

United States Environmental Protection Agency
Region X
POLLUTION REPORT

Date: Friday, April 25, 2008

From: Greg Weigel

To: Calvin Terada, EPA ERU

Subject: Continuation of Action

FMC Pond 16S

Hwy 30, 3 miles west of Pocatello, Pocatello, ID

Latitude: 42.9028000

Longitude: -112.5586000

POLREP No.:	4	Site #:	10EY
Reporting Period:		D.O. #:	
Start Date:	4/12/2007	Response Authority:	CERCLA
Mob Date:	4/12/2007	Response Type:	Time-Critical
Demob Date:		NPL Status:	NPL
Completion Date:		Incident Category:	Removal Action
CERCLIS ID #:	IDD984666610	Contract #	
RCRIS ID #:			

Site Description

FMC manufactured elemental phosphorus from the late 1940s until December 2001. Since 2001, FMC has decommissioned and dismantled the manufacturing plant and closed waste ponds. RCRA closed Pond 16S covers an area of approximately 10.2 acres and contains approximately 140 acre feet of phosphorus containing waste from the elemental phosphorus manufacturing process. The Pond 16S RCRA cap consists of a seven foot thick evapo-transpiration layer composed of soil, gravel and sand, which overlays a geo-synthetic composite barrier and drainage system over the waste. A pressure monitoring and gas collection system was installed around the perimeter. Eight temperature monitoring sensors were installed in well casings on top of the cap that extend through the geo-synthetic barrier to above the waste.

In June 2006, visible air emissions were observed coming from the temperature monitoring ports (TMPs) at Pond 16S. Air emissions were subsequently observed by Shoshone Bannock Tribal staff in September, 2006. These were thought to be emissions of phosphorus pentoxide, from the auto-ignition of phosphine gas. FMC reported that phosphine gas had collecting in TMP well casings, where it was auto-igniting. The auto-ignition concentration of phosphine is 20,000 parts per million (ppm). The concentration of phosphine gas that is immediately dangerous to life and health is 50 ppm. In November 2006, the EPA On-Scene Coordinator and START contractor conducted removal site assessment activities at Pond 16S. Additional, follow-up air sampling was conducted by EPA and START contractor in December, 2006. Air samples were collected of ambient air in the vicinity of Pond 16S, as well as from a TMP. Analytical results showed phosphine concentrations up to 360 ppm from the TMP. Additionally, hydrogen cyanide and hydrogen sulfide gasses were detected at significant concentrations. In ambient air, hydrogen sulfide was detected at low levels; phosphine and hydrogen cyanide were not detected in ambient air.

In December 2006, EPA issued a Unilateral Administrative Order under CERCLA, requiring FMC to characterize gas generation under the cap, conduct ambient air monitoring, and design, construct and operate a gas extraction and treatment system capable of drawing down gas concentrations under the cap to safe levels. The scope of work was subsequently modified to also require FMC to implement an interim gas extraction and treatment system until the larger system can be designed and built.

On July 30, 2007 FMC submitted the required Gas Characterization Report. The report identified phosphine (PH₃) concentrations in pond gas from TMP samples up to 1,276 ppm. This was far lower than expected based on calculated PH₃ concentrations from operation of the mobile gas extraction system. Calculated concentrations (after dilution with air) have ranged from around 100,000 ppm to 400,000 ppm PH₃. It was believed that the analytical method used for the PH₃ sampling, OSHA Method 1003, was ineffective at measuring PH₃ concentrations above 1,000 ppm. Other analytes and results included: H₂S results ranged from non-detect to 67 ppm. HCN results were mostly non-detect,

although HCN was detected in three samples at concentrations ranging from 0.23 to 14 ppm. SO₂ results ranged from non-detect to 5.2 ppm. HF results ranged from 0.8 to 12 ppm. NH₃ results were all non-detect. H₂, CO and CH₄ were all non-detect for samples collected directly from the TMPs (although detection limits were very high due to the dilution with N₂). Very low concentrations of H₂ (0.133 to 0.196 ppm) and methane (2.0 to 2.7 ppm) were detected in the GES discharge gas samples.

