriched tritium detection limits ranged from 3.50 to 4.02 pCi/L.

^d Gamma spectroscopy detection limits are nuclide-specific and sample-specific and can range from approximately 2 pCi/L to 170 pCi/L.

^e Estimated value (less than 3 times the detection limit).

ND = not detected

Conclusions

Tritium and gamma-emitting contaminant concentrations in water samples collected at Rulison are consistent with historical sample analysis results. The results continue to verify that detonation-related contaminants have not impacted groundwater and surface water at the sampling locations.

Please contact me with any questions at (970) 248-6477.

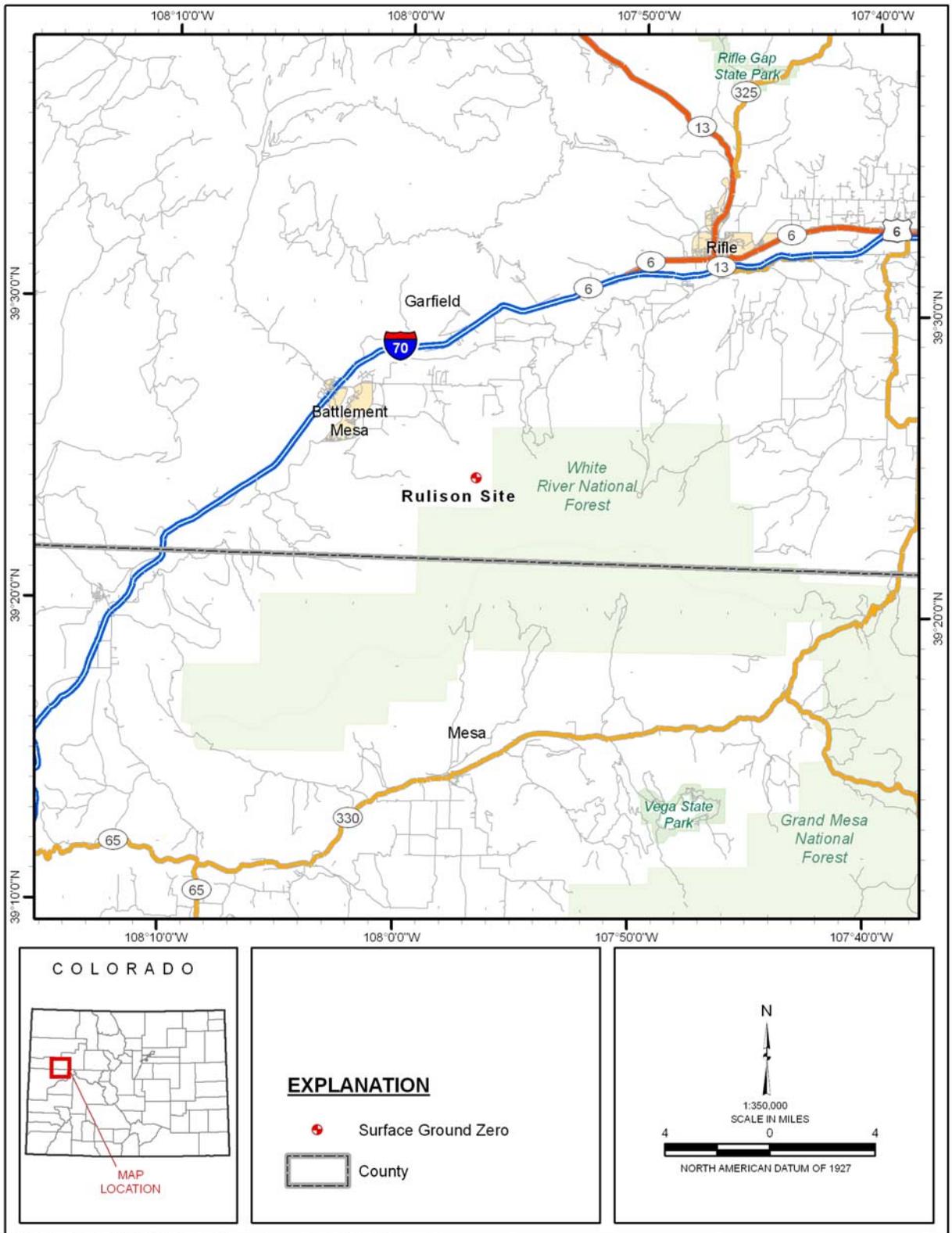
Sincerely,

Richard D. Hutton
Task Manager

Enclosures

cc: (electronic)
Jack Duray, S.M. Stoller Corporation (Stoller)
Rex Hodges, Stoller

