

May 10, 2012

U.S. Department of Energy
Office of Legacy Management
ATTN: Art Kleinrath
Site Manager
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: Contract No. DE-AM01-07LM00060, S. M. Stoller Corporation (Stoller)
Long-Term Hydrologic Monitoring Program Sampling and Analysis Results
for 2011 at Rulison, Colorado

REFERENCE: Task Order LM00-502-07-619, Rulison, CO, Site

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 18, 2011. The samples were shipped to the U.S. Environmental Protection Agency (EPA) Radiation and Indoor Environments National Laboratory in Las Vegas, Nevada, for analysis. All requested analyses were successfully completed, with the exception of the determination of tritium concentration by the enrichment method. The laboratory no longer provides that service. Samples were analyzed for gamma-emitting radionuclides by high-resolution gamma spectrometry and for tritium using the conventional method. Starting in 2012, DOE will retain a different laboratory that provides the enriched tritium analysis service.

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 or surface water at the sampling locations. In 2008, DOE reviewed all previous LTHMP data and evaluated future sampling locations. Based on the approximate 35 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 an effective approach for detecting detonation-related contaminant migration. The evaluation concluded that an updated monitoring program focused on detecting contaminant migration from the detonation zone was warranted. The updated monitoring program emphasizes the sampling of natural gas production wells in the vicinity of the Rulison site. Producing gas wells near the Rulison site 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 water sample analysis results for 2011. The results demonstrate that no detonation-related contaminants are impacting any of the sampling locations. Four sampling locations were not sampled because the property owners denied access to the sampling locations. These locations are noted in Table 1 as “not sampled.” Conventional tritium analysis for all of the sampling locations resulted in no detectable activity. 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. These results are consistent with background levels for tritium. For comparison, the EPA drinking water standard for tritium is 20,000 pCi/L. 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. As stated earlier, no enriched tritium analyses were conducted this year because the laboratory no longer provides that service.

Table 1. Rulison LTHMP Water Sample Analysis Results

Sample Location	Collection Date	Tritium ^a (pCi/L)	Gamma Spectrometry (pCi/L)
Cary Weldon (private well)	Not Sampled	-	-
Wesley Kent (private well)	Not Sampled	-	-
CER Test (private well)	05/18/2011	ND	ND
Daniel Gardner (private well)	05/18/2011	ND	ND
Kevin Whelan (private well)	05/18/2011	ND	ND
Morrissania Ranch (private well)	05/18/2011	ND	4.17 ^{b,c} (Bi-214)
Patrick McCarty (private well)	05/18/2011	ND	ND
Tim Jacobs (private well)	05/18/2011	ND	ND
City Springs (spring)	05/18/2011	ND	ND
Spr 300 Yrd N of GZ (spring)	Not Sampled	-	-
Sprg 500 ft E of GZ (spring)	Not Sampled	-	-
Battlement Creek (creek)	05/18/2011	ND	ND
Potter Ranch (spring)	05/18/2011	ND	5.18 ^{b,c} (Bi-214)

^a Conventional tritium detection limits ranged from 129 pCi/L to 147 pCi/L.

^b Gamma spectrometry detection limits are nuclide-specific and sample-specific.

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

ND = not detected

The high-resolution gamma spectrometry results for gamma-emitting radionuclides detected measurable concentrations of bismuth-214 at the Morrissania Ranch well and the Potter Ranch spring (Table 1). These concentration results are considered estimated values because of the high degree of uncertainty associated with very low measured concentrations. Bismuth-214 is a naturally occurring radionuclide in the uranium-238 decay chain. Bismuth-214 is not a fission product from a nuclear detonation and, therefore, does not indicate the presence of detonation-related contamination.

No other radionuclides were detected by the high-resolution gamma spectrometry analysis.

