

# 2013 ANNUAL REPORT

## GROUNDWATER/SURFACE WATER REMEDY

*Simplot Operable Unit*

*Eastern Michaud Flats Superfund Site*

*Pocatello, Idaho*

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*Prepared for:*

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## EXECUTIVE SUMMARY

This report presents the 2013 annual summary of operational information, monitoring results and evaluations of performance of the groundwater/surface water remedy for the Simplot Operable Unit (OU) of the Eastern Michaud Flats (EMF) Superfund Site (the Site) located near Pocatello, Idaho.

The groundwater/surface water remedy has been designed to meet the requirements of a Record of Decision issued by the Environmental Protection Agency (EPA) in 1998 and an Interim Record of Decision Amendment (IRODA) for the Simplot Operable Unit issued by EPA in February 2010. The remedy and monitoring also meets the requirements of a Voluntary Consent Order/Compliance Agreement (VCO/CA) between the Idaho Department of Environmental Quality (IDEQ) and the J.R. Simplot Company intended to fulfill Simplot's obligations for the Portneuf River Total Maximum Daily Load (TMDL).

The groundwater and surface water remedy consists of three elements: 1) lining of the existing gypsum stack to allow for continued placement of gypsum on top of the liner, 2) source controls in the Phosphoric Acid Plant (PAP) Area, and 3) groundwater extraction and reuse within the facility process. This report has been prepared in accordance with the Groundwater and Surface Water Monitoring Plan (Formation 2010d), and is intended to fulfill the reporting requirements for both the Superfund and VCO/CA projects.

A progress summary of remedy implementation in 2013 and the remedy performance is provided in the following paragraphs.

### Remedial Implementation/Status

#### Gypsum Stack Source Control

Source control for the gypsum stack will be achieved by lining the entire stack with a high density polyethylene liner in multiple phases of work. Phase I consisted of Decant Pond construction and lining of the lower stack. The Decant Pond is necessary for water management during the operation of a lined stack. The Decant Pond construction was completed in October 2009, and the lined-lower stack was brought into operation in July 2011. Liner installation at the north section of the upper west compartment of the gypsum stack was completed in November 2012. Liner installation at the south section of the upper west compartment of the gypsum stack was completed in 2013. Liner installation at the upper east compartment of the gypsum stack (Phase 4), and preparation work for the lateral expansion at the northwest corner of the existing gypsum stack (Phase 6) scheduled for construction in 2014.

### PAP Area Source Control

Source control in the PAP Area in 2013 consisted of replacement of the #2 Sump and Pad, upgrade of the SPA Aging Tank floor, replacement of the 19B Pad (to be completed in 2014), and on-going inspections of tanks, pads and sumps. Numerous smaller projects and operational changes were also implemented to reduce the potential for releases from the PAP Area.

### Groundwater Extraction System

The groundwater extraction system consists of a network of Upper and Lower Zone wells near the northern and northwestern edge of the gypsum stack and downgradient of the PAP Area. The wells have been located to intercept groundwater affected by gypsum stack seepage and sources in the PAP Area. The extraction system is designed to extract affected groundwater downgradient of these areas in the Simplot OU prior to mixing with impacted groundwater from the adjacent FMC facility area and then with regional groundwater inflow prior to discharging to the Portneuf River. Thirteen extraction wells were operating in 2013. The extraction system was shut down for routine annual maintenance (plant turnaround) in late May through early June. Approximately 495 million gallons of groundwater were extracted during 2013.

East Plant Upper Zone extraction wells 404 and 407 were taken out of service in in October and have been converted to monitoring wells. These wells were difficult to operate due to low water level and typically produced less than 1 gpm when operating. Central Plant Area extraction well 419 was temporarily shutdown in January because total cadmium and chromium concentrations exceed the TCLP hazardous characteristic concentration.

