



Memorandum

TO: Richard Healey, Enforcement Branch Manager
THROUGH: Bryan Leamons, P.E., Sr. Operation Manager
THROUGH: Jamal Solaimanian, P. E., No-Discharge Branch Supervisor
FROM: Linda Hanson, Geologist, P. G., No-Discharge Permits Branch
DATE: March 6, 2019
SUBJECT: El Dorado Chemical Company, El Dorado, Union County
Review of CAO LIS 08-085 and EDCC Response to Order and Agreement Paragraph 2 former ND Permit 0177-W; AFIN 70-00040; NPDES Permit No. AR0000752

BACKGROUND:

A CAO pertaining specifically to groundwater was approved in 2006 (CAO LIS 06-153) for El Dorado Chemical Company (EDCC). A Risk Assessment (RA) was submitted in August, 2007 and a Remedial Action Work Plan (RAWP) was submitted to the Department in November, 2007. According to the RAWP, a combination of ex-situ treatment by the operation of two groundwater recovery wells to minimize the zone of contamination and monitored natural attenuation were the remedies selected. This remedy was to continue on a semi-annual basis until November 2011, until the following criteria were met:

- 1. The 0.55 mg/L goal for ammonia in the down-gradient groundwater unit (DGU) has been met, or
2. If the ammonia data for the DGU is statistically significantly less than or equal to that of the background wells (up-gradient ground water unit (UGU)), or
3. If the DGU ammonia levels have stabilized (not increased) or decreased over time.

According to the RAWP, the remedy will be deemed complete at such time as either criteria 1 or 2 have been achieved. Once criterion 3 is attained, the continuation of the recovery well operation may no longer be necessary and may cease. At this time the monitoring frequency would be reduced to once a year to assess the progress of the natural attenuation progress. (Selected Remedy, pages 6 to 10 of the RAWP). No evidence of an approval letter for the RAWP has been found.

Review of the groundwater monitoring reports for each year from 2011 until 2017 indicated that some of the down-gradient wells have ammonia concentrations of greater than 0.55 mg/L (as listed in the Remedial Action Work Plan) as well as other contaminants above clean-up levels during sampling in recent years.

REVIEW OF CAO 85-085 and response letter:

Richard Healey, Enforcement Branch Manager emailed me a copy of the order and the response report listed above asking for my review and comments regarding the groundwater issues. The February 2019 GBM and Associates response regarding the groundwater monitoring and evaluation at the site demonstrates that several

of the monitor wells show greater than a 95% concentration of ammonia, nitrate, and sulfate, and significantly increasing amounts of these contaminants.

In Section 4.0 of Part 2(c) of this report, EDCC states that the recovery wells have been successful in removing contaminants from the uppermost saturated layer of the Cockfield Formation and has helped reduce potential exposure risk at the site. They also state that due to declining production from the recovery wells, they wish to investigate possible remedial/rehabilitative measure to restore/improve groundwater flow to these wells.

CONCLUSIONS AND RECOMMENDATIONS:

Regarding Condition 16 of the CAO; letters regarding sampling requirements dated October 2005, June, 2007, September, 2009 and July, 2011 were sent to EDCC approving changes in groundwater sampling requirements. Below is a spreadsheet listing the sampling schedule since 2011 for the various constituents.

Monitor Well #	Site Area	2x per year	2x annually	2x annually	2x annually	varies	varies	varies	2x per year even # years	2x per year even # years	2x per year even # years	2x per year even # years
		Water level	Temperature	Conductivity	pH	Nitrate	Ammonia	Sulfate	Lead Dissolved	Lead Total	Chromium Dissolved	Chromium Total
MW-1	upgradient	○	○	○	○	■	■	■	■	■	■	■
MW-2	upgradient	○	○	○	○	■	■	■	■	■	■	■
MW-3	upgradient	○	○	○	○	■	■	■	■	■	■	■
MW-4	N of process area	○	○	○	○	○	○	○	■	■	■	■
MW-5	N of process area	○	○	○	○	○	○	○	■	■	■	■
MW-6	N of process area	○	○	○	○	○	○	○	■	■	■	■
MW-7	N of process area	○	○	○	○	○	○	○	■	■	■	■
MW-8	N of process area	○	○	○	○	○	○	○	■	■	■	■
MW-9	N of process area	○	○	○	○	○	○	○	■	■	■	■
MW-10	N of process area	○	○	○	○	○	○	○	■	■	■	■
MW-11	N of process area	○	○	○	○	○	○	○	■	■	■	■
MW-12	S of process area	○	○	○	○	■	■	■	■	■	■	■
MW-13	S of process area	○	○	○	○	■	■	■	■	■	■	■
MW-14	N of Lake Kildeer	○	○	○	○	○	○	○	■	■	■	■
MW-15	N of Lake Kildeer	○	○	○	○	■	■	■	■	■	■	■
MW-16	N of Lake Kildeer	○	○	○	○	○	○	○	■	■	■	■
MW-17	downgradient	○	○	○	○	○	○	○	■	■	■	■
MW-18	downgradient	○	○	○	○	○	○	○	■	■	■	■
MW-19	downgradient	○	○	○	○	■	■	■	■	■	■	■
MW-20	downgradient	○	○	○	○	■	■	■	■	■	■	■
MW-21	downgradient	○	○	○	○	■	■	■	■	■	■	■
MW-22	downgradient	○	○	○	○	■	■	■	■	■	■	■
Source of limits												

○	Parameters for Semi-Annual (May & October) Sampling Frequency each year	■	2x per year every other even-numbered year
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The highest concentrations at the wells nearest the recovery wells have shown significantly increasing trends over time, (approximately one order of magnitude greater than the down gradient well values within the production area). This indicates that the recovery wells are controlling the production area ground water and keeping these contaminants from migrating out of the production area. However, some of the down-gradient wells have shown ammonia levels of greater than 0.55 mg/L (as listed in the Remedial Action Work Plan) during recent sampling, so shutting off the recovery wells could likely result in the down-gradient movement of contaminants.

EDCC should continue operating the recovery wells, continue the current sampling schedule, and implement measures to ensure the recovery wells are operating at full capacity.