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,

Rick Hutton

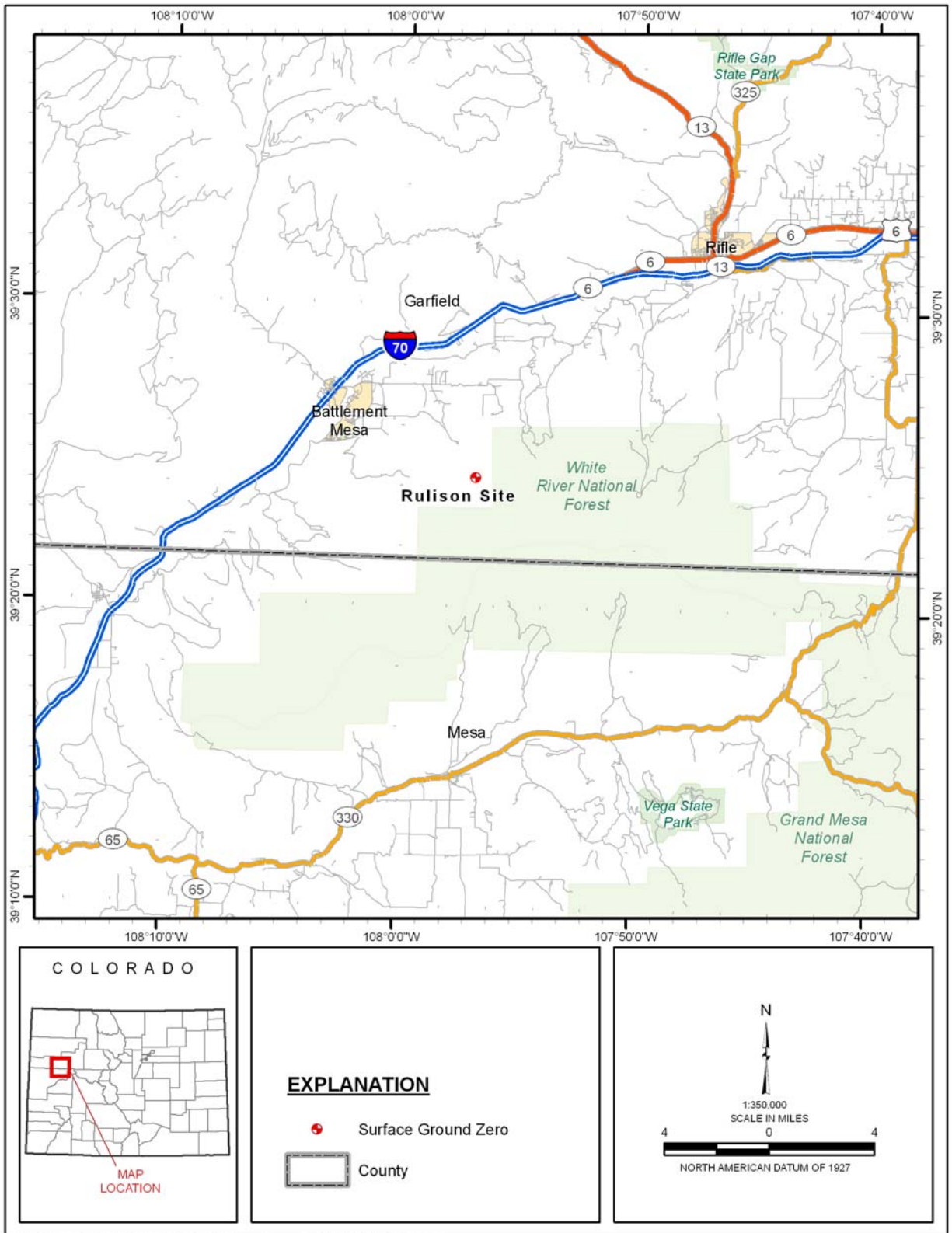
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Richard D. Hutton
Task Manager

Enclosures

cc: (electronic)
Jack Duray, Stoller
Rex Hodges, Stoller

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Figure 1. Rulison, Colorado, Site Location Map

