



Perchlorate Interim Measures

NWIRP McGREGOR



The Navy is committed to protecting the environment and is in the midst of a large environmental investigation and remediation program at NWIRP McGregor. As part of this commitment, SOUTHDIV and EnSafe, the CLEAN II contractor, formulated an expedited response that incorporates innovative techniques to address perchlorate contamination in soil and groundwater at the facility. Perchlorate, derived from ammonium perchlorate, is a highly soluble compound that was used as an oxidizing agent in solid rocket motors. Because of its high solubility, ammonium perchlorate quickly breaks down to ammonia and the perchlorate anion when it comes in contact with water. The perchlorate anion is highly stable in water and conventional treatment technologies are ineffective in destroying it. Perchlorate poses a concern for human health because it is a thyroid inhibitor that interferes with the uptake of iodine; however, it is not a bio-accumulator. Because perchlorate is not easily removed from water, treatment studies were performed to examine remedial options for corrective measures.

Project Summary

Investigation and design activities from September 1998 through June 1999:

- On a fast track and expedited basis, constructed and executed a detailed multi-task perchlorate groundwater investigation encompassing the 9,600 acres on site and approximately 22,000 acres off site.
- From December 1998 to June 1999, installed, developed, and sampled 138 monitoring wells; collected an additional 113 groundwater samples; collected 200 samples from surface water and private wells ran 45 line miles of Ground Penetrating Radar to better locate monitoring points on potential contaminant preferential pathways; conducted a bio-diversification study; and developed a detailed adjacent property owner list.
- Maintained an extensive public outreach program that includes:
 - Quarterly Restoration Advisory Board Meetings.
 - Technical presentations.
 - Updates on project milestones to local elected officials and stakeholders.
- Prepared an Interim Measures Evaluation.
- Completed an innovative biological treatment bench-scale study that reduced perchlorate concentration from parts per million to non-detect in parts per billion in both soil and groundwater.

Regulatory Requirements/Community Involvement

Under the effective partnership between the Navy, TNRCC, US EPA, and the Navy's contractors, the project has proceeded rapidly from investigation to interim remediation.

- The Navy quickly and proactively responded to a notice from TNRCC requesting the Navy to address offsite migration of perchlorate.
- Worked in close cooperation with TNRCC and the USEPA for the first-ever investigation of perchlorate in the State of Texas.
- Created an avenue for educating and disseminating perchlorate information to the community and stakeholders on both the local and national levels.

Site/Location:	NWIRP McGregor McGregor, TX 20 miles southwest of Waco, TX
Site Description:	Former bomb and solid rocket facility consisting of isolated manufacturing cells spread across 9600 acres
Team Contacts:	Mark Craig (SOUTHDIV RPM), 843-820-5517 Alan Jacobs/Jeff James EnSafe, CLEAN II, 901-372-7962 Dennis Ewing CH2MHill, RAC, 770-604-9182
Technology:	Interceptor Trench and Anaerobic Biological Treatment System
Contaminant:	Perchlorate
Action Levels:	Abate offsite groundwater migration and impacts to surface water from contaminated groundwater. Action levels currently being developed.
Legal Driver:	Resource Conservation and Recovery Act, Clean Water Act, and Texas Resource Conservation Commission (TNRCC) Interim Drinking Water Standard
Decision Document:	NA

Construction Challenges

Innovative approaches in a rapidly developing remedial technology and compressed schedules were required to address the abatement of offsite perchlorate migration.

- Rapidly developing technologies in the last six months changed treatment of perchlorate-contaminated water and soil from extremely difficult (and costly) too readily achievable and cost effective.
- The accelerated schedule for project design and construction had to be flexible enough to take into account the rapidly developing technologies in perchlorate remediation.
- Flexibility required close coordination between the Navy's CLEAN II contractor and the Navy's RAC contractor for the interim measures success.
- Progression of EnSafe's bench-scale study from design to procurement, followed by the start of construction of a full-scale system in six months.

Cost Avoidance Measures

- Negotiated a favorable interpretation of new "Consistency Document" with TNRCC, significantly reducing laboratory costs.
- Advancement of technologies reduced treatment system cost more than \$3,000,000 when compared to existing technologies.
- The selection of a collection trench reduced installation and operational costs by half when compared to traditional extraction wells.
- Innovative anaerobic landfarming of onsite perchlorate-contaminated soil lowered remediation cost by \$100,000 when compared to offsite transportation and disposal.
- Use of innovative investigation techniques, such as Ground Penetrating Radar, reduced the number of groundwater monitoring wells that had to be installed.

Project Successes

The coordinated effort and flexibility of all partners in this project has contributed to its success in meeting all goals and deadlines under very aggressive schedules.

- Began transferring property to the City of McGregor for industrial use.
- Eliminated report duplication by combining data from multiple investigations
- Developed innovative and customized technologies to investigate and treat perchlorate-contaminated soil and groundwater on a fast-track schedule.
- Established public confidence in the Navy's commitment to protect the environment and provide corrective action for site releases.

Lesson Learned

- Coordination and flexibility are essential between all partners for the success of a project, especially one with changing technologies and compressed schedules.
- Biological anaerobic treatment of perchlorate can be feasible and cost effective for other weapons sites with the same environmental concerns.

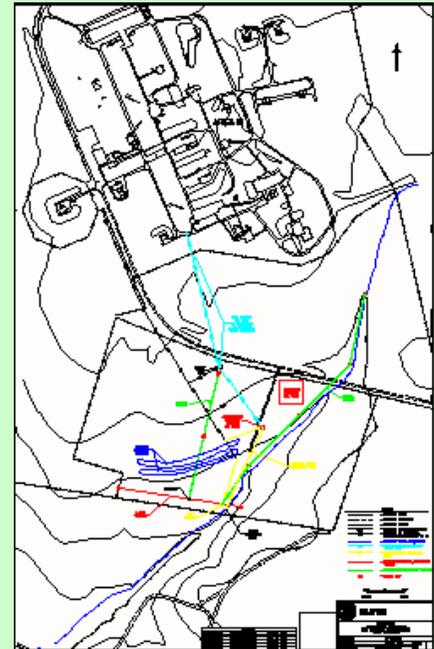


Figure 1: Trench location NWIRP McGregor.

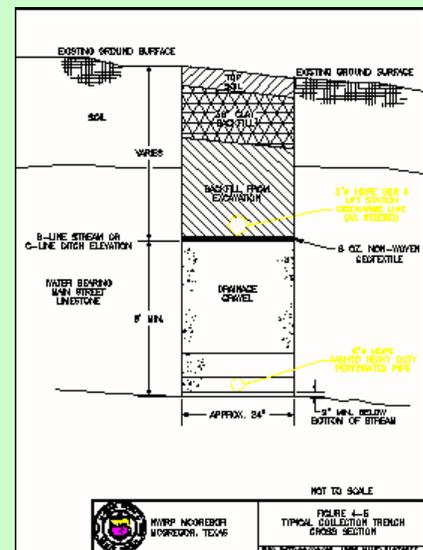


Figure 2: Cross-section of trench design.



Figure 3: Monitoring the bench-scale bioreactor.