In September, EPA approved a Pilot Treatment Study Work Plan for the Central Plant Area groundwater extraction system to determine if treatment of hazardous-characteristic groundwater can be implemented so that the treated groundwater can be recycled directly into the Don Plant process, while producing a sludge byproduct that is non-hazardous. A temporary pilot-scale batch treatment system, in operation at the Don Plant since February 2014, is being used to verify that extraction and treatment of the hazardous-characteristic groundwater can improve water quality such that well 419 can be brought back on-line per the approved extraction system design.

### **Groundwater Data Evaluation**

The groundwater data evaluation addresses the hypothesis tests and decision rules for the five monitoring program areas discussed in the following sections.

### Tracking Groundwater Quality in the Don Plant Area

The extent of indicator analytes (arsenic, phosphorus, and sulfate) in the Don Plant Area at the end of 2013 was similar to that at the end of 2012. Phosphorus concentrations in some wells in the East Plant Area have been increasing since the initiation of monitoring in 2004. The source of this increasing phosphorus concentration is believed to be related to the long-term operation of the gypsum stack, and a decrease in groundwater concentration is expected after lining of the entire gypsum stack is complete. Total phosphorus concentration downgradient of the Central Plant Area has been increasing since mid-October, and is the result of dense, low pH/high total phosphorus concentration liquid is diffusing upward from low spots in the surface of the AFLB clay near well 419, mixing with groundwater from upgradient of the PAP Area in the upper zone, and being transported by advection downgradient to the northeast.

### Demonstrating Source Control in the PAP Area

Concentrations of phosphorus in groundwater in this area have been monitored since the completion of the PAP Area Subsurface Investigation in 2009 (Simplot 2009b). Source control actions in the PAP Area have also been ongoing since 2009 and have achieved significant reductions in measured phosphorus concentrations in groundwater. Additional source control projects are proposed annually. Projects that were planned for 2013 are outlined in the Phosphorus Source Control Program.

### Demonstrating Hydraulic Control in the Target Capture Zones

Demonstrating hydraulic control in the target capture zones is performed according to EPA's *Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems* (EPA 2008). When the extraction system is operating as intended, affected groundwater should be captured by the extraction wells to the extent necessary to meet remedial objectives.

The estimated total rate of mass removal by the groundwater extraction system in 2013 was:

- ❑ 1.8 lbs arsenic/day
- ❑ 1,990 lbs total phosphorus/day
- ❑ 17,920 lbs sulfate/day

Based on the mass flux rate at the Target Capture Zones, the estimated average concentrations in groundwater discharging to the Portneuf River at the springs based on the model developed to support the remedial design are:

- ❑ 0.011 mg/L arsenic
- ❑ 9.7 mg/L phosphorus
- ❑ 115 mg/L sulfate

While the extraction system does not capture all affected groundwater, the capture zone analyses for 2012 and 2013 indicate that when well 419 is back on line, additional groundwater extraction is not necessary to meet the goal of reducing arsenic below MCLs in groundwater discharging to the Portneuf River. Source control actions (gypsum stack lining and Phosphoric Acid Plant actions) will reduce the required extraction rate once they become effective.

### Evaluating Reduction in Extent and Concentration of COCs in the Assessment Area

Groundwater monitoring was performed in four quarterly events in 2013. Samples were analyzed for field parameters, general chemistry parameters, and selected metals and nutrients. Analyses were performed in accordance with referenced EPA methods. Data validation was performed and a checklist of the validation process was prepared to document the review process and results.

The extent of arsenic, phosphorus, and sulfate in the Assessment Area at the end of 2013 was similar to that at the end of 2012. The vertical and lateral extent of arsenic, phosphorus, and sulfate in the Assessment Area is not expanding. Generally, arsenic, phosphorus, and sulfate concentrations decrease to the north in the Assessment Area. Concentrations are typically higher in the shallower intervals in the Assessment Area, as groundwater from the Lower Zone and Upper Zones mix due to significant upward gradients and the terminus of the AFLB near Highway 30. Elevated phosphorus concentrations at well 532B since the third quarter are the result of dense, low pH/high total phosphorus concentration liquid is diffusing upward from low spots in the surface of the AFLB clay near well 419, mixing with groundwater from upgradient of the PAP Area in the upper zone, and being transported by advection downgradient to the northeast. Well 532B is an upper zone monitoring well upgradient of the terminus of the AFLB aquitard.

