



Richard Martin Groundwater LLC

Richard J. Martin, LHG

EDUCATION

Graduate Studies, Hydrogeology, Wright State University
BS, Geology, Wright State University, 1989

REGISTRATION

Licensed Hydrogeologist: WA, 337, 2002

PROFESSIONAL SUMMARY

With over 23 years of experience as a hydrogeologist, Richard has been involved with all aspects of hydrogeologic studies, including evaluation of groundwater resources, design and implementation of aquifer testing, delineation of wellhead protection zones, assessment of groundwater/surface water interactions, evaluation of soil and groundwater remedial systems, and determination of historical contaminant plume movement. He also provides hydrogeologic support for geotechnical projects including development of construction dewatering plans, evaluation of groundwater seepage for slope stability problems, evaluation of soil infiltration capacity for stormwater control design, and estimation of groundwater inflows to tunnels and excavations.

PROJECT EXPERIENCE

Seattle Center, Former Metro Bus Barn Site Investigation and Remedial Design, Seattle Center, Seattle, WA. Richard was Project Hydrogeologist and Site Investigation Manager for this fast-track remediation project at the future site of the Gates Foundation headquarters. The site is a former bus maintenance and fueling facility and a benzene plume in groundwater was discovered beneath the site. Richard reviewed previous work completed at the site and developed a focused site investigation, which included using geoprobes to identify potential source areas, installing an array of monitoring wells to identify the extent of the plume, completing groundwater monitoring and hydraulic testing to assess contaminant movement, and installing test wells for a pilot-scale air sparging and soil vapor extraction system. The results of the site investigation led to development of a full-scale remediation system design for the site, which is expected to reduce benzene concentrations in groundwater to target levels within the project time frame.

City of Seattle, Strickland Properties, Seattle, Washington. Richard was Senior Hydrogeologist and provided hydrogeologic expertise for site cleanup. The site was a gas station in the 1950's and 60's that had leaky UST's. Richard's activities included: (1) evaluating historic hydrogeologic data and maps to develop a conceptual model of the site; (2) using groundwater and soil information from drilling activities to evaluate the contamination plume; (3) reviewing a product recovery well system and monitoring well system to remove free product from the subsurface; and, (4) assisting in the design of a passive remediation system to remove dissolved contamination from groundwater. The product recovery system was successful with product levels measured in wells reduced from over 5 feet to undetectable levels.

Washington State Department of Ecology, Review of Groundwater Modeling for Hanford Tank Closure and Waste Management EIS, Richland, WA. Richard was Project Manager and Principal Hydrogeologist working with Ecology providing oversight and technical review of groundwater flow and contaminant transport computer models that are being completed by the U.S. Department of Energy (DOE) for the Hanford reservation. The modeling was being performed to support the EIS that is being

completed as part of the consent decree between Ecology, DOE, and EPA. Richard reviewed the site-wide conceptual model for contaminant migration from ground surface downward through the unsaturated zone, and lateral movement of contaminants in the water table aquifer to the Columbia River. He participated in stakeholder meetings to respond to technical questions regarding the modeling work and technical review group meetings to provide recommendations to DOE's contractors for modeling improvement. His review included evaluation of hydrologic and hydrogeologic inputs to the computer models, including recharge, aquifer parameters, historical groundwater fluctuations in response to discharge of liquid waste at the site, and fate and transport mechanisms in the vadose zone.

Washington State Department of Transportation, Alaskan Way Viaduct/Seawall Replacement Project, Seattle, WA. Richard was Project Hydrogeologist for the Alaskan Way Viaduct/Seawall Replacement Project in Seattle, Washington. He reviewed groundwater conditions along the alignment, including development of a groundwater monitoring program to evaluate potential contamination that may be encountered during construction. He also developed a monitoring program to establish baseline water quality in multiple aquifers in support of project permitting requirements. Richard also constructed a three-dimensional groundwater flow model for the EIS to assess potential impacts to groundwater including mounding behind the finished structure, changes in groundwater discharge volumes and locations to Elliott Bay, and potential degradation of groundwater quality.

