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| In the Matter of: | FLORIDA POWER & LIGHT COMPANY (Turkey Point Units 6 and 7) | | |
|  | ASLBP #: | 10-903-02-COL-BD01 | |
| | Docket #: | 05200040 05200041 | |
| | Exhibit #: | INT-001-00-BD01 | Identified: 05/02/2017 |
| | Admitted: | 05/02/2017 | Withdrawn: |
| | Rejected: | | Stricken: |
| Other: | | | |

MARK A. QUARLES, P.G.

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PROFESSIONAL SUMMARY

Environmental consultant with 30 years experience in a variety of local, state, EPA, and international regulatory programs across the United States and South America. Bachelor of Science, Environmental Engineering Technology. Licensed Professional Geologist (P.G.) in Tennessee.

CONTACT INFORMATION

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RANGE OF TECHNICAL EXPERIENCE

Coal Combustion Wastes

- Multiple Clients – Nationwide United States**
 Conducted file reviews and groundwater data analyses for over 70 coal combustion residual (CCR) disposal sites in 12 states, specific to identifying coal combustion waste constituents in the groundwater. Sites included wet surface impoundments and dry landfills.
- Southern Environmental Law Center – Tennessee and Alabama**
 Evaluated CCR disposal area closure plans for numerous fossil plants. Those evaluations included critiques relative to NEPA, performance standards for closure-in-place according to the CCR Rule, and beneficial reuse standards according to the CCR Rule. One major consideration for not meeting those standards was the placement of CCRs in contact with and below the uppermost aquifer.
- Southern Environmental Law Center – Kingston, Tennessee**
 Developed technical comments for a proposed major permit modification associated with a coal combustion waste landfill expansion. Technical considerations included the geotechnical stability, use of a mine subsidence model to predict liner strain, groundwater connectivity to adjacent rivers, and unstable sinkhole geologic conditions.
- Southern Environmental Law Center – Kingston, Tennessee**
 Prepared technical comments regarding the Draft Environmental Assessment for a proposed bottom ash dewatering system. Compared the proposed plan to other utility-owned plants and “state-of-the-art” systems for water minimization, waste avoidance, and land disposal.
- Chris Dennis Environmental Fund – Ithaca, New York**
 Developed technical comments regarding a SPDES permit renewal for leachate and stormwater discharges from a coal combustion waste landfill relative to NYDEC Part 360 landfill monitoring, operational, groundwater corrective action, and closure / post-closure standards.
- Confidential Clients – Tennessee**
 Developed and implemented water and sediment sampling plans to locate previously unpermitted, discrete groundwater discharges in support of Clean Water Act litigation regarding coal combustion waste disposal sites. Sample locations were chosen based upon historical aerial photographs, river water levels, discovery requests for internal documents, and on-site water-based inspections.
- Sierra Club – Washington, DC**
 Reviewed the hydrogeologic investigation report and engineering design for a proposed TVA Gallatin (Tennessee) dry ash FGD landfill. Evaluated the proposed groundwater monitoring program, liner design, leachate collection and disposal plan, and closure plan relative to EPA and TDEC standards.
- Southern Environmental Law Center – Chesapeake, Virginia**
 Reviewed historical groundwater monitoring reports, landfill designs, aerial and topographic maps, regulatory files, and a plan for monitored natural attenuation of metals associated with closed impoundments and an active coal combustion waste landfill owned by Dominion Energy to determine the seasonal high groundwater table relative to wastes, groundwater flow preferences, and lateral extent of wastes.

