

# Soil and Groundwater Investigation and Remediation at a Former Chemical Manufacturing Plant

Nevada State Superfund Site

- EXPERIENCE
- INTEGRITY
- SERVICE



HARGIS + ASSOCIATES, INC  
ENGINEERING • HYDROGEOLOGY

**This manufacturing facility began operating a new chemical manufacturing plant in Nevada in 1947. The plant was constructed on land leased within a portion of an industrial complex. The plant specialized in the production of a variety of chemicals including chlorinating benzene for use elsewhere.** All operations ceased at the plant in 1983 and the plant was demolished in 1984. Various plant and site closure activities continued until 1989. A groundwater treatment system (GWTS) was installed downgradient of the plant in 1983 to prevent groundwater contaminated with volatile organic compounds (VOCs) from migrating off-site. The GWTS is currently active.

**Hargis + Associates, Inc. (Hargis)** was retained by the plant operator and its environmental counsel to conduct an environmental conditions investigation (ECI), including delineation of the extent of VOCs and pesticides in soil, soil gas, and groundwater. ECI tasks included the collection of surface and subsurface soil samples, drilling of exploratory soil borings, installation of groundwater monitor wells, developing and overseeing the implementation of a site-wide groundwater monitoring program, aquifer testing, and preparing technical reports summarizing these tasks for submittal to the Nevada Division of Environmental Protection. Hargis also assisted in the preparation of a remedial alternatives study (RAS) for impacted soil and groundwater.

ECI tasks also included the delineation of dense non-aqueous phase liquids (DNAPL) primarily composed of

chlorobenzene and polychlorinated benzenes. This work included drilling deep soil borings using rotasonic drilling techniques, screening the soil cores for DNAPL using dye-impregnated hydrophobic tape, using photoionization detectors and organic vapor analyzers to measure VOCs, and collecting soil samples for laboratory analysis. The extent of DNAPL was defined and Hargis currently oversees a DNAPL monitoring and extraction program. Approximately 100 gallons of DNAPL has been removed to date.

Hargis evaluates GWTS capture using a multiple lines of evidence approach that includes the preparation of water level contour maps, particle tracking analyses, triangular irregular network (three-point problem) analyses, and evaluating groundwater VOC data from a transect of downgradient monitor wells. Over the years, Hargis has provided recommendations to optimize capture, and has overseen the installation of additional GWTS extraction and monitor wells. Hargis developed a program where key extraction well performance data are tracked and used to determine when well redevelopment or equipment replacement/ repair is necessary.

Hargis also provides environmental consulting services and expertise to neighboring manufacturing facilities within the complex.

## KEY ACCOMPLISHMENTS

- Conducted an environmental conditions investigation for a Nevada State Superfund Site.
- Determined extent of impacted soil and groundwater.
- Installed monitor wells and conducted aquifer tests to estimate aquifer parameters.
- Conducted DNAPL screening and sampling to successfully delineate DNAPL in the vadose zone and groundwater.
- Designed DNAPL monitoring program, removed 100 gallons of DNAPL from aquifer to date.
- Assisted in development of soil and groundwater Remedial Alternatives Study.
- Evaluate GWTS capture using a multiple lines of evidence approach.
- Provide guidance on extraction well performance monitoring and redevelopment.