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Figure 1. Rulison, Colorado, Site Location Map

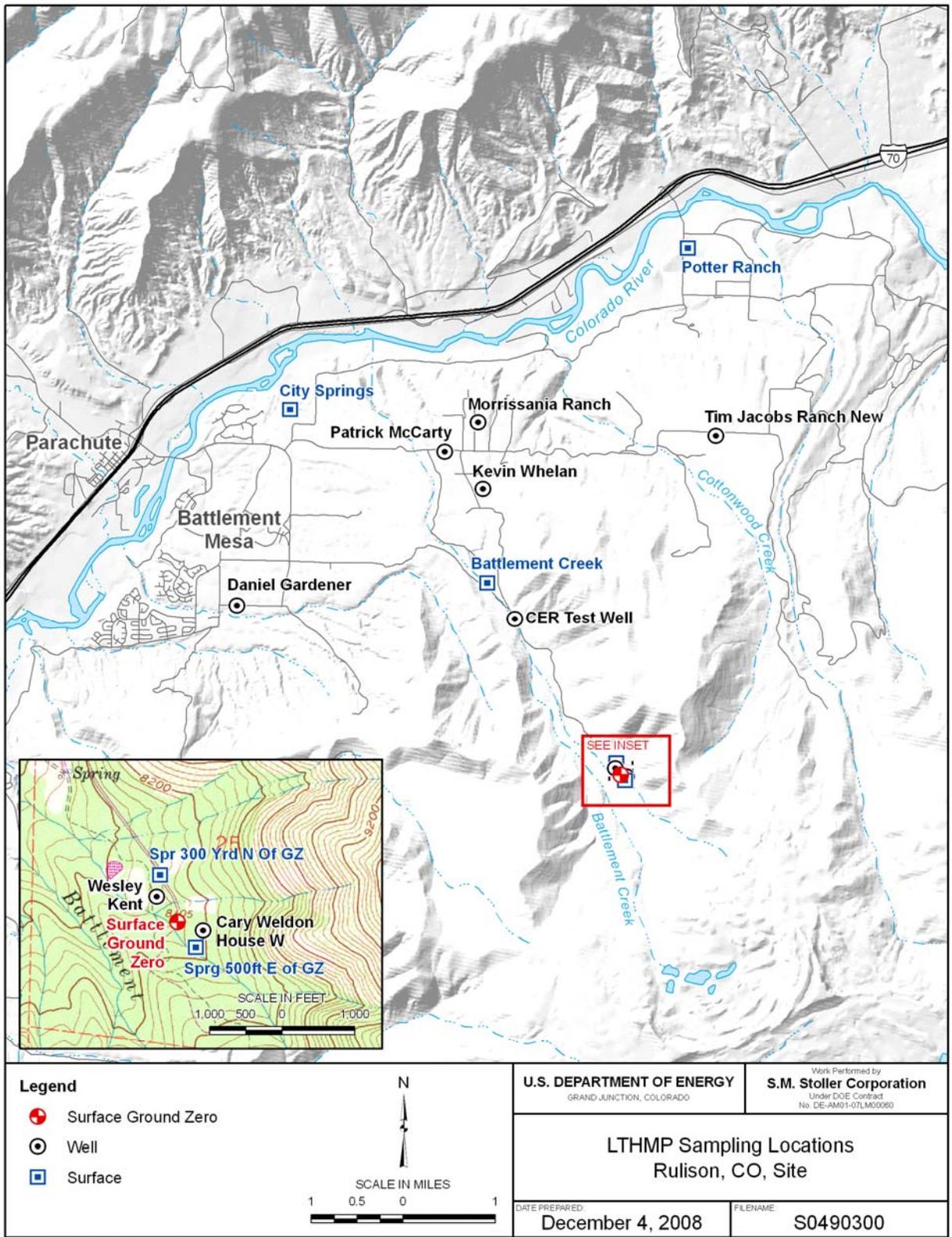


Figure 2. LTHMP Sampling Locations, Rulison, Colorado, Site

