Zellwood Groundwater Contamination

803 Jones Avenue
Zellwood, Florida
County: Orange
District: Central
Site Lead: EPA
Placed on National Priorities List: October 23, 1981
ERIC ID # 3812

Site Description and History

Drum Services, Inc. operated a 55-gallon steel drum reconditioning and recycling plant in Zellwood in Township 20S, Range 27E, Section 21 at 28° 43′ 56.3646″ N, 81° 36′ 53.2957″ W for approximately 30 years. In the process of reconditioning drums, various wastewaters containing residues of previous drum contents were generated from cleaning operations. Over the years, those wastewaters were disposed of, primarily by spray field evaporation, and by discharge to evaporation/percolation ponds. Drum Services is adjacent to a liquid fertilizer manufacturer, Douglas Fertilizer, and a fresh produce wholesaler. Douglas Fertilizer and Chemical Company had three unlined surface impoundments, which received wastewater from their production process.

Threat

Metals, nitrate and ammonia are present in the surficial and intermediate aquifers onsite and have migrated offsite. A volatile organic contaminant plume has also been identified. Businesses and residences in the site vicinity rely on private wells for their drinking water supply. This drinking water supply may be threatened by contamination from the Zellwood site. The October 2007 well survey identified 36 private potable wells and six Floridan aquifer well within a ½ mile radius of the site.

The area around the site has been designated "Delineated Area" under Chapter 62-524, which requires proposed potable wells be constructed to avoid exposure to contaminated groundwater and to prevent potential conduits for contaminant migration.

Institutional controls are in place in the form of a 2002 restrictive covenant control to ensure appropriate land use for the long-term integrity of the monolith.

Response Strategy and Status (December 2020)

Since the discovery of potential problems at the site in 1981, the Florida Department of Environmental Regulation (FDER, now DEP), engineering consultants to the EPA, and engineering consultants to Drum Services, Inc. have performed environmental monitoring in the area. This monitoring has included testing of sludges from the evaporation/percolation ponds, groundwater conductivity surveys and groundwater sampling and analysis.

Although there had been no formal enforcement or litigation, FDER had worked with Drum Services, Inc. over the years to address problems at the Drum Services' facility. In addition to the

monitoring discussed above, there have been a series of site inspections, meetings, and correspondence. Since 1980, the EPA has been involved in activities concerning the Zellwood site and the Drum Services facility under the Superfund program. As a result of FDER and EPA involvement, Drum Services drained and cleaned the evaporation/percolation ponds and disposed of the sludges off-site in 1982.

The property owners and the EPA completed an emergency removal during the fall of 1983, which consisted of the removal of a large number of abandoned drums and piles of a sludge-type material.

A remedial investigation/feasibility study (RI/FS) was completed in 1986. The EPA, without FDER concurrence, signed a Record of Decision (ROD) in December 1987. This ROD included onsite incineration of contaminated soils, solidification of the remaining ash and extraction and treatment of contaminated groundwater. The FDER did not believe the Floridan aquifer had been contaminated and requested additional assessment before concurrence could be given. EPA then divided the Remedial Alternative into 2 Operable Units (OUs). OU 1 was designated for the soil contamination and OU 2 was for groundwater contamination. The EPA decided to conduct a supplemental RI/FS for the groundwater in response to FDER's reservations.

An amended ROD for OU 1 Soils was approved by the FDER. The Amended ROD selected solidification of the contaminated soils as the remedy, without incinerating them first. It also provided for some groundwater assessment activities to be performed under OU 1. An Explanation of Significant Differences (ESD) for OU 1 was issued by EPA in August 1993, which moved the groundwater assessment activities back under OU 2. The ESD also revised some of the specific requirements stated in the Amended ROD. These included increasing the horizontal extent of the soil excavation, while deleting the requirement to excavate below the water table. The OU 2 for groundwater required further investigation of the nature and extent of contamination before DEP could concur with a ROD.

Final Remedial Design documents were provided to EPA in September 1991. The design included a solidified monolith of treated soil placed in large cells and several lifts. The EPA submitted a Superfund State Contract for OU 1 to the FDER in September 1991, committing the State to a ten percent cost share of the soil remedy. Construction for OU 1, which included excavation and solidification of soils, was anticipated to begin in January 1992, but was delayed because the owner of Drum Services had been excavating and stockpiling the soils. The EPA completed soil excavation in October 1992. In October 1993, solidification of the stockpiled soils was initiated. In January 1994, the solidification was completed. The solidified cells passed the leachability test conducted in April 1995. The EPA initiated groundwater monitoring in December 1995, to confirm the effectiveness of the soil remedy and performance of the monolith.

