

ROCKY FLATS SITE

REGULATORY CONTACT RECORD 2015-08

Purpose: Solar Ponds Plume Treatment System Interim Design and Implementation

Contact Record Approval Date: September 8, 2015

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Regulatory Contact(s)/Affiliation(s): Carl Spreng, Colorado Department of Public Health and Environment (CDPHE); Vera Moritz, U.S. Environmental Protection Agency (EPA)

Date of Consultation Meeting: July 13, 2015

Consultation Meeting Participants: Carl Spreng, CDHPE; Scott Surovchak, DOE; John Boylan, Kurt Franzen, Linda Kaiser, George Squibb, David Ward, SN3; Michelle Hanson, Jody Nelson, JG Management Systems, Inc.

Introduction: The Solar Ponds Plume Treatment System (SPPTS) at the Rocky Flats, Colorado, Site collects and treats water contaminated with nitrate and uranium. As described in several annual reports (especially the annual reports for 2006, 2007, 2008, and 2009) and documented in Contact Records 2007-02, 2008-03, 2008-06, 2008-08, 2009-01, and 2014-08, the SPPTS has been the focus of extensive study and modification over the past several years, particularly since the site closed. The primary objective has been to improve collection and treatment of contaminated groundwater, and has included repairs, subsurface exploration, treatability studies (laboratory, bench-scale, and pilot-scale), and the design and construction of system upgrades. Several factors drove these efforts, including the following:

1. Historically, concentrations of nitrate and uranium measured at the sampling location associated with the subsurface effluent discharge gallery (formally referred to as SPPDISCHARGE GALLERY, but often shortened to Discharge Gallery or DG) usually exceeded those in untreated influent to the system, even though this is where effluent confirmed to be adequately treated contributes to a pool of water on the ground surface.
2. Accessing and maintaining the treatment media and plumbing within the original structure is costly and difficult.
3. The original treatment media is not optimal over the long term. All of the currently viable alternatives for future system configurations eliminate use of the treatment media as configured in the original system.

The first factor listed above was addressed in 2008 with the installation of components that capture more of the contaminated groundwater. Recent annual reports (i.e., 2010, 2011, 2012, 2013, and 2014) have presented and discussed further efforts to optimize the effectiveness of the

SPPTS and to test alternatives for system reconfiguration, focusing on the performance of bench-scale and pilot-scale treatability studies.

The current focus has shifted to a more extensive reconfiguration of the system. Design of this reconfiguration was scheduled to begin in 2016. However, due to the condition of the media and the overburden within the large original treatment cell structure (the “Big Box”) and the fact that the Big Box has become clogged, this component needs to be emptied sooner. The heavy precipitation in the first 6 months of 2015 (greater than a typical year) has increased the need to empty the system and improve treatment of influent water. Evaluation of the best long-term configuration of the system is in progress, requiring further testing and alternatives analysis. Simply replacing the treatment media in the Big Box would not be appropriate or adequate due to the flow rates, the treatment targets, and the substantial waste that would result for such a short-term operation. Therefore, a different configuration is necessary in the interim period.

Discussion: During the July 13, 2015, Rocky Flats Legacy Management Agreement (RFLMA) parties’ consultation, the following SPPTS interim configuration was proposed and discussed:

1. Empty the Big Box material (overburden and treatment media) and dispose of the material as discussed below.
2. Take the Phase II uranium treatment cell out of service and remove and dispose of its contents as discussed below.
3. Create a lagoon in Cell 1 and a settling tank in Cell 2 of the Big Box. Cell 1 is the larger of the two cells and can provide a residence time for the entire SPPTS groundwater flow similar to the residence time that currently is used in the pilot-scale lagoons. The pilot-scale lagoons have been successful in removing nitrate (see the 2014 Annual Report). The pilot-scale lagoons also remove substantial uranium from the influent (generally 30 to 50 percent, sometimes more). No additional full-scale uranium treatment component will be installed in the interim system.
4. Install an insulated roof over the Big Box to reduce temperature fluctuations in the lagoon, which will help to maintain a healthy population of denitrifying bacteria.
5. Continue to test approaches for treating uranium, focusing primarily on the lagoon effluent. These tests will be performed on only a small portion of the effluent volume.