### Evaluate Source Control System for the Prevention of Migration into the Off-Plant OU at Concentrations above the MCL or RBC

Exceedances of the MCL for arsenic in groundwater were observed in the Compliance Area at wells 537A, 538A, 539B and at Batiste Spring. Total phosphorus concentrations above background were also observed in the Compliance Area monitoring locations; however, a risk-based concentration has not yet been established for groundwater.

### **Surface Water Data Evaluation**

Surface water samples were collected on a monthly basis during 2013 and analyzed for a range of constituents, including phosphorus. Assessment of surface water monitoring data for 2013 identified the following key conclusions:

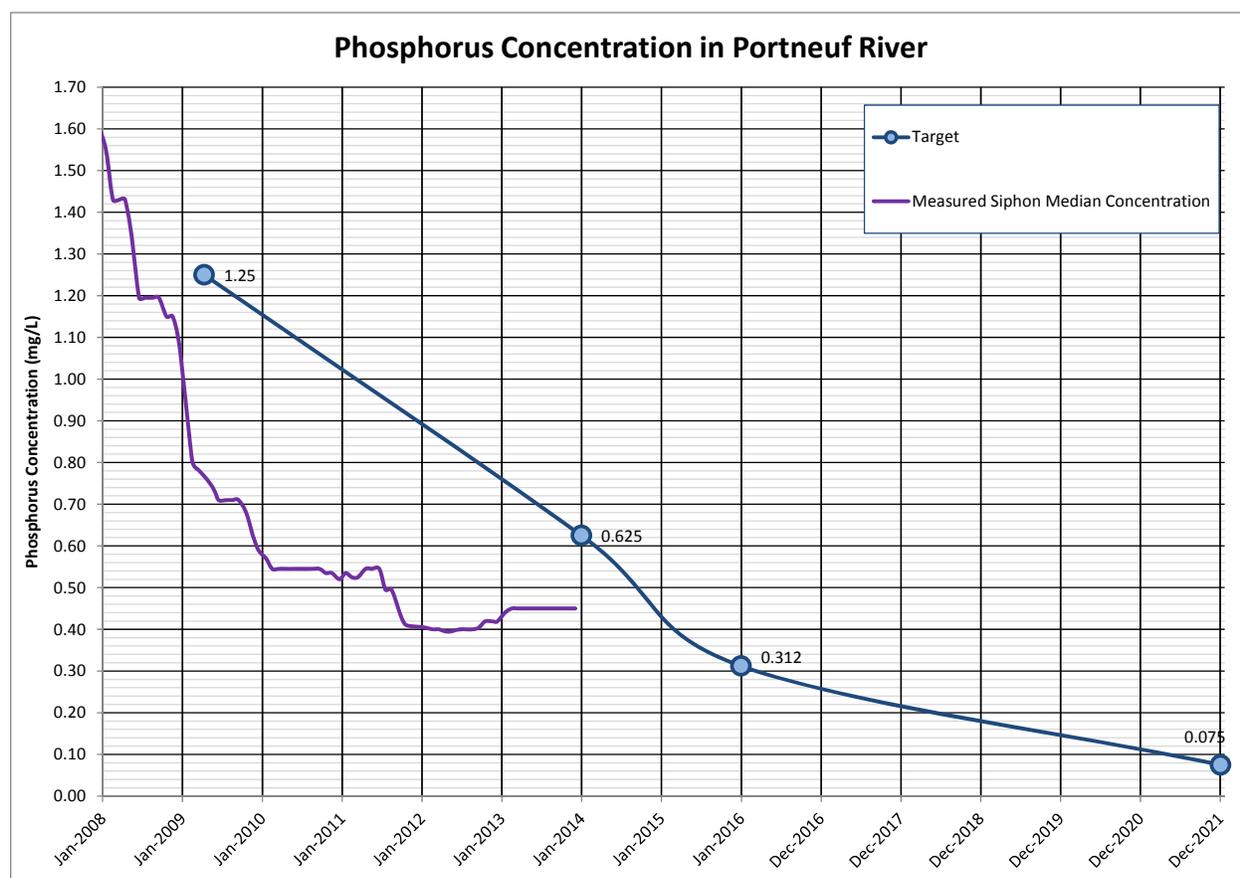
- ❑ The river is not affected by EMF groundwater at Batiste Road and this location can be used as a background monitoring location.
- ❑ Phosphorus concentrations at Siphon Road have decreased significantly starting in 2007. The 12-month median phosphorus concentration at the end of 2013 was 0.45 mg/L. This is below the December 31st, 2013 VCO/CA target of 0.625 mg/L.
- ❑ The reduced phosphorus concentration at Siphon Road is primarily due to reduced input to the Portneuf River from EMF groundwater. The estimated average phosphorus load from EMF groundwater at Siphon Road was 816 lb/day in 2013, and represents a 72% reduction from the 2007 average of 2,930 lb/day.
- ❑ Average daily minimum summer dissolved oxygen levels were 4.99 mg/L and 6.24 mg/L at Siphon Road and Batiste Road, respectively. There were 107 days in 2013 that the dissolved oxygen at Siphon Road dipped below 6 mg/L.