San Juan County Solid Waste Division, Orcas Island Landfill, San Juan County, WA. Richard was Project Hydrogeologist for the evaluation and preparation of the landfill's annual groundwater and landfill gas monitoring and reporting requirements. He evaluated groundwater flow direction and groundwater chemistry to develop a hydrogeologic conceptual model and to assess groundwater flow directions, gradients and groundwater divides. This information was used as a basis to evaluate possible contamination migration from the landfill. Richard prepared the annual monitoring reports, provided recommendations to the procedures detailed in their existing monitoring plan, evaluated chemical data review of groundwater and gas monitoring results, analyzed statistical trends for detected contaminants, and provided recommendations for system and monitoring improvements, including the installation of new monitoring wells.

U.S. Coast Guard Landfills, Kodiak Island, AK. Richard was Project Hydrogeologist several landfill sites associated with the U.S. Coast Guard facility. For the municipal landfill, he performed geotechnical and environmental studies, including the evaluation of existing and proposed new cover materials and cover design for the landfill. Leachate volumes generated from this closed landfill are approaching the capacity of the Kodiak wastewater treatment plant. The new cover and other groundwater controls are intended to reduce the leachate generation rates. Richard evaluated groundwater conditions and water quality following installation of the new cover. Richard was also Project Hydrogeologist investigating the movement of chlorinated solvents in groundwater at two RCRA-permitted landfills on the facility. He developed groundwater flow and contaminant transport models to evaluate the movement of chlorinated solvents in the absence of remediation for each site. The results of the modeling were used to focus additional field efforts in order to identify subsurface conditions controlling the spreading of the plumes. Richard evaluated the effectiveness of existing air sparging/soil vapor extraction systems and assessed the feasibility of alternative remedial measures for the sites.

Washington State Department of Ecology, Embankment Fill Monitoring Plan Review, Seattle-Tacoma International Airport Third Runway Project, Seattle, WA. Richard was Project Hydrogeologist for review of a proposed Embankment Fill Monitoring Plan, which was completed as part of the 402 Water Quality Certification for the Sea-Tac Third Runway project. Construction of the third runway included building a large embankment with imported fill adjacent to the existing runways and local wetlands. The Port of Seattle developed a seep and groundwater monitoring to evaluate the impact of the embankment

on water quality in adjacent wetlands, local groundwater, and nearby Miller Creek. Richard assisted Ecology in reviewing the monitoring plan, consultant reports prepared for the airport, a groundwater flow model prepared for the project, and existing water quality data. He provided Ecology with an opinion on the technical basis for the plan and recommendations for modifications to the plan. Richard met with both Ecology and the airport's consultants on multiple occasions to finalize a plan that would support Ecology's position on the project during public review.

Defense Energy Support Center, Defense Fuel Supply Point Site, Anchorage, AK. Richard completed soil leaching, groundwater, and contaminant transport models in support of risk assessment. He simulated the movement of fuel constituents and metals through the soil column to the water table surface. Richard constructed groundwater flow model of complicated site conditions that included areas of unsaturated soil, and numerous surface water seeps and drains. He simulated the transport of contaminants in groundwater to surface water discharge points on the site and used models to evaluate cleanup criteria and time frame for completion of remedial actions. Models used included SESOIL, and MODFLOW and MT3D as part of the DOD Groundwater Modeling System. The results of the modeling indicated that most of the contamination in groundwater eventually discharges to on-site surface drainages, only two of the eight identified source areas cause contamination in groundwater that exceeds cleanup criteria, and cleanup of contamination sources in soil will allow groundwater to meet cleanup criteria within a reasonable time frame.

