Ralph Markarian, PH. D.**,** Principal-in-Charge – NRDA & TOXICOLOGY

Dr. Ralph Markarian has over 40 years of experience in environmental impact assessment associated with a variety of known or suspected toxic compounds. This experience is associated with a number of habitats including terrestrial/upland, freshwater, estuarine, open ocean, and deep-water habitats. His efforts have included incident spill response, ecological risk assessments, environmental toxicology, strategic advice and litigation support. His expertise and specialties include the design and management of natural resource damage assessments (NRDAs), aquatic/ecological risk assessments, and effluent toxicity assessment and toxicity reduction programs. His recent work includes leading damage assessments in the Gulf of Mexico and Galveston Bay, as well as managing the assessment of the impacts resulting from BP’s blowout in the Gulf of Mexico. As a senior spokesperson on environmental matters, his role includes strategic consultation and technical negotiations in order to resolve damage claims associated with oil and chemical releases. His most recent experiences in complex stakeholder cooperative NRDAs have led to a number of resolutions for clients involved in Oil Pollution Act (OPA) NRDA cases. As the senior technical representative for the Responsible Party (RP), his role includes assessment design, Trustee interface, strategic consultation, and technical negotiations supporting a sound resolution of NRDA claims.

SELECTED PROJECT EXPERIENCE (\* denotes project experience prior to SWCA)

YEARS OF EXPERIENCE

40

EXPERTISE

Natura Resource Damage Assessment

Litigation Support/Expert Witness

Environmental Toxicology

Oil Spill Emergency Response

Ecological Risk Assessments/NEBA

Aquatic/Hydrocarbon Toxicology

Risk Management

EDUCATION

PhD, Aquatic Ecology; Pennsylvania State University

M.S., Environmental Science; Washington State University

B.S., Zoology, University of Rhode Island

MEMBERSHIPS

Society of Environmental Toxicology and Chemistry (SETAC)

Connecticut Maritime Association

Associate; Maritime Law Association of the United States

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 **ITC Storage Tank Explosion; Intercontinental Terminals Company (ITC); Pasadena, Texas.** Role: Senior NRDA Advisor and Director.

**Contaminated Estuary and NRDA Issues Project; New York.** Role: Senior Advisor.

**\*Vessel Collision Project; Bayport, Texas.** *Role: Senior Advisor and Director.*

**\*B-255 vessel Explosion Project; Gulf of Mexico.** *Role: Senior Advisor and Director.*

**\*NRDA Matters for Kirby Texas Y Incident and Release; Galveston Bay.** *Role: Senior Advisor and Retained Expert.*

**\*Kirby Marine Release; Bella Bella Island, British Columbia, Canada (ongoing).** *Role: Senior Advisor and Director.*

**\*MC 252 Deepwater Horizon Release; BP; Gulf of Mexico.** *Role: Program Manager/**Lead NRDA Consultant.*

**\*Methyl tertiary-butyl ether (MTBE) Release for West of England and Britannia in the Houston Ship Channel; Insert Client; Houston, Texas.** *Role: Senior Technical Advisor.*

**\*Release of Brine North Dakota Watershed Project; Meadowlark/Summit Midstream; North Dakota.** *Role: Senior Technical Advisor.*

**\* DM 932 Mississippi River incident; American Commercial Lines; Mississippi.** *Role: Technical Director and RP NRDA Negotiation Specialist.*

**\*RP NRDA Release; CITGO; Calcasieu River, Louisiana.**R*ole: Technical Director and RP NRDA Negotiation Specialist.*

**\* RP NRDA Tank Barge DBL 152 Release; Gulf of Mexico Offshore Sabine Pass.** *Role: Technical Director and RP NRDA Negotiation Specialist.*

