

**Sin Senh, P.G.**  
**President and Chief Executive Officer/  
Principal Hydrogeologist****TECHNICAL SPECIALTIES**

Specialties include ERD and ISCO technologies for chlorinated sites, evaluation of environmental discharge to water bodies, degradation studies of CVOCs, analytical and numerical groundwater and surface water flow and contaminant transport modeling for hazardous waste sites, multi-phase (petroleum free-product) finite-element modeling, dual-phase recovery well design, landfills and remedial design of pump and treat systems, GIS database management, aquifer testing, and 3-D computerized visualization.

**EXPERIENCE SUMMARY**

Over twenty years of experience: President and Chief Executive Officer, Chief Practice Officer, Vice President, Office Manager, Principal, Senior, Project, and Staff Hydrogeologist with Roux; Hydrogeologist with the South West Florida Water Management District.

**CREDENTIALS**

Professional Geologist, State of New York License No. 000124

M.A., Hydrogeology, Binghamton University 2005

B.S., Geology, Binghamton University 1997

B.A., Environmental Studies, Binghamton University 1997

**PUBLICATIONS**

*Large-Scale Enhanced Reductive Dechlorination for the Remediation of Chlorinated Volatile Organic Compounds*, Kwan, W. P., Senh, S. and Netuschil, G., Proceedings of the Seventh International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Paper F-036, 2010.

*Significant Acceleration of Time Frame to Closure via Transition from Long-Term Biological Treatment to ZVI/EVO Injection*, Kovacs, R., Senh, S., Silverstein, W., Moss, D., Kelley, R., Proceedings of the Tenth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Abstract and Poster, 2016.

**EXPERT TESTIMONY EXPERIENCE**

- Olin Corporation vs. Insurance Company of North America, et al. US District Court Southern District of New York. Case No. 1:84-cv-01968-JSR, 2020.
- Soo Line Railroad Company d/b/a Canadian Pacific vs. The Travelers Indemnity Company. US District Court for the District of Minnesota. Case No. 0:18-cv-01989, 2020.
- Certain London Market Company Reinsurers vs. Lamorak Insurance Company f/k/a OneBeacon America Insurance Company. US District Court District of Massachusetts. Case No. 1:18-cv-10534-NMG, 2020.
- Olin Corporation vs. Lamorak Insurance Company. US District Court Southern District of New York. Case No. 84 Civ. 1968 (JSR), 2018 (Deposition).

- Sunoco, Inc. (R&M) vs. 175-33 Horace Harding Realty Corp. US District Court Eastern District of New York. Case No. 2:11-cv-02319-JS-GRB, 2014 (Court Testimony).
- Getty Petroleum Marketing Inc., et al. Sworn Declaration for life-cycle costs for remediation. US Bankruptcy Court Southern District of New York. Case No. 11-15606 (SCC), 2012.
- Thomson, Inc., et al. vs. A.M. Guarantee, et al. Marion Superior Court Civil Division, Indiana. Case No. 49D07-0807-PL-30746, 2011 (Deposition).
- Thomson, Inc. n/k/a Technicolor USA Inc. and Thomson Consumer Electronics Taiwan, LTD. vs. Ins. Co. of North America, et al. Marion Superior Court Civil Division, Indiana. Case No. 49D07-0807-PL-30747, 2011 (Deposition).

**SPEAKING ENGAGEMENTS**

- *Mitigating Risk and Opportunities in Development*. Perrin Conferences Environmental Risk & Litigation Conference, June 12, 2018.
- *Update on Coverage Rulings and Risks*. Perrin Conferences Environmental Risk & Litigation Conference, June 20, 2017.
- *Presentation to the Chinese Association of Environmental Protection Industries*. NYC Mayor's Office of Environmental Remediation, May 11, 2017.
- *Funding, Cost Savings and other Incentives for Land Remediation & Redevelopment*. Symposium on Land Cleanup and Revitalization in NYC: Using City Resources to Navigate the Cleanup Process, November 18, 2016.
- *Innovations in Brownfields Cleanup and Redevelopment – the Municipal Model: What's Happening in NYC*. 4<sup>th</sup> Annual Northeast Sustainable Communities Workshop, June 7, 2012.
- *Environmental Considerations for Brownfield Redevelopment Projects*. New York Society of Architects Technical Symposium on Environmental Remediation, March 25, 2010.