- *Southern Environmental Law Center* – Birmingham, Alabama
Reviewed regulatory file data, current and historical aerial photography and topographic maps, and water seep sampling results to determine if coal combustion waste constituents associated with three coal plants were present and if the water was considered to be groundwater, leachate, or both.
- *Southern Environmental Law Center* – Moncks Corner, South Carolina
Reviewed groundwater monitoring reports, plume maps, and a site assessment for the Santee Cooper Grainger Station to determine the feasibility of cap-in-place and permeable reactive wall barriers as viable corrective actions versus excavation and disposal in a lined Subtitle D landfill.
- *Environmental Integrity Project, Sierra Club, and Earthjustice* – Washington, D.C.
Reviewed historical power plant file and groundwater water monitoring reports for CCR landfills and impoundments to identify previously undetermined damage cases according to EPA protocol. Results were summarized in two co-authored reports: *Out of Control* (February 2010) and *In Harms Way* (August 2010).
- *Sierra Club* - Washington, D.C.
Reviewed historical groundwater monitoring reports associated with CCR landfills and impoundments for 10 coal-fired power plants in Kentucky to identify impacts to groundwater relative to EPA damage case standards. Co-authored the report *Slow Motion Spills* (2010).
- *Prairie Rivers Network* - Champaign, Illinois
Evaluated Illinois standards for the disposal and beneficial re-use of CCRs compared to national standards. Included an in-depth analysis of chemical and physical characteristics, a summary of site characterization and siting standards, and a summary of national damage assessment cases.
- *Plaintiff Attorney* – Kingston, Tennessee
Developed a surface water monitoring program to determine the lateral extent of 5.4 million cubic yards of CCWs that were released to the surface water from a surface impoundment failure at the TVA Kingston coal-fired power plant.

Unconventional Natural Gas and Hydraulic Fracturing

- *Tulane Environmental Law Clinic* – New Orleans, Louisiana
Provided expert testimony at a public hearing for proposed oil and gas well in the Tuscaloosa Marine Shale in St. Tammany Parish, an area largely undisturbed by drilling. Reviewed the application and regulatory standards for deficiencies compared to industry and US EPA standards. Sensitive issues included a well pad in a wetland, drilling through multiple layers of a Sole Source Aquifer, and the cumulative effects of the proposed 60,000 acres of leases.
- *Northern Plains Resource Council* – Billings, Montana
Provided testimony at a Board of Oil and Gas Conservation grievance hearing for a proposed oil and gas well in Belfry along the Beartooth Front near Red Lodge. Reviewed the application for deficiencies and identified shortcomings that were not protective of human health and the environment and did not meet minimum industry standards for hydraulic fracturing.
- *Shenandoah Valley Network, Shenandoah Riverkeeper* - Virginia
Developed technical comments associated with the first proposed shale gas well in Virginia. The report evaluated, among others, the proposed plan for hydraulic fracturing, storage of produced waters and flow back, protection of groundwater supplies, treatment and disposal of wastes, and the location relative to the floodplain.
- *Sierra Club* - Washington, D.C.
Provided technical comments regarding proposed Tennessee oil and gas regulations, with an emphasis on well casing standards, fracture chemical disclosure, and baseline / post drilling monitoring for fracture chemicals and methane intrusion. Compared the proposed regulations to industry standards and other state's regulations and provided recommendations for changes.

Landfill Design and Operation

- *Tulane Environmental Law Clinic* – New Orleans, LA
Prepared technical comments for a proposed expansion of a construction / demolition debris landfill by comparing the site characteristics, operation plan, and monitoring program to LDEQ and EPA landfill standards.

- *Sierra Club* – Nashville, Tennessee
Reviewed the hydrogeologic investigation and supporting documents developed by the landfill operator for a permit expansion to identify shortcomings of the site characteristics and the design relative to TDEC and EPA Subtitle D standards.
- *Plaintiff Attorney* – Atlanta, Georgia
Evaluated the technical merits of a municipal solid waste disposal permit that had been issued by the Georgia EPD. Key technical issues were placement of the landfill adjacent to a public surface water supply, liner performance, and landfill leakage history in Georgia. The permit was appealed to the Georgia Administrative Court.
- *Plaintiff Attorneys, Secondary Aluminum Smelter Waste Landfills* - Tennessee
Reviewed secondary aluminum smelter waste characterization results, landfill designs, and hydrogeologic investigations for smelter waste landfills.

