

Executive Summary

This Remedial Action Plan (RAP) for groundwater is submitted by ARCADIS on behalf of the Raytheon Company (Raytheon) for its property (the "Site") located at 1501 72nd Street, St. Petersburg, Pinellas County, Florida.

The purpose of this RAP is to evaluate, select, and provide the rationale for the Site remedy. A summary of historic assessment activities, results of pilot or bench studies, substantiation for remedy selection/rejection, design details for the selected remedy, and an outline of the performance monitoring are included to provide a clear picture of the reasoning used to reach the conclusion that the selected remedial alternative is most appropriate. The process is a logical determination of Site presentation and applicable technologies. The technologies are then assembled to best address impacts and characterization presented in the Site CSM.

The RAP is organized toward four primary purposes to:

- Convey the Site history, background, current conditions, and determine remedial action objectives (Sections 1-3);
- Evaluate technologies and select active remediation methods, and overall approach to Site remediation (Sections 4-6);
- Provide design information, operation and maintenance (O&M), performance monitoring, and waste handling and disposal (Sections 7-10); and
- Identify the path forward regarding the formal design process, bid, construction, overall project schedule, reporting, and references (Sections 11-14).

Scope of the RAP

Previous assessments are summarized in the *Site Assessment Report Addendum/Groundwater Monitoring Report (SARA)* (ARCADIS 2008c). The SARA was approved by Florida Department of Environmental Protection (FDEP) on January 28, 2009. Soil remediation, with confirmatory sampling, took place in 1994 and is considered complete. There were no detections in any sampled retention pond; therefore, surface water is not developed as a media in the RAP. Samples collected in the drainage ditch south and west of the Site identified constituent concentrations below freshwater surface water target cleanup levels, but exceeded groundwater target

cleanup levels. After assessment, which was summarized in the *Summary of Investigation Work since SARA Submittal* (post-SARA memorandum)(ARCADIS, 2008d), the exceedances were attributed to groundwater infiltration into a portion of the stormwater system. This RAP presents a summary of stormwater system rehabilitation work performed in 2009. Air quality was evaluated in 2007 and 2008 and summarized in the Human Health Risk Assessment (Appendix J of the SARA) and is not considered a media of concern for the RAP. The media of concern for the RAP is groundwater.

Remedial Action Objectives

Remedy selection focused on meeting remedial action objectives. Raytheon arrived at the selection of groundwater remedy and prepared this RAP according to Rule 62-780.700 (1), Florida Administrative Code (F.A.C.)(FDEP 2005).

RAOs are established for Site groundwater to:

- Protect human health and the environment.
- Reduce Site constituents of concern (COC) concentrations in groundwater to meet GCTLs within a reasonable timeframe.
- Hydraulically control groundwater containing COCs in concentrations greater than the GCTLs.
- Manage SAS groundwater such that Site-related COCs do not pose a potential future exposure risk to human health and the environment.
- Provide containment as a short-term goal so there is no further degradation of groundwater quality (through operation of the Interim Source Removal (ISR) system).
- Establish groundwater recovery as a long-term goal.
- Aggressive removal of mass from the source area.

An additional Raytheon specific goal for the Site is to shorten the timeframe for source area mass removal through use of aggressive, state-of-the-art treatment technologies.

Selected Remedial Alternative (RA) - Thermal Treatment, In-situ Chemical Oxidation, Expand Interim Source Removal Groundwater Recovery and Treatment System to Off-Site Areas

RA-5 includes use of both in-situ thermal treatment and in-situ chemical oxidation (ISCO) to reduce Site COC mass in groundwater in the Building M source area. Thermal treatment will be implemented first focusing on the interbedded unit. After completion of thermal treatment, ISCO will be implemented at Building M focusing on the upper sand and lower sand units. No additional activation other than residual heat from thermal treatment will be required. The objective of implementation of thermal treatment and ISCO at the Building M source area is to reduce Site COC mass within this source area.

RA-5 also includes use of ISCO at the Building E source area. The objective of implementation of ISCO at this source area is to reduce COC mass near Building E both off- and on-Site. The treatment area will focus on the reduction in COC mass in the lower sand unit, where the hydraulic conductivity of the sands are suitable for delivery of oxidants.

The off-Site ISCO treatment will be completed using Geoprobe injections designed to distribute sodium permanganate across the footprint of the treatment area in the lower sand unit. It is anticipated that the direct-push injections will be completed using a 10-foot radius (approximately 20-foot spacing). On-Site, the sodium permanganate will be delivered to the lower sand using a series of injection wells placed on the western perimeter of the ISR system, where it will move under the influence of pumping at RW-4 to the west across the treatment area. Permanganate will be injected at low rates (up to two gpm) in each of the injection wells. Routine monitoring of permanganate concentrations will be completed on-Site to track the movement of the oxidant across the treatment zone and enable adjustments of injection volumes and concentrations as the treatment progresses.

To remediate Site COCs in off-site groundwater, RA-5 also includes expansion of the ISR groundwater recovery and treatment system to a total of 15 wells. The components of the ISR treatment system would be expanded to treat the higher flow rate (118 gpm) and the increased mass loading from the expanded groundwater recovery system. Included in the 11 new wells, proposed recovery well PRW-16 is considered to be a contingency well at this time. The need for this well will be confirmed by additional groundwater data collected from existing monitor wells IMW-20, IMW-B, SMW-B located on Stone's Throw Condominium property and a proposed

monitor well. A proposed monitor well will be located near proposed recovery well PRW-16, and will be screened in the Lower sand unit. The need for proposed recovery well PRW-16, and the final location, will be based on groundwater data and the ability to obtain off-Site access authorization. Treated groundwater will be discharged to the POTW in accordance with a discharge permit. As part of the remedy, Raytheon will continue to offer potable water for irrigation use to those properties where the irrigation well groundwater concentrations exceed GCTLs within the defined area.

Design, Bid, and Construction

The RAP presents detailed design for the groundwater system and sufficient detail for in-situ thermal treatment and ISCO to address key remediation questions. The design section and supporting appendices present details for remediation approach, well layout and configuration, aboveground equipment, monitoring approach and performance criteria.

The schedule included in Section 12 identifies the start of ISCO immediately after FDEP approval of the RAP and the start of in-situ thermal treatment approximately one year after RAP approval (assuming an October 2009 approval).

Conclusion

The RAOs can be met by implementation of four remedial alternatives considered RA-2 through RA-5. Although R-2, R-3 and R-4 would be less costly and take longer to achieve RAOs than RA-5, Raytheon proposes to select RA-5. This alternative meets RAOs and provides the most effective, aggressive, and timely mass reduction of all the alternatives.