US Coast Guard, Groundwater Investigation, Kodiak, AK. Richard investigated the movement of chlorinated solvents in groundwater at two RCRA-permitted sites at the USCG ISC Kodiak. He developed groundwater flow and contaminant transport models to evaluate the movement of chlorinated solvents in the absence of remediation for each site. MODFLOW and MT3D were used to confirm the direction of contaminant movement and assess if natural attenuation is limiting contaminant migration. The results of the modeling were used to focus additional field efforts in order to identify subsurface conditions controlling the spreading of the plumes. Richard evaluated the effectiveness of existing air sparging/soil vapor extraction systems and assessed the feasibility of alternative remedial measures for the sites.

US Navy, Hydrogeologic Study, Naval Submarine Base, Bangor, WA. Richard evaluated soil and groundwater remediation effectiveness for the Bangor Naval Base site. Simulated groundwater pump and treatment system using the U.S. Geological Survey (USGS) MOC computer model to optimize the number and pattern of groundwater remediation wells. He used MOC to evaluate potential impacts to surface water receptors in the absence of remediation. Richard assessed the effectiveness of soil washing as a remediation technique using an analytical contaminant transport model. Richard evaluated a second site at the Naval Base utilizing pump-and-treat and reinjection to capture and confine a contaminant plume in a deep confined aquifer. He used a groundwater flow and particle tracking computer model to optimize well field performance.

Alaska Department of Environmental Compliance, Groundwater Investigation, Fairbanks, AK. Assessed a chlorinated solvent plume in groundwater. Used statistical analysis to create a three-dimensional view of the plume in order to optimize the location of pilot testing for remedial alternatives. Determined contaminant masses along cross-sections perpendicular to the groundwater flow direction.

US Army Corps of Engineers, Alaska District, Remedial Investigation/Feasibility Analysis, AK. Involved with remedial investigation/feasibility study at Sparrevohn Long-Range Radar Station for the Alaska District COE. Conducted soil, groundwater and surface water sampling to assess impacts to the environment in support of risk assessment. Reviewed subsurface data to evaluate groundwater flow conditions and remedial options. Conducted geophysical surveys to determine extent of a former landfill

at the lower camp and to identify potential locations of contaminated soils associated with former buildings and dump sites around the upper camp.

US Army Corps of Engineers, Environmental Investigation, Yakima Training Center, Yakima, WA. Evaluated subsurface conditions at a contaminated site at the YTC for the Seattle District. Observed drilling and logged soil and rock conditions for a deep observation well, provided design recommendations for well design, and evaluated groundwater conditions at the site. Estimated the direction of groundwater flow and provided recommendations for locating additional downgradient monitoring wells.

Seattle Tennis Club, Groundwater Flow Analysis, Seattle, WA. Completed a groundwater flow and contaminant transport model in support of a risk assessment. The object of the model was to determine if petroleum contamination released from a UST formerly used on site would pose an unacceptable risk to Lake Washington. A “worst-case” model was constructed. The model indicated that contaminant concentrations discharging to surface water would be less than MTCA criteria. Ecology determined that no further action was needed for the site.

Port of Seattle, Hydrogeologic Assessment for the BINMIC Brownsfield Pilot Project, Seattle, WA. Completed a hydrogeologic assessment for Ballard Interbay North Manufacturing Industrial Center (BINMIC) Brownfields Pilot Project for the Port of Seattle. The goal of the project is to facilitate the redevelopment of Brownfields by improving the quality and pace of cleanup related decision-making in the areas adjacent to the Ship Canal and Salmon Bay. The assessment included estimation of key soil and groundwater parameters, identification of groundwater gradients, and an evaluation of aquifer interconnectedness. Using existing data from a variety of sources, a conceptual model of groundwater flow and the relationship to surface water was developed specific to the BINMIC area. The hydrogeologic model provides a framework for property owners to understand the general subsurface conditions beneath their site and direct site-specific explorations and investigations.