Wastewater Permit Compliance

- *Kentucky Waterways Alliance* – Henderson, Kentucky
Provided technical review of a draft wastewater discharge permit associated with the proposed Cash Creek Integrated Gasification Combined Cycle (IGCC) plant and associated landfill. Included research into IGCC wastewater and solid waste constituents, and a comparison to the proposed discharge criteria.
- *Sierra Club* – Bedford, Kentucky
Provided technical review of a draft wastewater discharge permit associated with the Trimble County Generating Station coal plant and flue gas de-sulfurization (FGD) expansion. Research included the characteristics of FGD process and gypsum by-product wastes; the leachability of solid wastes; the characteristics cooling water blowdown, metal cleaning wastewater, stormwater runoff, and coal and limestone pile runoff; the structural integrity of an existing ash surface impoundment proposed for vertical expansion; and the technical feasibility of a proposed gypsum disposal surface impoundment.
- *Tulane Environmental Law Clinic* – New Orleans, Louisiana
Reviewed a draft LDEQ permit and provided written legal testimony associated with a Draft *General Permit for Discharges from Oil and Gas Exploration, Development, and Production Facilities*. The project consisted of comparing proposed effluent limitations to EPA Effluent Limitation Guidelines, comparing sampling parameters to expected exploration and production waste contaminants, and recommending additional monitoring schemes that were more reflective of the risks.

Environmental Investigations and Remediation

- *US EPA* – Dickson, Tennessee
Investigated the occurrence of a cluster of cleft palate / cleft lip birth defects in the county relative to the occurrence of trichloroethylene in the groundwater and public water supply. Reviewed EPA and TDEC regulatory files, CDC and Department of Health reports, interviewed City, County, TDEC, and EPA officials, and interpreted regional karst geologic and hydrogeologic data.
- *Harpeth River Watershed Association* – Franklin, Tennessee
Provided technical comments for an environmental investigation and corrective action plan in opposition to a proposed monitor-only, natural attenuation remedial action. Contaminants of concern included free product toluene, dissolved-phase BTEX constituents, dissolved-phase acetone, and dissolved-phase chlorinated solvents. Comments resulted in a required active soil / groundwater remediation.
- *Natural Resources Defense Council* – Confidential Location
Provided technical input for development of a Complaint for Declaratory and Injunctive Relief related to the inappropriate disposal, investigation, and cleanup of volatile organic compounds in soil, groundwater, and surface water.
- *Multiple Clients* – Eastern United States
Created Remedial Investigation / Feasibility Studies (RIFSSs), Corrective Action Plans (CAPs), Quality Assurance Project Plans (QAPPs), Field Sampling and Analysis Plans (FSAPs), and

Health and Safety Plans (HASPs) for Superfund, RCRA, and voluntary state programs to identify, quantify, and remediate releases of chlorinated solvents (notably trichloroethylene and its break-down components), volatile organic compounds, semi-volatile organic compounds, and heavy metals.

Local and FERC Utility Line Environmental Assessments

- *Private Landowner* - Livingston, Tennessee
Represented a private landowner to prevent a proposed Corps of Engineer development. Arguments included identifying deficiencies in the aquatic resources alteration permit, the cultural resources survey, the stream use classification, and the Section 404 application.
- *Private Landowner* – Bowling Green, Kentucky
Provided technical comments of a Draft EA for the construction of a 220-mile electrical powerline. Technical, legal, and financial reporting resulted in stopping the project in its entirety, the Public Services Commission revoking the certificate of need (CON), and the Kentucky Attorney General conducting a formal investigation.
- *Sumner Trousdale Opposing Pipeline* – Gallatin, Tennessee
Provided technical comments and field inspections to identify deficiencies in the wetland and aquatic resources alteration permits for a proposed 30-mile natural gas pipeline, to represent the group in public hearings, and develop technical arguments against the proposed pipeline.

Reservoir Water Quality and Use Assessments

- *Plaintiff Attorney* - Winchester, Tennessee
Developed technical comments on Section 10 and Section 26A Regulation permit applications and a Recreational Boating Capacity Study for reservoir-wide community boat docks associated with residential development.
- *Plaintiff Attorney* - Guntersville, Alabama
Developed technical comments to Section 10 and Section 26A Regulation permit applications for residential developments. Completed a detailed assessment of reservoir water quality relative to designated use standards.
- *Plaintiff Attorney* - Atlanta, Georgia
Evaluated the technical merits of a water withdrawal permit and the effects of increased urbanization on stormwater runoff and groundwater recharge. Water withdrawal for commercial irrigation purposes resulted in decreased water levels in lakefront property of an adjacent residential neighborhood. The permit was appealed to the State Administrative Court.