## Remedy Performance

The performance of the remedy was evaluated for 2013. This analysis indicated the following:

- ❑ The estimated phosphorus load to groundwater attributable to the PAP Area is 328 lb/day in 2013. This is up from a load of 111 lb/day in 2012. A portion of the groundwater affected by the PAP Area was not captured because extraction well 419 was temporarily shut down.
- ❑ Overall, the extraction system removed approximately 40% of the estimated phosphorus load (total, including from the gypsum stack and PAP Area), 55% of the estimated sulfate load and 57% of the estimated arsenic load in 2013. The total mass of phosphorus removed from groundwater in 2013 was approximately 726,000 lbs.

The phosphorus concentrations measured in the Portneuf River at Siphon Road have decreased considerably since 2007. This is primarily due to reduction of the phosphorus load from EMF groundwater; from 2,930 pounds per day on average estimated in 2007 to 816 lb/day in 2013. The VCO/CA sets phosphorus concentration targets in the Portneuf River at Siphon Road. These are shown on the figure below. The purple line shows the rolling 12 month median phosphorus concentrations at Siphon Road. Concentrations have decreased quickly, indicating that remedial actions are being more effective and/or resulting in a more rapid effect than predicted by modeling.



### Remedy Components Planned for 2014

Consistent with the Superfund and VCO/CA requirements, Simplot will continue remedy implementation in 2014. Planned activities include:

- ❑ No significant modifications to the groundwater extraction system or groundwater monitoring system are planned.
- ❑ A pilot-scale batch treatment system, in operation at the Don Plant since February 2014, is being used to determine whether lime treatment of hazardous-characteristic groundwater in the PAP area can be implemented so that the treated groundwater can be recycled directly into the Don Plant process, while producing a sludge byproduct that is non-hazardous. The objectives for the pilot-scale treatability study have been established in the Pilot Treatability Study Work Plan approved by EPA (EPA 2013).
- ❑ Liner installation at the upper east compartment of the gypsum stack (Phase 4) is scheduled for completion in 2014, and construction of a lateral expansion at the

northwest corner of the existing gypsum stack (Phase 6) is scheduled to start in 2014.

- Major improvement projects are planned in the PAP Area at the 19B Pad (complete pad replacement that was started in 2013), #2 Deflo Tank and Foundation (upgrade) and the Repulp Tank and Foundation (upgrade).
- Additional source control in the PAP Area will be achieved through pad and sump inspection and maintenance.

The effect of the remedy will continue to be assessed through quarterly monitoring of groundwater and monthly monitoring in the Portneuf River.