

TROJAN UV CASE STUDIES

Environmental Contaminant Treatment



Site Example: Treatment of NDMA and 1,4-Dioxane

Drinking Water Projects, **SAN GABRIEL VALLEY**, California

Since it was first settled in 1841, California's San Gabriel Valley, pictured above east of Los Angeles, has hosted a wide variety of industries. However, industrial development has left a significant portion of the Valley's groundwater contaminated with various organic contaminants, including *N*-nitrosodimethylamine (NDMA) and 1,4-dioxane. Because much of the Valley's water supply is obtained from this groundwater, treatment facilities are required.

Volatile organic compounds were first discovered at the Valley County Water District in 1979. The plume now extends for approximately nine miles and underlies the cities of Azusa, Baldwin Park, West Covina, Industry, and Irwindale. NDMA was first discovered in the plume at the La Puente Valley County Water District in 1997. Its discovery led to the reevaluation of treatment plans for impacted facilities. The aquifer in the San Gabriel Valley, in which the plume is located, provides drinking water to over one million residents in

Los Angeles County. While many of the contaminants can be removed with conventional contaminant treatment technologies such as air stripping and carbon adsorption, NDMA and 1,4-dioxane require more advanced technology. NDMA, produced as a by-product of rocket fuel manufacturing, is considered highly carcinogenic and is most cost effectively removed by UV light. 1,4-Dioxane, a stabilizer used in industrial solvents, requires treatment by UV-oxidation (the combination of UV light with hydrogen peroxide).

THE TROJAN SOLUTION

To date, Trojan has supplied UV-oxidation treatment systems to all five groundwater treatment facilities in the Baldwin Park Operable Unit Superfund Site located in the San Gabriel Basin. For the five systems, Trojan supplies NSF-grade hydrogen peroxide through its subsidiary, US Peroxide. This turn-key solution includes full-service delivery of

hydrogen peroxide to the plant. The first Trojan UV system, at the La Puente Valley County Water District, replaced a competitor's existing UV system due to the substantial operation and maintenance cost savings that the Trojan system provided. After testing the site's water and optimizing the system based on the site's water quality parameters, extensive permit testing was completed in November 2001. This testing showed excellent NDMA and 1,4-dioxane destruction while reducing electricity consumption by over 80% when compared to the previous high-energy UV system. Trojan gained technology acceptance for use of its UV technology in drinking water at La Puente from the California Department of Health Services in January 2001. The Trojan UV system at the La Puente Treatment Facility has been delivering drinking water since May 2002.

The five NDMA and 1,4-dioxane treatment plants treat over 50 million gallons per day (MGD). Each of the plants is capable of reducing the

CASE STUDIES

NDMA concentration to less than 2 parts per trillion (ppt) and 1,4-dioxane to less than 0.5 parts per billion (ppb). These five systems help restore groundwater supplies that had been lost to contamination:

California Domestic Water Company

- Flowrate: 14.4 MGD
- Influent NDMA concentration: 200 ppt

San Gabriel Valley Water Company B5

- Flowrate: 11.2 MGD
- Influent NDMA concentration: 700 ppt

San Gabriel Valley Water Company B6

- Flowrate: 11.2 MGD
- Influent NDMA concentration: 900 ppt

Valley County Water District SA-1

- Flowrate: 11.2 MGD
- Influent NDMA concentration: 3,000 ppt

La Puente Valley County Water District

- Flowrate: 3.6 MGD
- Influent NDMA concentration: 1,500 ppt

TESTIMONIALS

"Trojan was a great help in obtaining drinking water permit approval quickly from the California DHS – not to mention the fact that the reduction in power use with the Trojan system allowed us to negotiate a lower rate with the power company."

Mike Berlien

La Puente Valley County
Water District, Plant Manager



GENERAL CONTAMINANT OVERVIEW

CONTAMINANT:
N-nitrosodimethylamine (NDMA)

POTENTIAL SOURCES:

- Drinking water disinfection with chlorine or chloramine
- Printed circuit board manufacturing
- Pesticide manufacturing
- Pharmaceutical manufacturing
- Fish & seafood processing
- Rocket fuel manufacturing

TOXICITY:

- Probable human carcinogen
California Department of Health Services

(DHS):

- Action level - 2 ppt

SUMMARY:

NDMA is formed relatively easily in a variety of processes, including drinking water disinfection with chlorine or chloramine. This emerging contaminant, often associated with only rocket fuel contamination, is being detected in water supplies throughout North America.

CONTAMINANT:
1,4-Dioxane

POTENTIAL SOURCES:

- Chlorinated solvents manufacturing
- Plastic, lacquer, varnish & paint manufacturing
- Pesticide production
- Textile processing
- Paper manufacturing

TOXICITY:

- Probable human carcinogen

CALIFORNIA DHS:

- Action level - 3 ppb

SUMMARY:

1,4-Dioxane is most commonly used in industry as a stabilizer in chlorinated solvents such as trichloroethylene (TCE) and 1,1,1-trichloroethane (TCA). Reported fractions of 1,4-dioxane in the host solvent range from 1% to 15%, depending on the manufacturer. For this reason, 1,4-dioxane is often found intermingled in groundwater solvent plumes. Due to its chemical properties, 1,4-dioxane migrates farther and persists longer than other contaminants in a groundwater plume.

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