Rulison Site Enriched Tritium Concentration for Wells

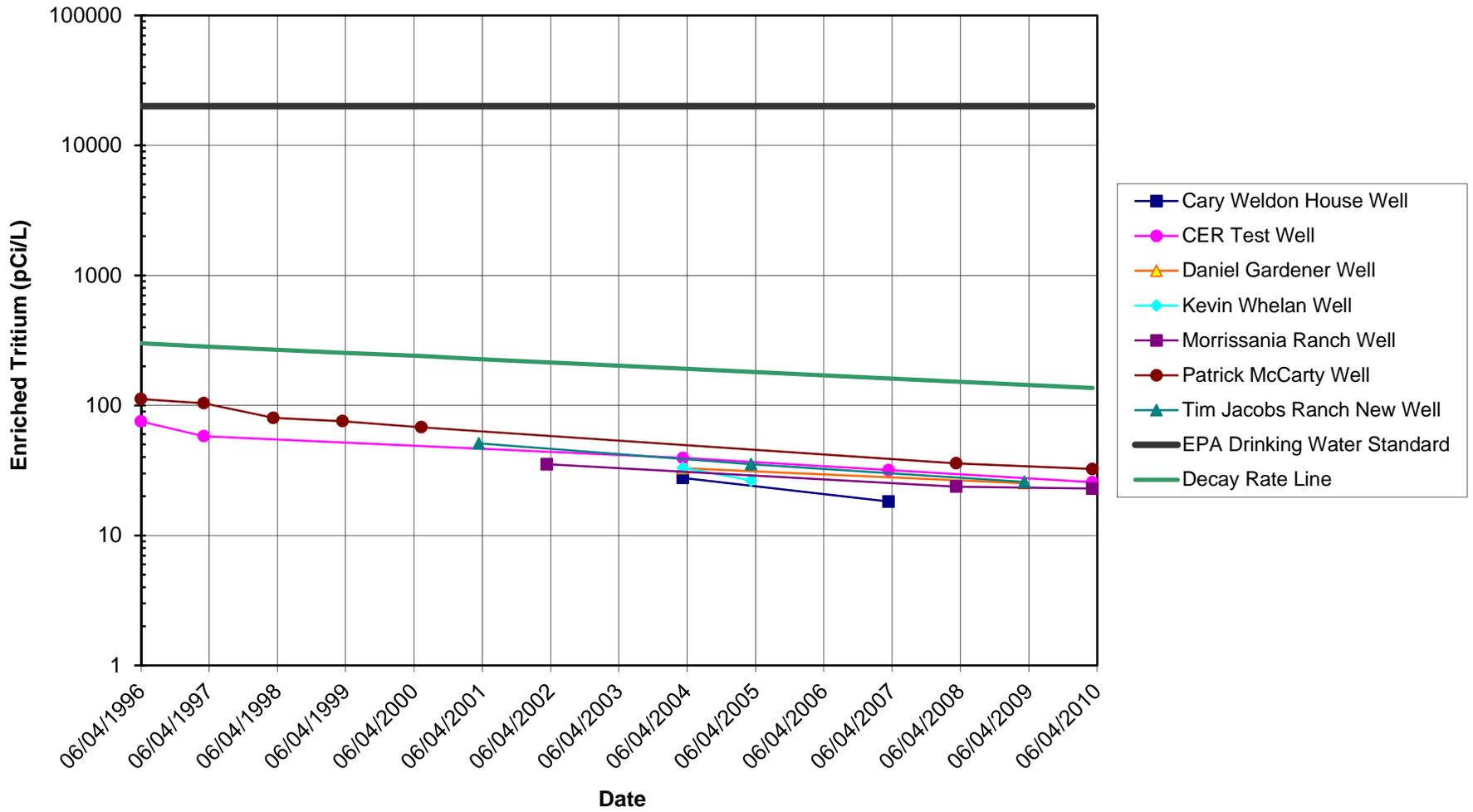


Figure 3. Enriched Tritium Concentrations—Wells, Rulison, Colorado, Site