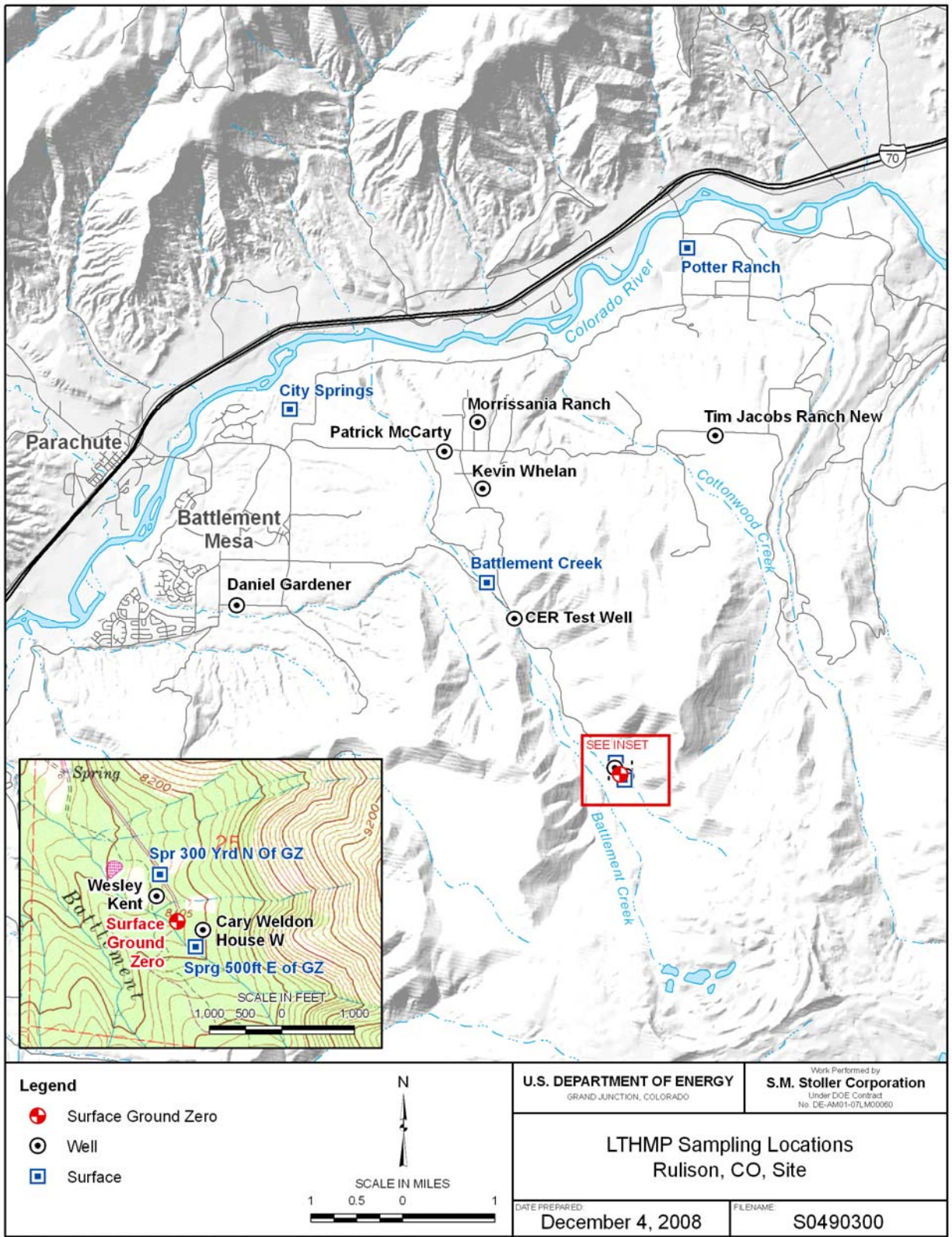


Figure 2. LTHMP Sampling Locations, Rulison, Colorado, Site

Rulison Site Enriched Tritium Concentration for Wells