Martin Selig, 333 Elliott Development, Seattle, WA. Richard was Project Hydrogeologist on this site cleanup/property development project in downtown Seattle. The property is under a consent decree with the Department of Ecology to remove creosote-contaminated soil and provide groundwater containment. Richard designed a dewatering system to allow excavation of the contaminated soil to a depth of up to 25 feet below the water table and includes perimeter vacuum-extraction well points and large-diameter dewatering wells within the excavation. To mitigate potential drawdown-induced ground settlement beneath the adjacent railroad tracks, he recommended using a water-tight secant pile shoring wall along the railroad property line with recharge wells at the ends of the wall. Because of the permitting challenges and costs associated with disposal of dewatering effluent from a contaminated site, Richard worked closely with the owner, contractors, and regulators to obtain the necessary permits and to minimize dewatering discharge rates for both the temporary construction dewatering and permanent groundwater control systems, thereby reducing costs to the owner.

King County, Regional Detention Facility (RDF), Des Moines, WA. Richard was Project Hydrogeologist for design of a liner for the base of the stormwater retention facility to prevent mobilization of arsenic into the surface water of Des Moines Creek, a salmon bearing stream. The RDF is one of the major components of a series of projects being implemented by the Des Moines Creek Basin Planning Committee to protect and restore Des Moines Creek. During design phase environmental sampling, elevated levels of arsenic were identified in the proposed excavation areas. Richard developed a preliminary construction dewatering design to provide estimates of groundwater discharge rates. Because of the arsenic, discharge of the dewatering effluent is critical for the project and Richard worked with the project team to identify cost-effective and constructible approaches for handling the water,

including a phased construction dewatering design. Richard prepared technical plans and specifications for construction dewatering.

Badger Properties LLC, Groundwater Analysis for Proposed Comprehensive Plan Amendment, Benton County, WA. Richard was project hydrogeologist for a groundwater study to evaluate the on-site sewage capacity and potential impacts on the groundwater regime in the area from a new development in Benton County. He developed a three-dimensional groundwater flow model to evaluate potential groundwater mounding below the site. Richard's evaluation indicated groundwater mounding of less than 5 feet below the septic system, which would rapidly dissipate toward the edge of the development site.

Freer Consulting Company, Proposed Freeze Pack Land Application Site, Pasco, WA. Richard was project hydrogeologist to evaluate potential impacts of land application of treated wastewater on groundwater from a vegetable processing facility in Pasco, WA. He used existing subsurface information to assess current groundwater conditions below the site. Richard developed a spreadsheet-based groundwater flow model to evaluate potential mounding of groundwater below the land application site. His evaluation indicated insignificant impacts on shallow groundwater with groundwater mounding of less than 1 foot under worst-case conditions.

USKH, City of Wasilla Sewer Lagoon Percolation Analysis, Wasilla, Alaska. Richard was project hydrogeologist to evaluate the percolation capacity of an existing wastewater drain field for the City of Wasilla. The City of Wasilla would like to increase the capacity of the facility, located on the top of hill, to infiltrate up to 1 million gallons per day (mgd), above the current capacity of approximately 0.4 mgd. Richard's evaluation indicated the existing facility is likely at maximum capacity and increasing to 1 mgd would require a 2- to 3-fold increase in application area for the facility. His analysis also indicated that groundwater mounding may be occurring below the site and discharge may be occurring to a stream at the base of the hill below the facility. Richard recommended an exploration and testing program to evaluate percolation capacity of potential application areas, the extent of existing and future groundwater mounding, and potential slope instability of the hillside if capacity is increased.

Freer Consulting Company, Watts Brothers Frozen Food (WBFF) Facility Groundwater Evaluation, Patterson, WA. Richard was project hydrogeologist for this groundwater evaluation in support of the land application permit for the facility. The WBFF is an existing vegetable processing facility with a wastewater treatment system that land applies screened effluent. Richard developed and implemented a groundwater exploration program to characterize shallow groundwater below the site because of concerns of potential contamination from nitrogen in the effluent. His evaluation demonstrated the limited extent of shallow groundwater overlying basalt and that it is unlikely that shallow groundwater would transport nitrogen to deeper basalt water supply wells located upgradient of the site.