**Rulison Site
Enriched Tritium Concentration
for Springs/Surface Water**

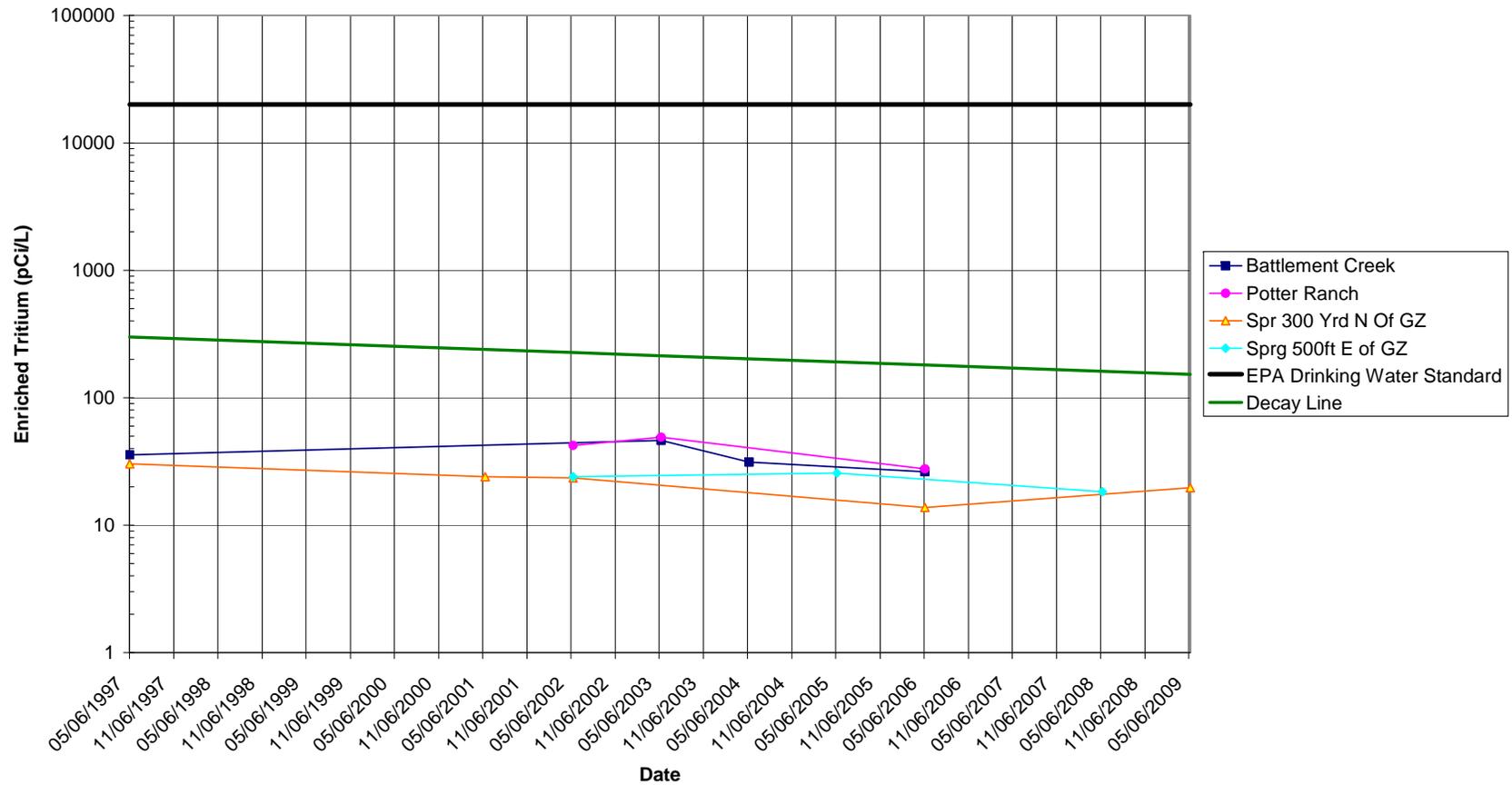


Figure 4. Enriched Tritium Concentrations—Surface Water, Rulison, Colorado, Site