Oil and Gas Exploration and Production Wastes

- *Indigenous Rights Organization* – Amazon Basin, Peru
Developed a Best Management Practices guide for remediation of petroleum-contaminated soil and groundwater in remote areas of the Amazon basin of Peru.
- *Plaintiff Attorney* - Amazon Basin, Ecuador
Provided technical assistance for the first environmental class action lawsuit in South America. The work demonstrated that oil exploration and production activities did not meet historical industry standards, did not meet historical company standards dating to the 1920s, and violated international and national water and soil quality standards.
- *Indigenous Rights Organization* – Amazon Basin, Peru
Provided independent third-party evaluation of crude oil remediation activities of 75 sites in Block 1AB in the Amazonian jungle occupied by three indigenous groups. The work included sampling of soil, sediment, and surface water contamination from present day and legacy operations; evaluating the effectiveness of *in-situ* bioremediation as the chosen remedial alternative; and comparing cleanup activities relative to Peruvian and U.S. standards.

Stormwater Permitting and Compliance

- *Tennessee Clean Water Network* – Knoxville, Tennessee
Provided technical comments for the draft Knox County Phase II Municipal Separate Storm Sewer System (MS4) permit.

Municipal Wastewater Management

- *Emory Law Clinic and Everglades Law Center* – Homestead, Florida
Provided technical comments regarding the proposed use and deep well injection of 90 million gallons per day of partially treated domestic wastewater from the Miami-Dade County South District Plant to cool nuclear reactors at the Turkey Point power plant operated by the Florida Power & Light Company. The evaluation included a critique of the wastewater characterization, the human risk assessment, the local geological conditions, and the potential to harm the Upper Floridan Aquifer due to injection into the Boulder Zone.
- *Various Municipalities* – Fulton, Cobb, and DeKalb County, Georgia
Performed sewer modeling and point-source identification to identify sources of infiltration / inflow, perform cost evaluations for source removal, and properly design treatment plant expansions.
- *Boston Water and Sewer Commission* - Boston, Massachusetts
Completed sewer modeling and point-source identification projects of combined and separate sewers up to 15 feet in diameter in order to design the Deer Island wastewater treatment plant in the Boston Harbor. Identified sources of infiltration / inflow and performed cost evaluations for source removal.

EDUCATION***Master of Business Administration***

Vanderbilt University, Owen Graduate School of Management, Nashville, Tennessee

Bachelor of Science, Environmental Engineering Technology

Western Kentucky University, Bowling Green, Kentucky

PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS

Licensed Professional Geologist (P.G.), Tennessee

Certified Hazardous Materials Manager, Masters Level (1993 – 2001)

Class II Water Pollution Control Operator, Massachusetts (1988)

TECHNICAL PUBLICATIONS AND LECTURES

- Quarles, M., Lisa Evans, and Peter Harrison, Panel Discussion on Coal Combustion Waste Management and the New CCR Rules, Appalachian Public Interest Environmental Law Conference, Knoxville, Tennessee, October 2015.
- Quarles, M., and William Wilson, “Unconventional Natural Gas and its Risk, A Tennessee Perspective,” Appalachian Public Interest Environmental Law Conference, Knoxville, Tennessee, October 2011.
- Quarles, M., et. al., “*In Harms Way: Lack of Federal Coal Ash Regulations Endangers Americans and their Environment*,” Environmental Integrity Project, Earthjustice, and Sierra Club, August 2010.
- Quarles, M., and Craig Segall, “*Slow Motion Spills: Coal Combustion Waste and Water in Kentucky*,” Sierra Club, April 2010.
- Quarles, M., et al., “*Out of Control: Mounting Damages from Coal Ash Waste Sites*,” Environmental Integrity Project and Earthjustice, February 2010.
- Quarles, M., “A Case Study in Karst Hydrogeology and Contaminant Fate and Transport,” National Groundwater Association 51st Annual Convention and Exposition, December 1999.
- Quarles, M. and Allen P. Lusby, “Enhanced Biodegradation of Kerosene-Affected Groundwater and Soil,” 1994 Annual Conference of the Academy of Hazardous Materials Managers, October 1994.
- Quarles, M., “New Tank Performance Standards,” *Tennessee Environmental Law Letter*, July 1993.

