

STATE OF CALIFORNIA  
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL COAST REGION

STAFF REPORT FOR REGULAR MEETING OF SEPTEMBER 9, 2005  
Prepared on August 9, 2005

ITEM NUMBER: 18

SUBJECT: **Conditional Waiver of Waste Discharge Requirements for Groundwater Cleanup Using an Injection of Sodium Permanganate, Tecknit, Inc. and Tube Holding Co., Inc. (a Subsidiary of Raytheon Company, Inc.), 312 and 320 North Nopal Street, Santa Barbara, Santa Barbara County, Regional Board Order No. R3-2005-0124**

SUMMARY:

Project Area: 0.28 acres  
Treatment Method: Chemical Oxidation with Sodium Permanganate  
Volume of Discharge: 17,041 gallons NaMnO<sub>4</sub> (12.5 % Solution)  
Groundwater Contaminant: Trichloroethylene (TCE) and other Volatile Organic Compounds (VOCs)  
Responsible Parties: Tecknit, Inc. and Tube Holding Co., Inc. (a Subsidiary of Raytheon Co., Inc.)  
Existing Orders: Cleanup or Abatement Order No. 94-49  
Monitoring and Reporting Program Order No. 94-49

DISCUSSION

From 1955 to November 1967, Tube Holding Company, Inc. and its predecessors leased and operated an electronic radio tube manufacturing business at 312 and 320 North Nopal Street in Santa Barbara (see Location map, Attachment 1). From 1967 to 1989, Tecknit, Inc. owned and operated a wire manufacturing business at the property. Tube Holding, its predecessors, and Tecknit stored, in drums, and used trichloroethylene (TCE) and other chlorinated solvents as degreasers. Spent solvents were discharged to drains and underground sumps that connected to the sanitary sewer laterals. Past business operations resulted in ground water contamination with TCE and other volatile organic compounds (VOCs) at both 312 and 320 North Nopal Street (Property). From 1991 to 1993, the Property was used as an auto repair shop. Since 1993, the tenant at 312 North Nopal Street operates a smoked salmon business and the tenant at 320 North Nopal Street operates a film plastic

manufacturing company. Since at least 1993, TCE has not been used at the Property.

On December 19, 1994, the Executive Officer issued Cleanup or Abatement Order No. 94-49 (Order) to Tube Holding and Tecknit requiring the Dischargers to characterize the extent of contamination, propose a cleanup plan, implement Monitoring and Reporting Program No. 94-49, and comply with time schedules. In compliance with the Order, Tube Holding and Tecknit submitted the "Revised Workplan, Interim Remedial Action Plan" dated June 30, 1993. In late 1993, the responsible parties jointly completed the site assessment and installed a groundwater extraction and treatment or "pump and treat" system. From 1994 to 1999, groundwater was extracted from MW-1, treated via carbon canisters, and then discharged to the sanitary sewer. In 1999, the extraction system was upgraded to extract groundwater from new extraction wells EW-1 and EW-2. Since the pump and treat system was

installed, over 8.75 million gallons of groundwater have been pumped, treated, and discharged to the sanitary sewer under a City of Santa Barbara industrial wastewater permit.

The depth to groundwater at the site is between three and five feet below ground surface. As shown on Attachment 2, the groundwater flow direction to the site is estimated to be from the northeast to southwest at 0.016 feet per foot, except in the area of the operating groundwater extraction wells. Although not shown on this map, groundwater monitoring wells are located west-southwest of the property on an adjacent property located on Montecito Street. These offsite wells were installed by the neighboring facility, which had an unauthorized release of petroleum products from several underground storage tanks (USTs) and chlorinated solvents from business operations at the Mission Linen Supply. Petroleum products and chlorinated solvents are detected in groundwater monitoring wells at this neighboring property. Regulatory oversight for the Mission Linen Supply cleanup is under Santa Barbara County Fire Protection Division purview.

Although the groundwater extraction and treatment system has operated at the Property since 1994, TCE and VOC concentrations in groundwater persist. As shown on Attachment 3, the maximum concentration of TCE is 17,000 micrograms per liter (ppb) in EW-2 during the January 2005 groundwater sampling event. For comparison, the Water Board's Water Quality Control Plan (Basin Plan) objective for TCE is 5 ppb in groundwater. Since the pump and treat system began operation, the TCE concentration has reduced over time from a maximum concentration of 140,000 µg/l detected in PZ-1 during the November 11, 1994, groundwater sampling event. However, the existing pump and treat system, as currently operated, may need to operate for several more decades before groundwater is restored to drinking water standards.

As shown on Attachment 3, methyl tertiary butyl ether found in several of the groundwater monitoring wells is thought to originate from a Thrifty gas station UST case located to the north of the Property. Regulatory oversight for Thrifty gas station UST case is under Santa Barbara County Fire Protection Division purview.