On August 6, 2007 FMC submitted the required Ambient Air Monitoring Report. Ambient air monitoring included eleven rounds of ambient air samples from one upwind and three downwind locations, performed under specific meteorological conditions; One round of soil-gas samples from the perimeter of Pond 16S, along a transect five feet outside the edge of the pond liners, where pond gases could be detected if moving laterally to the pond perimeter; Two rounds of near-surface air samples from each of ten (10) one-acre cells across the surface of the Pond 16S cap. The results showed that all gasses of concern were below their limits of detection in all upwind and downwind samples collected during 11 rounds of ambient air sampling; PH₃ analytical results for the cap perimeter soil-gas samples ranged from below the 0.07 ppm limit of detection to 0.782 ppm. H₂S and HCN concentrations in the cap perimeter soil-gas samples were below the limit of detection for all samples. PH₃ concentrations in two rounds of cap surface air samples collected from 10 one-acre cells on the Pond 16S cap ranged from non-detect to 0.249 ppm PH₃. Results for HCN and H₂S were all non-detect. The sampling method was incapable of detecting the source of PH₃ at the Pond 16S cap surface.

Current Activities

On October 15, 2007, EPA approved FMC's 100% Design Analysis Report for construction of a Gas Extraction and Treatment System (GETS) required by the Order. The GETS will be capable of extracting pond gas simultaneously from all 8 TMPs at Pond 16S (up to 80 cubic feet per minute total). The GETS will also inject inert make-up gas (nitrogen) to minimize air infiltration under the cover. Nitrogen will be injected at a rate equal to the total extraction rate through the existing perimeter gas extraction piping. Extracted gas will be treated through specialized carbon units so that the discharge will not exceed 0.3 ppm PH₃ (the OSHA PEL). Preliminary estimate is that the GETS will have to operate for approximately 1 year to achieve the Order requirement of 10% of the LEL, as measured in every TMP. The GETS will then have to operate and maintain levels below 10% of LEL for a minimum of one additional year.

On October 30, 2007 EPA, Idaho DEQ and Shoshone Bannock Tribal personnel participated in a Pre-Construction Meeting with FMC and their contractors to go over construction plans, safety concerns, quality control, scheduling of activities, etc..

On October 31, 2007, EPA requested FMC to stop work on a road that was being constructed on Pond 16S for GETS construction, and to not use the road for construction of the GETS until FMC submitted and EPA approved an Addendum to the 100% Design Report that dealt with the road and provided adequate information to ensure that the road construction or its use would not compromise the integrity of the RCRA cap on Pond 16S.

On December 14, 2007, EPA certified that FMC had met the conditions that EPA had imposed for use of the constructed road for the purpose of constructed the GETS.

Construction of the GETS occurred from November, 2007 through March, 2008.

On April 1 and 2, FMC conducted, per EPA's request, another round of perimeter soil gas sampling at Pond 16S. Samples were taken from 14 locations along a transect five feet outside the edge of the pond liners, where pond gases could be detected if moving laterally to the pond perimeter. Sample results ranged from a low mean of 2 ppm PH₃ to a high mean of 52 ppm PH₃ at the 14 locations. These concentrations are significantly higher than the concentrations observed in the July, 2007 round of soil gas monitoring. It should be noted, however, that the methodology changed from the previous to the recent soil gas monitoring. Soil gas and cap perimeter monitoring will continue on a monthly basis after GETS system start up.

On April 3 and 4, 2008, EPA, Idaho DEQ and Shoshone Bannock Tribal personnel met with FMC and their contractors to review the constructed GETS and observe initial dry run start-up of the system. EPA provided verbal approval for GETS system start up, pending formal approval of the required Removal Action Work Plan (RAWP).

On April 10, 2008 the GETS was started up on phosphine by slowly introducing PH₃ from two TMPs. Several start up problems were encountered in the following days, including overheating of one of the carbon treatment vessels, and occurrences of auto-ignition of PH₃ at the eductors where pond gas

from the TMP is first diluted with air.

On April 18, 2008, FMC held a conference call with EPA, Idaho DEQ and Shoshone Bannock Tribal personnel to discuss the start up problems and proposed resolution to the problems. Also on April 18, 2008, EPA approved the required Removal Action Work Plan, that addresses start up and initial optimization of the GETS.

Next Steps

FMC must succeed in completing system start up; i.e. being able to operate the GETS on all 8 TMPs, without auto-ignition or other system malfunction, and extract PH3 to the design concentration of approximately 500 ppm entering the treatment system while meeting the discharge requirement of less than 0.3 ppm. When those conditions are met, the preliminary optimization sequence may begin. Preliminary optimization is anticipated to begin the week of April 28. Preliminary optimization will require approximately 30 days.

FMC will meet with EPA, Idaho DEQ and Shoshone Bannock Tribal personnel on site on June 3 and 4 for a required Construction Completion Inspection, during which the agencies and FMC will review system start up and initial optimization data and examine requirements for intermediate and long-term optimization and system operation. FMC is required to submit for EPA approval an Operation and Optimization Plan for longer term operation.

response.epa.gov/FMCPond16S