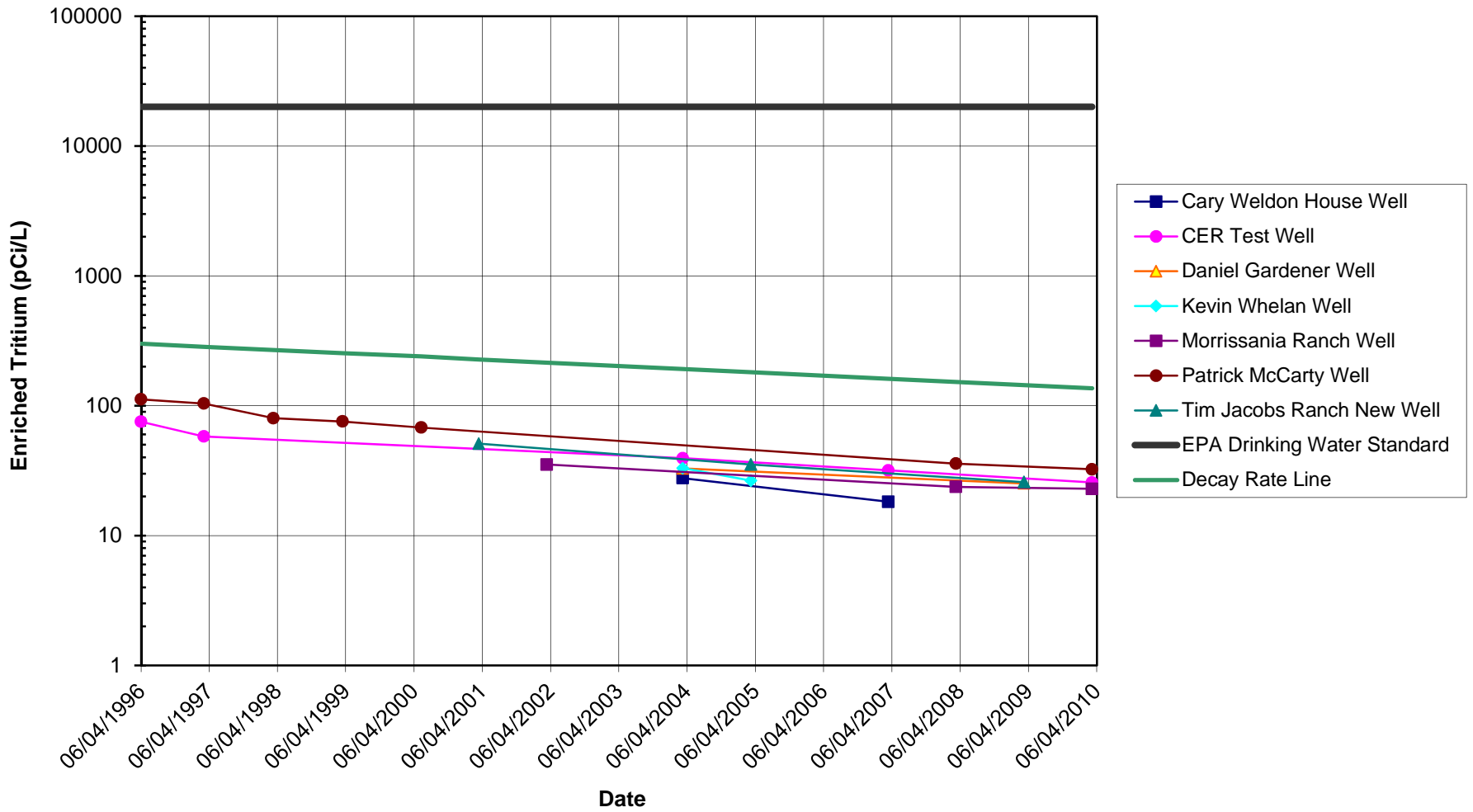


Figure 3. Enriched Tritium Concentrations—Wells, Rulison, Colorado, Site

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