**KEY PROJECTS****Expert Witness**

- Expert Witness for a major petroleum company (Plaintiff) for a retail gasoline service station in Queens, New York. Case involved evaluating the timing of release from a UST system, environmental forensic evaluation, and allocation of cost. Prepared expert report on behalf of Plaintiff. Sunoco, Inc. (R&M) vs. 175-33 Horace Harding Realty Corp. US District Court Eastern District of New York. Case 2:11-cv-02319-JS-GRB, court testimony 2014. Judge ruled in favor of Plaintiff.
- Expert Witness for a case between a major insurance carrier and a large multi-national chemical manufacturer. Case involved categorizing past costs

of 12 chemical sites across the country. Over 5,700 invoices (\$40M+ in past costs) were categorized within eight weeks using self learning software. Prepared expert report on behalf of insurance carrier (Defendant), deposition in 2018, settled at trial. Complaint No. 84 Civ. 1968 (JSR); U.S. District Court, Southern District of New York.

- Expert Witness for a major insurance carrier (Defendant) at a 230-acre 130-year old railyard in Minnesota. Case involves categorization of past costs and estimating future remedial cost at multiple operable units at the facility. Evaluated contaminant fate and transport of pentachlorophenol (PCP; used in wood treating) and releases from chlorinate solvents and petroleum. Utilized self learning software to categorize over 12,000 invoices and checks. Prepared expert report on behalf of Defendant, deposition in 2020. Complaint No. 18-cv-01989, Fourth Judicial District Court, MN.
- Expert Witness for a case between a major insurance carrier and a large multi-national chemical manufacturer at a 43,000-acre NPL-listed site in Illinois. Case involved past cost categorization of over \$50M in environmental response costs. Prepared expert report on behalf of insurance carrier (Defendant), deposition in 2020. Complaint No. 1:84-cv-01968-JSR; U.S. District Court, Southern District of New York.
- Expert Witness for a major petroleum company (Defendant) for a retail gasoline service station in Queens, New York. Case involved evaluating the timing of release from a UST system and environmental forensic evaluation. Prepared expert report on behalf of Defendant. 82-11 Queens Boulevard Realty Corp. vs. Sunoco, Inc. (R&M), No.2:11-cv-05144-ADS-ETB. Case was dismissed.
- Expert Witness for a divorce settlement involving the timing and remediation schedule under the New York State Brownfield Cleanup Program. Plaintiff was seeking equitable distribution of marital property which included a redevelopment site that received millions of dollars in tax credits. Prepared expert rebuttal report on behalf of Plaintiff. Case was settled privately. Verified complaint index No. 315523/14; Supreme Court of the State of New York, County of New York.
- Expert Witness for a case involving a construction company allegedly accused of transporting contaminated soil to a residential property in Nassau County, New York. Case involved evaluation of disposal, cost allocation, and best management practices. Verified complaint Index No. 606103/2015E; Supreme Court, State of New York, County of Nassau.
- Expert Witness for a major oil company involved in a Joint Defense Group against a large multinational industrial company on Onondaga Lake, NY.

Project involves partitioning of lake sediment data to evaluate potential sources of petrogenic and pyrogenic PAHS, mercury, chlorobenzene, and PCBs.