The Supplemental Remedial Investigation (SRI) and Focused Feasibility Study (FFS) for OU 2 were conducted from February 1993 to January 1995. The results of the SRI/FFS confirmed a metal and nutrient plume located in the surficial aquifer. In addition, sediments in the Easternmost Douglas fertilizer pond appeared to be a continuing source of groundwater contamination.
The EPA signed an Interim Action ROD in August 1995, to eliminate a continuing source of groundwater contamination. This would be achieved by excavation of contaminated sediments in

the Douglas Pond. The technical practicability of achieving groundwater cleanup at the Site was also to be evaluated. The DEP agreed that the Remedial Design (RD) be approached in phases to determine if contaminants could be effectively removed prior to construction of a groundwater treatment system. Groundwater contaminants of concern included aluminum, ammonia, arsenic, cadmium, chromium, iron, lead, manganese, mercury, nickel, nitrate, selenium, and vanadium.

In October 1995, the DEP concurred with the Interim Action ROD for OU 2. Negotiations between EPA and the PRPs for the Remedial Design (RD) were conducted in January and February of 1996. However, these negotiations were not successful. The EPA issued a Unilateral Administrative Order (UAO) in September 1996. EPA withdrew this order in 1997 and the remedy was not implemented.

EPA conducted sampling of specific monitor wells in April 1998, to determine the magnitude of the metals contamination located near Douglas pond. The results of the sampling indicated there was only one metal at concentrations slightly above MCLs.

The EPA selected Camp, Dresser, and McKee (CDM) to conduct a second RI/FS for OU 2, and fieldwork was initiated in June 1999. The new sampling data indicated the presence of nutrients and heavy metals, which was consistent with contaminants identified in previous investigations. Volatile Organic Compounds (VOCs) were also detected during the same sampling timeframe. However, the EPA concluded that these contaminants were not related to the sources of contamination previously identified at the Zellwood site. A separate investigation would be conducted under the EPA's Site Screening Program to determine the source of the VOC contamination.

The EPA conducted an additional investigation in August 2000, to further define the extent of groundwater contamination using Direct Push Technology (DPT). The report provided a general delineation of contaminants associated with the Zellwood site, identifying a metals and nutrient plume extending south and southwest of the site.

The EPA signed a ROD for OU 2 in August 2000. The major components of the groundwater remedy include: Monitored Natural Attenuation (MNA) of contaminants; institutional controls, including groundwater advisories issued by EPA; installation of permanent groundwater monitoring wells; and development and implementation of a performance monitoring plan.

The DEP did not concur with the OU 2 ROD for a number of reasons: the existing groundwater plume had not been delineated to allow evaluation of contaminant migration; a geochemical investigation had not been performed to predict degradation rates of known site specific contaminants; the VOCs were not included in the ROD as contaminants of concern and, given previous information from the OU 1 soil removal, should have been included; the DEP secondary standards for manganese and vanadium were not identified in the ROD as contaminants of concern; and the Post-ROD Monitoring Plan was insufficient to evaluate the effectiveness of the selected remedy over time. In order to address these concerns, EPA and DEP entered into a Superfund Memorandum of Understanding (SMOU) in August 2001. The SMOU provides assurances to the DEP that specific issues regarding plume delineation, natural attenuation

evaluation using a site-specific model, and groundwater monitoring for VOCs, manganese and vanadium would be completed within the Operation and Maintenance period.

In September 2001, EPA and the property owner, Drum Services Company (now IFCO-ICS-Florida), entered into a consent decree and Prospective Purchaser Agreement (PPA), obligating IFCO-ISC-Florida to perform the remedy outlined in the OU-2 ROD. DEP signed a settlement agreement in September 2002 which guarantees performance of the Work by IFCO-ICS-Florida as defined in the agreement, along with financial security. The Work included installation of up to 4 new monitoring well pairs (total 8 wells), performance of groundwater monitoring for 15 years, and routine maintenance at the monolith.

Post-ROD groundwater monitoring included four quarterly monitoring events in 2002-2003. The DEP and EPA met with IFCO-ICS-Florida in June 2002 to discuss the results of the initial sampling report, and to evaluate plume delineation as specified in the SMOU. In a September 6, 2002 correspondence to EPA, DEP provided recommendations for additional plume delineation and requested that EPA technical staff suggest an appropriate model to support measurement of the progress of the natural attenuation remedy.

In February 2003, EPA's technical staff provided comments and recommendations for evaluating the effectiveness of the MNA remedy through a modeling program. It was emphasized that for groundwater modeling to be useful and reliable, an adequate monitoring program including source and plume delineation and determination of flow velocities and migration pathways as well as groundwater geochemistry, was essential.

The VOC plume (Jones Avenue Contamination) located on the Zellwood site was assessed through the EPA Site Screening Program to identify the origin of the VOC contamination at the site. A draft report was produced in August 2004. The results of the screening process showed a VOC plume that is south and down gradient from the OU 1 monolith. Three possible source areas were identified as the origin of the VOC plume.