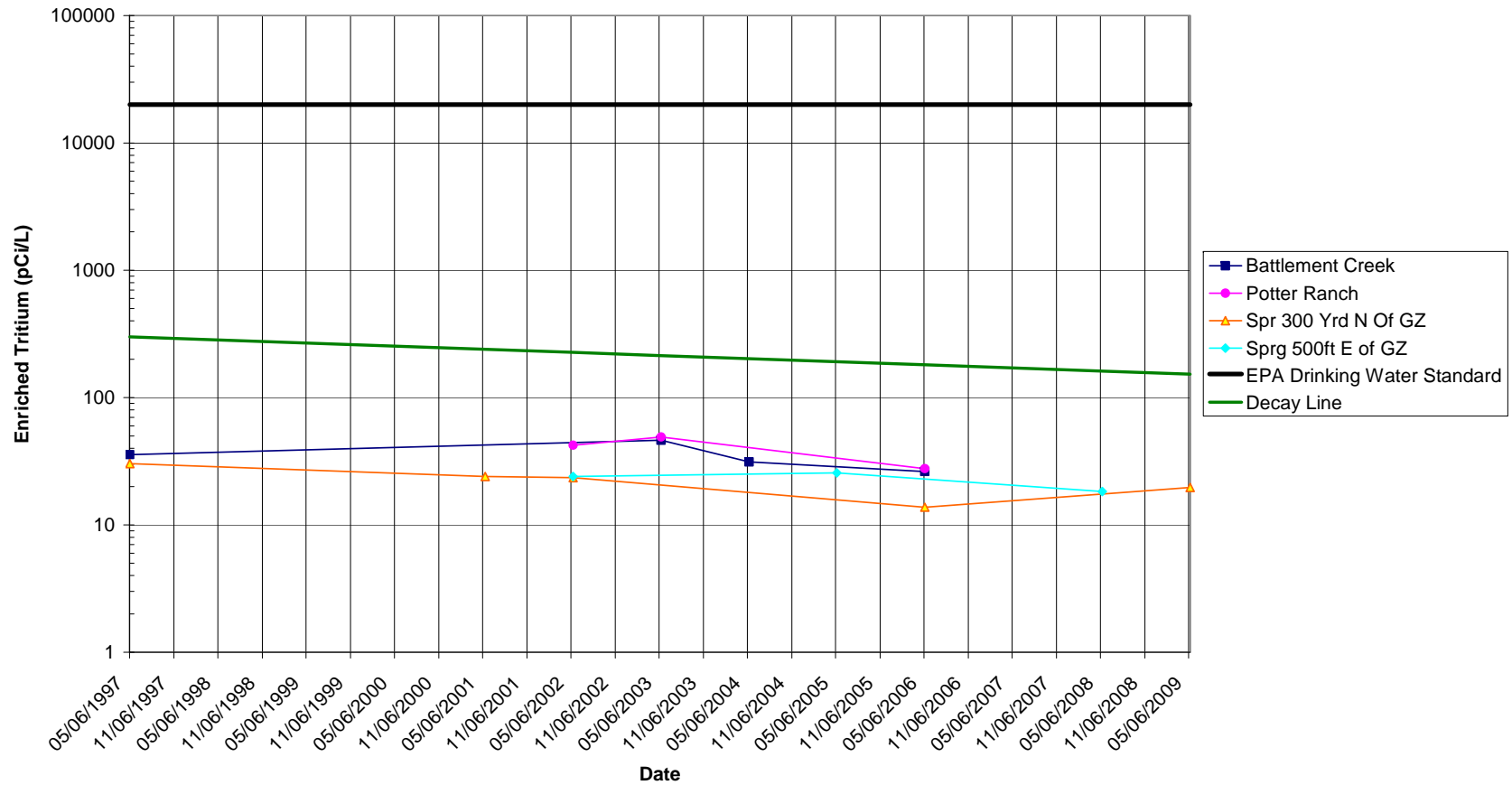


Figure 4. Enriched Tritium Concentrations—Surface Water, Rulison, Colorado, Site