- Expert Witness for a case on behalf of a PRP (Defendant) at a former landfill in upstate New York. The site is in the New York State Superfund program and contained waste from Love Canal. Downgradient receptors include a residential community. Case involves evaluation of mass contribution of specific chemicals, timing of disposal, and cost allocation. Complaint Index No. E161116/2017; Supreme Court of the State of New York, Niagara County.
- Expert Witness for a case on behalf of a major petroleum company (Defendant) for a former retail gasoline service station in Long Island City, New York. Case involves evaluating the timing of release from the UST system from 1989, evaluation of a potential secondary product release, evaluation of remedial attempts, and cost allocation. The NYSDEC spill number is still open.
- Expert Witness for a case on behalf of a major insurance carrier at a former electric generating plant in New Haven, Connecticut. Case involves significant releases of PCBs in soil and sediment, UST releases, and allocation of responsibilities across multiple parties. Complaint Index No. 3:12-cv-01794; United States District Court for the District of Connecticut.
- Expert Witness for a case involving a petroleum release at a property in Lido Beach, NY. Scope of work include assessing timing of release, determining nature and extent of contamination, allocation of cost between multiple parties, and remedial cost evaluation.
- Consulting Expert for major petroleum company for 77 gas stations in New Jersey and Pennsylvania in a bankruptcy case. Evaluated life-cycle costs for each gas station based on their anticipated remedies which included vapor mitigation, groundwater remedial systems, and soil remedies. Performed receptor evaluations for each station including well searches, vapor intrusion, and ecological risks. Prepared expert report illustrating environmental exposure for 36 gas stations that were considered to be high priority with respect to risk. Sworn declaration submitted to US Bankruptcy Court Southern District of New York. Case No. 11-15606 (SCC), 2012.
- Consulting Expert and Fact Witness for an insurance matter involving a class action suit against a Fortune-500 client for groundwater contamination at a former television manufacturing facility in Taiwan. Evaluated historic usage of carbon tetrachloride, PCE, and TCE as cleaners during a 30-yr span, impacts of former TCE stills, chemical fires, and

effects of break-down products in groundwater. Provided contaminant mass loading calculations for purposes of allocating cost. Case No. 49D07-0807-PL-30746 and Case No. 49D07-0807-PL-30746, sworn deposition for both cases 2011.

- Consulting Expert for a major petroleum company (defendant) involving reviewing past costs and possibly future estimated costs as well as looking into the appropriate standard applicable to the clean up and providing an analysis of past remedial activity on the property. The case was an insurance litigation claim where a developer purchased the property in NYC and built a 10-story residential tower then claimed environmental damages against the defendant for its prior use of the property as a gas station. Evaluated total construction costs and provided allocation of costs related to environmental contamination. Preparation of expert report for which claim settled for less than one-third of the original claim.
- Consulting Expert for a retail property owner on Long Island, New York. The property is a NYSDEC Class 2 Inactive Hazardous Waste Disposal Site where the primary contaminants are chlorinated solvents in soil and groundwater. The site is being evaluated by the USEPA to potentially be a NPL-listed site. Investigations revealed DNAPL-like concentrations in the vadose zone with concentrations over 3.5 million parts per billion (ppb) and up to 300,000 ppb in groundwater of PCE. Due to potentially intermingled plumes, the scope of work included the allocation of costs related to the investigation and remediation of the groundwater plume.

#### Real Estate/Transactional

- Principal-in-Charge of an 8.5-acre redevelopment in East Orange, NJ. Site had been historically operated with multiple dry cleaners that date back to the 1920's, three former filling stations, and a former automotive repair shop. Project scope included completing a NJ specific Preliminary Assessment and Site Investigation, an assessment of indoor air and IECs at over 30 tenant spaces, a remedial investigation to delineate CVOC plume vertically and horizontally in the overburden and bedrock. Prepared RIR/RAWP with Zero-Valent Iron (ZVI) injections into bedrock as the proposed for remedy for groundwater.
- Principal-in-Charge for the Remedial Investigation (RI) and Remedial Action (RA) implementation associated with a former dry cleaner located in Parsippany-Troy Hills, New Jersey. Soil, groundwater, and subsurface vapor were impacted with chlorinated VOCs as a result of the former dry cleaner operations. Project included the design and implementation of a Supplemental RI that included the installation of soil borings, monitoring wells, and the completion of groundwater vertical profiling. Oversaw the design,

implementation, and management of an extensive groundwater remediation injection program in which over 200,000 pounds of Zero-Valent Iron (ZVI) and 2,500 gallons of Emulsified Vegetable Oil (EVO) were injected into the subsurface using pneumatic fracturing. Post-treatment results show over 95 percent reduction in concentrations of chlorinated VOCs in groundwater. Additional work included the design, installation, and operation of a Soil Vapor Extraction (SVE) system to address impacted vadose zone soil.

