

**EXPERIENCE:** Carol is a Senior Environmental Geologist with experience in a wide range of projects utilizing both the Risk Reduction Rules and Texas Risk Reduction Program (TRRP) in her 6 years of experience. Her past projects include Phase I Environmental Site Assessments, Phase II assessments, sampling of groundwater monitoring wells, surface and subsurface soil investigations, groundwater and soil remediation, and aquifer characterization. These investigations have included assessment of contaminants including tetrachloroethene and other volatile organic constituents, metals, fuel, and wood preserving chemicals. Provided below is a brief review of key projects highlighting Carol's experience:

**KEY PROJECTS:** *Industrial Property Evaluation:* Carol helped perform a Phase I Environmental Site Assessment on a former dress manufacturing facility located in an industrial area. The Phase I ESA led to a subsurface investigation due to old USTs on-site and the use of chlorinated solvents in the past. Due to detected chlorinated organics in the groundwater, the decision was made to not purchase the property.

*Phase I ESAs – Texas:* Carol has completed Phase I ESAs on properties including vacant land, warehouse distribution facilities, shopping centers and other land uses. She has completed over 30 ESAs.

*City of Morton – Morton, Texas:* Carol coordinated and implemented a groundwater-monitoring plan for a wastewater-holding pond and a land application area located adjacent to the wastewater treatment facility in west Texas. The plan was implemented by the City of Morton in order for the city to gain a renewal permit for the wastewater facility.



*Reese AFB – City of Lubbock:* Carol was responsible for gaining site access and historical review of a 20- acre parcel of land to be used by the City of Lubbock Police Department as a Small Arms Firing Range. The Reese AFB site is a RCRA/ CERCLA site with a former landfill on-site. Carol was responsible for implementing a Phase II for the site, which included grid soil sampling, as well as a geophysical survey for the former landfill boundaries. Carol was responsible for performing and interpreting the geophysical survey, directing the drilling crew, soil sampling, analyzing data, subsequent report writing, and presenting the findings to the City of Lubbock.

*Industrial Dry Cleaning Facility – Odessa, TX – Project Manager/Geologist:* Carol has performed several quarterly groundwater monitoring events for the site and helped prepare the Quarterly Reports to be submitted to the VCP. She also supervised an off-site investigation that included the installation of 50 monitor wells, nine soil borings to delineate the vertical and lateral extent of chlorinated contaminants. The investigation is of two aquifers with double-cased wells and stainless steel well materials used due to the nature of the investigation. Developed the Work Plan and remediation design for aquifer remediation through injection. Responsible for coordinating all on and offsite activities of the installation of 200 injection wells and subsequent injection. Responsible for obtaining authorization from the Underground Injection Control Section of the TCEQ to install the injection wells, prepared Site Health & Safety Plan for on and offsite groundwater remediation. Assisted client representative in gaining access to off-site properties for groundwater remediation.

*Industrial Property – Euless, TX:* Carol supervised the implementation of an On-Site and Off-Site Investigation Plan for delineation of TCE impacts in the soil and groundwater. The investigation required coordination



with off-site property owners and the city. Carol installed monitor wells and several borings at the site and prepared reports detailing the subsurface conditions.

*Dallas Area Habitat for Humanity:* Carol coordinated and implemented an on-site soil investigation within the interior of the building to delineate vertical and lateral soil contamination. She prepared a detailed Site Investigation Report to be submitted to the TCEQ Voluntary Cleanup Program (VCP). Carol coordinated transportation and disposal of contaminated soil and groundwater from the site.

Later events leading towards closure included developing a Construction Storm Water Pollution Prevention Plan, asbestos abatement notification/oversight, building demolition oversight, remediation and removal of over 2,000 cubic yards of PCE impacted soil, Response Action Completion Report, assisted in closing site under residential cleanup levels.

*Strip Center with Dry Cleaners:* Carol supervised investigation inside and outside of the dry cleaners on-site in order to prepare a Site Investigation Report for the VCP. She was responsible for collecting natural attenuation parameters in order to demonstrate degradation of chlorinated organics for the site and to gain closure for the site under RRS2.

*Commercial Dry Cleaning Facility, Dallas, Texas - Project Manager.* Responsible for site delineation, quarterly groundwater monitoring and reporting, APAR, and remediation of 200 cubic yards of impacted soil within the facility under restrained space and time conditions, prepared Response Action Completion Report.



***3 Power Plant Facilities in Central Plains Region of Texas – Senior Geologist:*** Responsible for Work Plan for all 3 facilities, coordinating subsurface investigations, site delineation, groundwater classification studies, Affected Property Assessment Reports, and coordination with TCEQ.

***1 Power Plant in the Houston Ship Channel Area, Texas – Senior Environmental Geologist and Project Manager:*** File review and Work Plan development, coordinating and conducting a subsurface investigation of soil and groundwater, Affected Property Assessment Report and coordination with TCEQ.

***Auto Salvage Facility–Houston, Texas – Senior Environmental Geologist:*** Work Plan development for soil and groundwater investigation, delineation of soil and groundwater in preparation for the sale and redevelopment of the property. Extensive metals investigation which will require remediation. The future plan is to remediate and close the property under the Voluntary Cleanup Program with residential standards.

***Industrial Facility in Dallas, Texas which was formerly a Fence Galvanizing Operation – Project Manger and Sr. Geologist:*** Performed Phase I ESA that lead to a subsurface investigation of soil and groundwater, groundwater classification studies, entrance into the Voluntary Cleanup Program, Self Implemented Response Action, Affected Property Assessment Report, Response Action Completion Report. Pending review of the TCEQ, should receive a final certificate of completion with residential standards.

**EDUCATION:** B.S., Secondary Education with a minor in Geology; Texas Tech University; 1992.

M.S., Geology (emphasis in soil mineralogy and stratigraphy); Texas Tech University; 1999.

***Cirrus Associates, L.L.C.***

***Dallas***

***Lubbock***

***Houston***



*Cirrus Associates, LLC*

**CAROL M. TOWNSEND, P.G.**  
**Senior Environmental Geologist**

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**TRAINING:** 40 hour Hazardous Waste Operations (HAZWOPR)

40 hour TRRP training

**MEMBERSHIP:** Texas Groundwater Association