EXPERT LEGAL TESTIMONY

- *SELC on behalf of the Tennessee Clean Water Network and Tennessee Scenic Rivers Association versus Tennessee Valley Authority*, US District Court, Middle District of Tennessee. 2017. Oral and written testimony. Qualified by the Court as an expert.

- *Tulane Environmental Law Clinic on behalf of the Town of Abita Springs (LA) and the Concerned Citizens of St. Tammany Parish*, New Orleans, Louisiana. 2014. Oral and written arguments for an Office of Conservation evidentiary public hearing, proposed well by Helis Oil & Gas Company. Qualified by the Office as an expert.
- *Carbon County Resource Council, Northern Plains Resource Council versus Montana Board of Oil and Gas Conservation* - 2014 Grievance hearing before the board. Oral and written testimony in support of more stringent hydraulic fracturing standards.
- *Joint Intervenors versus the Nuclear Regulatory Commission, Atomic Safety and Licensing Board Panel*. 2012 and 2013. Regarding the Florida Power & Light Company, Turkey Point Nuclear Plant expansion.
- *Chesney versus Tennessee Valley Authority* – 2011 US District Court. Written testimony associated with fly and bottom ash sampling, waste characterization, contaminant fate and transport, and contaminant risks compared to US EPA screening levels, drinking water standards, fish and aquatic life standards, and sediment cleanup standards.
- *Busch, et al versus Dr. Carol Couch*, Atlanta, Georgia, 2008. State Administrative Court. Written and verbal testimony regarding drought restrictive surface water and groundwater use. Qualified by the court as an expert in geology, hydrogeology, and stormwater runoff.
- *Darrel Segraves, et al versus Dr. Carol Couch*, Atlanta, Georgia 2008. State Administrative Court. Written and verbal testimony regarding appeal of a municipal solid waste landfill permit. Qualified by the court as an expert in geology, hydrogeology, landfill design pertaining to landfill leakage, and stormwater runoff.
- *Tulane Environmental Law Clinic*. 2007 - 2008. Written testimony for numerous draft LDEQ permits and proposed rules.
- *Republic of Ecuador and PetroEcuador vs. Chevron Texaco Corporation and Texaco Petroleum Company*, U.S. District Court, Southern District of New York, 2007. Written testimony regarding environmental investigation protocol.
- *Friends of Tims Ford vs. Tennessee Valley Authority and Tennessee Department of Environment and Conservation*. U.S District Court, 2007. Written testimony in support of violations of State and Federal water quality standards, reservoir carrying capacity standards, and NEPA environmental assessment standards.
- *Freddie Howell vs. Creative Customs*, Atlanta, Georgia, 2007. Technical support regarding litigation associated with stormwater and groundwater flow and their effects on the Howell property.
- *Aguida vs. ChevronTexaco*. Lago Agrio, Ecuador Court, 2006. Written testimony regarding Texaco's waste management and standard operating practices in the Ecuadorian concession area relative to industry standards.

TRAINING

Basic Spanish Language Proficiency

Current Wetland Issues in Tennessee (2007)

Professional Liability Education - Contract Review and Revision (2000)

Professional Liability Education – Mid-Town Developer Case Study Workshop (1999)

Professional Liability Education – Liability IQ for Environmental Consultants (1998)

Liquid Animal Waste Management System Design to NRCS Standards for CAFO (1998)

8-Hour OSHA Health and Safety Refresher Training

Hazardous Materials / Waste Manager Course, University of Alabama (1993)

40-Hour OSHA Health and Safety Training (1990)