- Principal-in-Charge for the development of two data centers in Secaucus, New Jersey – one was a 210,000 sq ft and the other was 70,000 sq ft; both constructed over a closed solid waste landfill. Project included in situ waste characterization, wetlands evaluation, health and safety oversight, air monitoring, and excavation oversight.
- Project Manager of an ISRA site in New Jersey where groundwater is impacted by pesticides that threaten public water-supply wells. Responsibilities included management of a multi-year quarterly groundwater sampling program, installation of 400-ft deep monitoring wells, and performed a 12-hour 350 gpm pump test to determine capture zone for the on-site pump and treat system.
- Principal-in-Charge for the removal of two waste oil underground storage tanks (USTs), a subsurface oil water separator (OWS), and associated piping at a former vehicle maintenance shop in Parlin, New Jersey. A historic release occurred from the OWS triggering a Remedial Investigation (RI) for petroleum-related VOCs and chlorinated VOCs in soil. Developed and implemented a Remedial Action (RA) that included excavation and off-site soil disposal. SESOIL modeling utilized to demonstrate groundwater (approximately 100 feet deep) was not impacted by the shallow soil contamination.
- Principal-in-Charge for the largest redevelopment project in New York City (over \$5 billion) which includes the multiple relocation of an active 9-acre 100-year old railyard in order to maintain 100% runtime of trains. Project includes Phase I and Phase II ESAs (investigation of soil, groundwater, and soil vapor) at over 75 properties; Construction support for excavation of over 1,000,000 cubic yards of soil including implementing an in-situ waste characterization program; Environmental support for demolition, asbestos and lead abatement, site remediation using In-Situ Chemical Oxidation; Property acquisition support throughout the project (7 city blocks); and Agency support for NYSDEC, NYCDEP, MTA (LIRR/NYCT), and ESDC. The environmental data was used as an integral component of the New York State Environmental Quality Review Act (SEQRA) final Environmental Impact Statement (EIS). The project will encompass 336,000 sq ft of office space, 6.4 million sq ft of residential space, an

18,000 seat sports and entertainment venue - the Barclays Center (home of the Nets professional basketball team) - 247,000 sq ft of retail space, a 165,000-square-foot hotel, and over 8 acres of intricately designed publicly accessible open space.

- Principal Coordinator for a due diligence project for a major petroleum company for the divestiture of retail service stations throughout the Mid-Atlantic and New England regions. The project was to complete an assessment of over 1,000 retail service stations with the intent of divesting of both the property and the environmental liability. Provided strategic insights for developing and managing the overall project. Managed team that performed over 180 Phase I ESAs in accordance with ASTM E1527-05, developed the scope of work for the Phase II site characterizations within a four-month period; finishing ahead of schedule and on budget. Following the Phase I ESAs, managed team that performed the Phase II site characterizations at 60 of the retail service station sites. The scope of work for each site in general included a geophysical survey, soil borings and soil samples, and installing monitoring wells and sampling groundwater. The Phase II investigations generated a substantial volume of data including laboratory results, well location survey data, groundwater elevation measurements and boring logs; all of which were presented in a summary report of each site.
- Principal-in-Charge for the investigation and remediation of a gasoline service station in downtown Brooklyn, New York. Performed remedial investigations, prepared a remedial action plan, and completed remedy of a BTEX and MTBE groundwater plume which included the injection of over 1,600 pounds of chemox (Nano-Ox™) into the aquifer. NYSDEC Spill has been closed.
- Project Manager at a former petroleum bulk storage terminal in Oceanside, New York. Responsibilities included installation of 20-plus monitoring wells, 6 pumping wells, slug tests and constant rate pump test, design and installation of a pump and treat system, and performance monitoring of the full-scale system for 3 years after which it was shut down due to approval from the NYSDEC for reaching cleanup goals.
- Principal-in-Charge of a \$125MM redevelopment project in Flushing, New York. Project involved coordination the NYC OER for the E-designation program (noise and hazardous materials) and NYC Brownfield Cleanup Program; Phase II ESA; in situ waste characterization and excavation support for 90,000 tons of soil which achieved a Track 1 (Unrestricted use) clean up goal, and the design and installation of a vapor barrier. Project received a Brownfield Incentive Grant, Brownfield Opportunity Area grant, an E-designation grant, and a NYC Green Property Certification.
- Principal-in-Charge of a large four tower redevelopment project in Flushing, New York. Project involved coordination the NYC OER for the E-designation program (noise and hazardous materials) and NYC Voluntary Cleanup Program; Phase II ESA and remedial investigation; in situ waste characterization and excavation support for approximately 438,000 tons of soil; closure on a NYSDEC Spill; and the design and installation of a vapor barrier. The Site was divided into A and B (B was 95% of Site's footprint) where A achieved a NYSDEC Part 375 Track 2 (Restricted Residential Use) clean up due to an active SSDS and B achieved a Track 1 (Unrestricted Use) clean up.
- Principal-in-Charge for a 12.5-acre redevelopment project for a Cornell University on the southern half of Roosevelt Island, New York. The project involves the construction of a new applied sciences and engineering campus containing academic and research buildings, corporate co-location and residential buildings, hotel and conference facilities, retail spaces, a central utility building, and publicly accessible open space. Implemented a Phase II ESA, community air monitoring program, and construction support to date.
- Principal-in-Charge for a 13-acre redevelopment project in Norwalk, Connecticut. The project will involve the construction of a new fully enclosed mall – the first in the U.S. since the 2008 financial crisis. Project includes soil and groundwater investigations, remedial design to accommodate mall construction, dewatering and discharge into the adjacent river, in-situ waste characterization for the support of excavation of approximately 200,000 cubic yards of soil, construction oversight, and application for the CT DECD Brownfield Remediation and Development funding.
- Principal-in-Charge of a site investigation project in Lynbrook, New York immediately downgradient of a 11.5-acre cemetery. Evaluated source of contaminants as a result of cemetery operations and historical site use including a manufactured gas plant and former dry cleaner. Collected soil, soil vapor, and groundwater samples to support delineation of pesticides and herbicides suspected to be emanating from the cemetery.
- Principal-in-Charge for an expansion of a major mall in Staten Island, New York. Project involves the construction of adjacent building to the existing mall and construction of a new above grade parking structure. Performed a Phase II ESA and designed an in-situ waste characterization program which was used in the CEQR EIS being prepared for the project.
- Principal-in-Charge for an international developer constructing a commercial tower that is within the Cambridge, Somerville, and Boston areas of