Results of semi-annual groundwater sampling reported in June 2004 and January 2005, continued to indicate insufficient southern delineation of the Zellwood groundwater contamination. DEP requested that the PRPs conduct a survey of potable wells in the area during the next semi-annual sampling event, and reinvestigate access issues which were preventing the installation of monitoring wells for down gradient delineation of the offsite contaminant plume.

The Second Five Year Review Report from EPA was finalized in September 2006. Several issues were identified to be addressed: delineation of the Zellwood groundwater plume; additional sampling to delineate the VOC plumes and related source areas; completion of a current potable well survey; and establishment of institutional controls to ensure appropriate land use and ensure the integrity of the OU 1 monolith. Recommendations included installation of two additional down gradient monitor wells; re-surveying of monitor wells casing elevations; and clarification of institutional controls.

The frequency of groundwater monitoring was reduced from semi-annual to annual events in 2007. In 2009, the Year 6 Annual Event Report reported that contaminant levels were declining. EPA determined that MNA would continue as the site remedy, and the PRPs would continue to perform the routine sampling.

In March 2011, the EPA initiated the Third Five Year Review with a site inspection. The OU 1 monolith was observed to be well maintained. The PRPs provided documentation of the Restrictive Covenant, the institutional control which ensures appropriate land use for the long term integrity of the monolith. EPA requested that the PRPs continue to pursue delineation of the groundwater plume located offsite.

The third Five Year Review Report was signed by the EPA on September 9, 2011. The report concluded that the protectiveness of the OU 1 and OU 2 remedies could not be fully determined without additional information. Groundwater monitoring results during the review period indicated that concentrations of some contaminants in several monitoring wells down gradient of the monolith are not declining as expected and is some cases are increasing, including iron, cadmium, manganese, nickel, vanadium, ammonia and nitrate. Delineation of the down gradient plume had not been accomplished and prevented a complete determination of the effectiveness of the natural attenuation remedy. Recommendations included: review and update of the 2007 well survey to determine if any private wells are present in the surficial or intermediate aquifers that should be tested; coordination with Water Management District to issue groundwater advisories if needed; complete full delineation of the extent of groundwater contamination to support evaluation of the MNA remedy and identify any remaining sources for both the Zellwood contaminants and the lingering VOC plume; re-evaluation of arsenic levels in groundwater for comparison to the more stringent current arsenic drinking water standard; and evaluation of the need for a vapor intrusion study.

Annual groundwater monitoring in 2011, 2012, and 2013, continued to confirm significant concentrations of cadmium, nickel, manganese, ammonia and iron above ROD cleanup goals in monitoring wells down gradient of the monolith and the former Douglas Fertilizer Pond. The data confirmed that vanadium, nickel, nitrates, ammonia, manganese and iron are not delineated offsite. In review comments, DEP has recommended installation of down gradient wells. A more rigorous evaluation of the effectiveness of MNA and its ability to meet performance standards in the OU 2 remedy has also been recommended. The DEP Site Investigation Section completed additional investigations in June 2013, and February 2014, to support evaluation of sources of the VOC plume(s) in the vicinity of the Zellwood Superfund site. The reports were provided to EPA for consideration.

The Fourth Five-Year Review (FYR) was completed in September 2016. It concluded the OU1 and OU2 remedies remained protective. FYR recommendations included review and evaluation of the DEP volatile organic contaminant (VOC) data to determine if VOCs should be site contaminants of concern, completion of a vapor intrusion evaluation, evaluation of the effectiveness of the ongoing Monitored Natural Attenuation remedy at the site, and regular updates to area well owners regarding private well use.

During the 2016 FYR, the EPA requested that VOC analysis be included in the next annual monitoring well sampling event. A 2016 FDEP memo summarizing a data review indicated the VOCs in area groundwater are not highly concentrated, with no apparent clear lines of evidence indicating the site monolith as the origin. The memo further indicated determination of release locations may be difficult but concurred with addition of some VOC sampling to delineate contamination extent and concentration, south and north of Jones Avenue, respectively. VOC data was not collected in 2018 or 2019 annual groundwater monitoring.

FDEP review comments on the 2019 annual monitoring report concurred with continued annual monitoring, requested rationale for deletion of some analytes from the COCs/metals monitored, noted wells where remedial performance standards were exceeded, requested additional analyte concentration trends analysis in future reports, and requested same-day collection of water level and monitoring well sampling data in future sampling events.

Schedule

Annual groundwater monitoring will continue as part of the remedy. Resulting data analysis will continue to support area VOC plume assessment, source remedy (soil monolith) effectiveness confirmation, and next phase action evaluation.