On July 26, 2005, Water Board staff received the "Final Work Plan for In Situ Chemical Oxidation" (Work Plan) prepared by Environmental Resources Management (ERM). The application of the permanganate reagent at the Property will be applied via horizontal infiltration to target residual VOCs in soil and via vertical wells to target VOCs in saturated soils and in groundwater. As shown on Attachment 4, the proposed treatment will utilize 30 injection wells and approximately 1,000 feet of infiltration trenches to ensure effective distribution of sodium permanganate throughout the chlorinated solvent impacted area.

The sodium permanganate will be injected as a 12.5 percent solution. A total of 10,828 pounds of sodium permanganate (7,596 gallons) will be injected (via trenches) into the unsaturated soil at a depth of between two and six feet below the ground surface. The injection wells will receive a total of 13,463 pounds of sodium permanganate (9,445 gallons). The sodium permanganate injection is expected to take less than one week.

After the injection or infiltration begins, chlorinated solvents will be mineralized into manganese dioxide and other soluble ion salts (potassium, sodium, chloride), and carbon dioxide by means of oxidation chemical reactions. The oxidation destroys the organic double bonds of the chlorinated ethene compounds, reducing them ultimately to oxygen and carbon dioxide.

Implementation of the Work Plan will expedite the soil and groundwater cleanup at the Property. Although the chemical oxidation reactions are swift, due to groundwater flow rates, the treatment typically requires a few months due to advection and dissolution transport, and desorption. For these reasons, the sodium permanganate treatment is expected to mineralize most of the soil and groundwater contamination within six months. In the event that the chemical oxidation reaction stalls and the chlorinated solvents do not completely break down, the Dischargers may reapply and monitor the injection of sodium permanganate in the treatment area with Executive Officer pre-approval.

Because the injection of sodium permanganate into the vadose zone and groundwater table is considered a "discharge" (California Water Code), regulation by the Water Board is necessary. Water

Board staff recommend a waiver of waste discharge requirements because the proposed project is considered to be in the public's interest, and the project, when conducted in conformance with the proposed conditions of this waiver, will not pose a significant threat to water quality. The proposed Conditional Waiver of Waste Discharge Requirements, Order No. R3-2005-0124 is included as Attachment 5.

Water Board staff has developed a monitoring and reporting program to evaluate the effectiveness of the injection, chlorinated solvent breakdown, and subsequent impact of the manganese dioxide and soluble salt injection. Initially, the sodium permanganate concentrations will be high and the solution is expected to be above the drinking water standards for manganese and chlorine (50 ppb and 4,000 ppb, respectively). However, during the chemical oxidation process, the chlorinated solvents, manganese, chlorine and sodium will break down rapidly in the shallow aquifer over the treatment area and local groundwater quality will improve and no longer be degraded by chlorinated solvents.

Water Board staff prepared Monitoring and Reporting Program (MRP) No. R3-2005-0124. MRP R3-2005-0124 will replace existing Monitoring and Reporting Program No. 94-49 which was issued as part of Cleanup or Abatement Order No. 94-49. After the sodium permanganate injection is complete, all groundwater monitoring wells will be monitored monthly for the presence of sodium permanganate, its breakdown products (sodium, potassium, manganese oxide, chlorine) and other general chemistry parameters (such as pH, temperature, oxygen reduction potential (ORP), etc.). Because sodium permanganate is a purple in color, the colorimetric technique is expected to be an effective field monitoring method. In addition, MRP No. R3-2005-0124 requires ongoing quarterly groundwater monitoring for chlorinated volatile organic compounds, metals, and general mineral analysis.

Three and six months following treatment, ERM will evaluate the effectiveness of the sodium permanganate injection and include this information as part of its quarterly groundwater monitoring report for the Property.

In addition, a health and safety plan has been prepared and will be implemented to ensure human health protection. The health and safety plan also addresses procedures for responding to spills of sodium permanganate. Prior to implementing the Work Plan, the discharger is required to obtain groundwater monitoring/injection well permits through the County of Santa Barbara Protection Services Division and other local agency permits that are required for construction of the onsite chemical storage area.

### COMPLIANCE HISTORY

Over the 11-year period of Water Board staff regulatory oversight, Tube Holding, Techknit, and Raytheon have complied with all Water Board directives issued to date, including Cleanup or Abatement Order No. 94-49 and Monitoring and Reporting Program Order No. 94-49.

### PUBLIC NOTICE

Prior to implementing this corrective action (Work Plan) at the Property, ERM and Water Board staff prepared the attached public notice. In August 8, 2005, ERM hand delivered the public notice to all neighbors located within 500 feet of the Property. A copy of the Public Notice that was distributed is included as Attachment 7.

### RECOMMENDATION

Water Board staff recommends adoption of Order No. R3-2005-0124 as proposed.

Adoption of this Order will enable Tube Holding, Techknit, and Raytheon to expedite its' groundwater cleanup at the Property and restore local groundwater quality.

### ATTACHMENTS

1. Site Location Map
2. Groundwater Elevation Contours (1/19/05)
3. Analytes Detected in Groundwater (1/19/05)
4. Proposed Remediation Plan Map
5. Proposed Order No. R3-2005-0124
6. Proposed Monitoring & Reporting Program R3-2005-0124
7. Public Notice