Massachusetts with a petroleum plume migrating into adjacent railyard. Project includes remedial design for source removal, plume containment, and off-site groundwater treatment and working within limits of RAM Plans under MassDEP MCP and the previous property owner's LSP.

- Principal-in-Charge for the remediation and redevelopment of a former asphalt manufacturing facility in Flushing, New York. Project included closure of multiple NYSDEC spill numbers, Phase II ESA, closure of a 10,000-gal UST, hot spot soil excavation, coordination with NYSDEC Tidal Wetlands staff when working within tidal wetland buffer zone, and re-zoning of the property for lease to a metals recycling contractor.
- Principal-in-Charge for the redevelopment of 3.1-acre site in the St. George region of Staten Island, New York. The project enrolled in the NYC OER VCP, transferred over 20,000 CY of soil through the Clean Soil Bank, and will obtain a Track 1 Clean Up. When constructed, the project will provide 62,000 sq ft of retail, 109 residential units, a 180-room hotel, 125,000 sq ft of subgrade parking, and rehabilitation of four historic U.S. Lighthouse Deport buildings to the community. Project responsibilities included the oversight of 60,000+ CY of excavation, community air monitoring, and the installation of a vapor barrier.
- Principal-in-Charge for the closure and abandonment of 53 Class V drywell structures at commercial warehouse facility in Syosset, New York. The drywell abandonment project was conducted in accordance with the USEPA Underground Injection Control Program as administered by Nassau County Department of Health (NCDOH). The project required coordination with the client and their developer, the NCDOH, the USEPA, the local union representatives, Nassau County Department of Public Works, and subcontractors in order to complete the job. Obtained a No Further Action from NCDOH and USEPA through work plans, memoranda and summary reports.
- Principal-in-Charge of a remediation project at a former 18-acre television manufacturing facility in Taoyuan, Taiwan. Project included coordination of a soil and groundwater investigation using Taiwanese consultants and subcontractors. Investigation included using a MIP probe to delineate a DNAPL source for a 9,000-ft dissolved PCE and TCE plume, installation of over 65 monitoring wells, design and management of two 24-hour pump tests, implementation of an Enhanced Reductive Dechlorination (ERD) pilot study using HRC/molasses injections and an In-Situ Chemical Oxidation (ISCO) pilot study using potassium permanganate, tracer studies, implementation and design of a full-scale ERD remedial system that includes over 125 injection

wells and a groundwater re-circulation system, database management, and numerous report preparation including site investigation summary reports and remediation work plans.