The proposal was based on the following considerations:

- The contents of the Big Box need to be removed very soon to resolve the clogged media problem.
- The pilot-scale lagoons have been successful in treating nitrate as well as in removing a substantial portion of the uranium.
- The recently tested microcell approach would be labor-intensive if it was operated at full scale. Based on current flows, approximately 10 microcells at a time would be needed to achieve a uranium concentration similar to what is seen from the pilot-scale lagoons, and each microcell would operate for only 1 to 2 weeks before needing replacement. This approach also would generate significant waste.
- A recently issued geochemical report shows that the SPPTS influent represents only a small portion of the uranium load in North Walnut Creek (i.e., less than 10 percent).

- Because nitrate can mobilize uranium through the chemical oxidation process, decreasing the nitrate in North Walnut Creek might also decrease uranium concentrations.

Therefore, the emphasis during the SPPTS interim configuration will be on treating nitrate in a full-scale lagoon.

This SPPTS interim configuration will be implemented starting in October 2015 when the Big Box will be emptied.

Water Management: While the Big Box is offline, untreated SPPTS influent will be pumped upgradient of the collection trench as previously approved in Contact Record 2008-06. (A small portion of the water will be directed to the pilot-scale lagoons periodically to maintain the treatment effectiveness of these components, as they will be the source of the denitrifying bacteria for the lagoon that will be installed in the Big Box.) Water that has passed through media in the Big Box is considered treated and the clear water (i.e., containing minimal particulates) generated during the process of removing and dewatering the media will be placed in the effluent manhole. If turbid water is generated during the process of dewatering the media, it will be placed upgradient of the SPPTS collection trench.

Media Management: The material in the Big Box consists of the following:

- Overburden (approximately 260 cubic yards of 90 percent wood chips and 10 percent dirt)
- Cell 1 nitrate treatment media (approximately 218 cubic yards of 90 percent sawdust and 10 percent zero-valent iron [ZVI]), plus 1 foot of gravel (20 cubic yards)
- Cell 2 uranium treatment media (approximately 72 cubic yards of 85 percent pea gravel and 15 percent ZVI), plus 1 foot of gravel (7 cubic yards),

The materials in the Big Box have been determined to be a solid waste. As such, the contents will be disposed of as a single waste stream at a local landfill. The solid waste characterization is based on process knowledge, the analytical data from the 2011 sampling event, and an evaluation by a certified health physicist.

The Phase II treatment cell contains media consisting of a varying mixture of pea gravel and ZVI installed as layers (from approximately 15 percent ZVI in the bottom layer to 45 percent ZVI in the upper layer). This treatment media was installed in 2010 and has a slightly higher content of ZVI and a different type of pea gravel than the original Phase II media. The media removed in 2010 was analyzed and shipped to the Energy Solutions disposal facility in Utah as low-level waste. Based on the 2010 data and the fact that the current treatment media is treating the same groundwater plume, the media removed during fall 2015 will also be disposed of at the low-level waste disposal facility in Utah.

Operations: Going forward, the Big Box lagoon will be operated and monitored for a minimum of four full seasons to evaluate nitrate and uranium removal efficiency, sludge buildup, factors that affect removal efficiency, optimization needs, and operation and maintenance requirements and costs. Results will inform the consideration and design of a longer-term SPPTS configuration.

The RFLMA parties agreed with implementing the above proposed SPPTS interim configuration.

Resolution: CDPHE, after consultation with EPA, will approve, approve with modification, or disapprove this contact record.

After completion of the approval process and incorporation of any required changes CDHPE approved this contact record.

Closeout of Contact Record: Progress and the completion of the work will be reported by DOE in RFLMA quarterly and annual reports of surveillance and maintenance activities for the period(s) in which these activities occur. The contact record will be closed when the media is removed, the required infrastructures are installed and any required revegetation and erosion controls are in place.

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Rocky Flats Contact Record File