Riddell Development, Tullamoor Development Wastewater Disposal Site Evaluation, Connell, WA. Richard was project hydrogeologist for this study to evaluate the suitability of the site for land application of wastewater generated by the development's wastewater treatment facility. Based on exploration and geophysics performed at the site and existing groundwater information for the area, Richard determined the impacts of the land application on shallow groundwater would be negligible and that it is unlikely that contamination from effluent would impact deeper water supply aquifers.

Port of Tacoma, Remedial Investigation, Tacoma, WA. Managed the remedial investigation at the former PRI fuel storage and loading facility in Tacoma. Supervised drilling and installation of monitoring wells to evaluate groundwater conditions at the site. Installed dataloggers and pressure transducers in monitoring wells and in the adjacent waterway to evaluate groundwater/surface water interactions.

Assessed soil and groundwater contamination at the site and the potential impacts of metals and chlorinated solvents to water quality and sediments in the adjacent waterway.

City of Seattle Water Department, Groundwater Study, Seattle, WA. Richard evaluated groundwater resources at the Highline Well Field as part of an aquifer storage and recovery (ASR) program. This project was one of the first ASR programs of its kind in the country. Richard completed computer simulations of groundwater flow using MODFLOW to assess impacts of artificial recharge on the aquifer during the winter months using excess surface water resources. The model was used to optimize pumping scenarios during summer peak period use to maximize capacity. His modeling indicated that the ASR program may not be able to increase production at the well field, however could maintain previously declining aquifer water levels at pre-production levels. Richard also delineated wellhead protection areas using particle-tracking methods for 1-, 5-, and 10-year travel times for the well field.

Port of Tacoma, Groundwater/Surface Water Study Sitcom Waterway Superfund Project, Tacoma, WA. Analyzed groundwater and surface water interactions for the Sitcum Waterway confined disposal facility. Modeled impacts of surface water tidal fluctuations on groundwater levels beneath the site using MODFLOW. Used MT3D and analytical models to evaluate potential movement of dissolved metals from the disposal site to adjacent surface water receptors. Developed long-term groundwater monitoring well program to assess potential migration of contaminants from the confined disposal facility.

Great Western Chemical Storage Facility, Duwamish Waterway, Seattle, WA. Evaluated soil and groundwater contamination for the remedial investigation. Modeled the migration of chlorinated hydrocarbons in groundwater towards the Duwamish Waterway. Involved with development of preliminary remedial alternatives for soil and groundwater. Oversaw drilling and installation of approximately 25 monitoring wells on site, and conducted hydraulic testing of several wells using dataloggers and pressure transducers.

Groundwater Flow Analysis, Adams County, WA. Assessed groundwater flow and predicted contaminant movement beneath a future county landfill facility. Simulated groundwater conditions in weathered and fractured bedrock beneath the site using MODFLOW. Used the calibrated model to evaluate changes in groundwater flow under pumping stresses. Assessed the effectiveness of the planned groundwater monitoring system using particle-tracking methods to simulate the movement of contaminants from potential leaks in the landfill.

US Department of Energy, Radionuclide Evaluation, Hanford Site, Richland, WA. Evaluated radionuclide movement beneath storage tanks at the Hanford site. Used pore water chemistry to determine controlling factors in transport and geophysical logs to analyze historical plume movement. Assessed future radionuclide movement using a two-dimensional vadose zone transport model.

Parker Paint, Soil and Groundwater Contamination Study, Tacoma, WA. Evaluated soil and groundwater contamination at a paint facility in Tacoma. Supervised drilling and installation of monitoring wells and a soil vapor extraction system. Conducted soil vapor extraction tests to determine air/soil flow properties. Used a numerical model to assess the radius of influence and effectiveness of soil vapor extraction system.