- Project Manager for the Delaware City PVC Superfund Site. Project included soil/groundwater investigations at the polyvinyl chloride manufacturing facility, construction of flow model for design of additional pump and treat system, annual groundwater sampling of over 85 wells to assess the effectiveness of existing pump and treat system, and performing aquifer pump test on newly installed wells, and annual reporting to the USEPA.
- Project Manager for a former fibers manufacturing facility undergoing RCRA Corrective Action in Williamsburg, Virginia. Managed multi-person field crew who installed multiple monitoring wells, gauged and sampled groundwater, and prepared reports for VDEQ approval. Segregated site into multiple parcels for property transaction and prepared closure reports for each parcel as part of the property divestment.
- Project Manager of a multi-year quarterly monitoring and reporting program at a municipal landfill complex on Long Island, New York. The complex consists of multiple landfills, leachate containment systems and leachate holding tanks. Project involves collection of water level and water-quality data from dozens of monitoring wells, sampling of leachate containment systems, coordination with contract laboratory, data validation, data evaluation and report preparation.
- Project Manager for a 7.2-acre site redevelopment project in Rego Park, New York. Project involved Phase II ESAs, groundwater monitoring, and excavation support for 258,000 cubic yards of soil. Developed a unique in situ waste characterization plan which included the collection of over 1,000 soil samples, management and review of several thousand records of analytical data, preparation of various graphics delineating the Site by horizontal and vertical grids of hazardous and non-hazardous soil, preparation of state and federal applications, and documentation of the fate and transport of hazardous and non-hazardous soils.

#### **Modeling**

- Primary groundwater flow and contaminant fate and transport modeler for a Phase II RI/FS at USEPA NPL Superfund site in Logan Township, New Jersey. Constructed a 12-layer MODFLOW model to simulate groundwater flow and MT3D transport model of three contaminant plumes (TCE, Benzene, and BCEE) resulting from former petroleum lagoon and acid washing facility. Performed evaluation of discharge from groundwater to surface water bodies (swamps, creeks, ponds, and lakes), calculation of bio-degradation rates of TCE and Benzene based on

microbial studies. Participated in installation of monitoring wells and soil borings, soil sampling, conducting a 72-hour constant rate pump test and hydrogeologic interpretation of site.

- Primary modeler for the largest subsurface free-product plume in North America (Brooklyn, NY). Constructed a groundwater flow and multi-phase flow model using BIOSLURP™ to estimate total free-product volume and recovery time and a three-dimensional groundwater flow model using MODFLOW. Provided alternative remedial strategies to expedite recovery effort and improvements to maintain hydraulic containment and prevent discharge to adjacent creek. Performed two constant-rate pump tests and hydrocarbon characterization sampling to evaluate mobility of free-product plume. Modeling results were used to design and installed additional thirteen 12-inch diameter stainless steel recovery wells. Total volume recovered to date is over 12 million gallons of free-product.
- Primary modeler and contaminant transport assessment at a bulk petroleum storage facility in Buffalo, New York. Project included assessment of the site's environmental discharge to the Buffalo River, soil investigations, GIS database management and computerized mapping. Constructed a MODFLOW groundwater flow model to evaluate hydraulic containment to the river and a multi-phase flow model using BIOSLURP™ to estimate total free-product volume and recovery time. Provided alternative remedial strategies to expedite recovery effort. Performed three 24-hour constant-rate pump tests and hydrocarbon characterization sampling to evaluate mobility of free-product plume.
- Primary modeler for the investigation and remediation activities at an active 130+-acre railyard in Queens, New York. Responsibilities included evaluation of unsaturated and saturated soil, groundwater, separate-phase hydrocarbon, soil vapor and on-site sewer system as well as characterizing a 250,000-gallon PCB-contaminated separate-phase hydrocarbon plume.