**\*Oil Spill Project; Dubai Star; San Francisco Bay, California.** Role: Principal and Lead NRDA Consultant.

**\*Numerous New Jersey NRDA’s; New Jersey.**  *Role: Lead NRDA Consultant.*

**\*M/V Bermuda Islander Oil Spill; Bermuda.** Role: *Principal and Lead NRDA Consultant.*

**\*Caribbean Case Project; US Virgin Islands.** Role: *Lead NRDA* *Investigator.*

**\*B120 Oil Release; Buzzards Bay, Massachusetts.** Role: *Lead RP NRDA Technical Representative.*

**\*Tank Barge MM53 incident; Louisville, Kentucky.** Role: *Principal and Lead NRDA Consultant.*

**\*Major Pipeline Release in a Maryland Estuary; Maryland.** Role: *Lead RP NRDA Technical Representative.*

**\*Net Environmental Benefit Analysis (NEBA); Alabama**. Role: *Principal investigator.*

**\*Tank Vessel Athos I Oil Spill; Delaware River & Bay, Pennsylvania, Delaware, and New Jersey.**Role: NRDA Consultant.

**\*Bouchard Barge No. 45 Release, Port Jefferson; New York.** Role: Lead RP NRDA Technical Representative.

**\*M/V Brussel Release, Coney Island; New York.**Role: Lead RP NRDA Technical Representative.

**\*Port Mobil Barge explosion; Staten Island, New York.**Role: Lead RP NRDA Technical Representative.

**\*Dredging Vessel Fuel Oil Spill (Stuyvesant); Coastal Area in the Western USA.** Role: Technical Lead RP NRDA.

**\*NRDA in a Well Blowout;Coastline Area of Louisiana**. *Role: Lead Consultant.*

**\*Pipeline Rupture Project; Offshore in Louisiana.** Role: Technical Lead and NRDA Consultant.

**\*Aquatic Toxicity of Hydrocarbon Products; American Petroleum Institute**.*Role: Principal Investigator.*

**\*NRDA Case Regarding an Oil Rig Blowout;** **Gulf of Mexico Region.** Role: Principal Technical Advisor.

**\*NRDA of a Crude Oil Underwater Pipeline Rupture**. Role: Principal Investigator and Lead Technical Negotiator.

**\*Natural Resource Damage Assessment; Texas.** Role: Lead NRDA Consultant and Program Director.

**\*Major Oil Pipeline Release; Louisiana.** *Role: Senior Technical Negotiator*.

**\*River Sediment Removal.** *Role: Principal Advisor.*

**\*Natural Resource Damage Assessment for a Pipeline Break.** *Role: Principal Consultant and Project Manager.*

**\*NRDA Involving a Tanker Leak; Delaware.** *Role: Project Manager.*

**\* Valdez Spill and Cleanup Effort; Exxon Corporation; Alaska**. *Role: On-Scene Toxicologist and Environmental Advisor.*

**\* Environmental Studies; Exxon Corporation; Aruba, Caribbean.** *Role: Project Manager and Senior Scientist.*

**\* Accidental Pollution Incident Assessment; Ohio.** *Role: Project Scientist.*

BOOKS

* Markarian, R.K. 1992. The Assessment of Ecological Impacts of Hazardous Materials. In *Management of Hazardous Agents: Volume 1: Industrial and Regulatory Approaches*, edited by D.G. Levine and A. Upton. Washington Papers. 208 pp.
* Markarian, R.K. 1995. General Types of Aquatic Assessments. Chapter 29 in *Fundamentals of Aquatic Toxicology: Effects, Environmental Fate and Risk Assessment*, edited by G. Rand. Second Edition. Taylor and Francis. 1125 pp.

**PEER REVIEWED, PUBLISHED PAPERS**

* Slocomb, J., G. Robilliard, R.K. Markarian, R. Barrick, and J. Kubitz. 2008. Use of Logistic Regression Models for Oil Spill NRDA. SETAC 2008.
* Pfeifer, C., E. Brzozowski, and R.K. Markarian. 2008. A Comparison of Methods for Locating, Tracking and Quantifying Submerged Oil Used during the T/B DBL 152 Incident International Oil Spill Conference.
* Pfeifer, C., E. Brzozowski, and R.K. Markarian. 2008. Quantifying Percent Cover of Submerged Oil Using Underwater Video Imagery. International Oil Spill Conference.
* Pfeifer, C.P, E. Brzozowski, and R.K. Markarian. 2008. Long-Term Monitoring of Submerged Oil in the Gulf of Mexico Following the T/B DBL 152 Incident. International Oil Spill Conference.
* Kolluru, V.S., L.M. O’Hanlon, G.T. Gipson, and R.K. Markarian. 2003. Case Examples of Oil Spill Modeling for Aquatic Injury Assessment. Poster presented at International Oil Spill Conference.
* Fichera, M.J., V.S. Kolluru, L.M. O’Hanlon, G.T. Gipson, and R.K. Markarian. 2003. Oil Spill Water Column Modeling for Aquatic Injury Assessment – Refinements for Assessing Oil Toxicity. Poster presented at International Oil Spill Conference.
* Fichera, M.J., V.S. Kolluru, L.M. O’Hanlon, J.G. Webber, S.L. Friant, and R.K. Markarian. 2001. Oil Spill Water Column Injury Assessment Using PAH Specific Hydrodynamic Fate and Transport Modeling. Poster presented at SETAC 22nd Annual Meeting, Baltimore, MD. November 15, 2001.
* Lorentz, W.P., Jerry Hall, Heather Finley, Jim Hanifen, Derek Hamilton, Linda Pace, Tony Penn, John Kern, Buddy Goathcher, Ralph Markarian, and Chris Pfeifer. 2001. The Lake Barre Oil Spill NRDA: From Response to Restoration IOSC Proceedings 2001 DOI abstracts 10.7901/2169-3358-2001-1-667.
* Rockel, M.L., M.J. Kealy, T. Tomasi, S.L. Friant, and R.K. Markarian. 1998. Valuing Ecological Services Using an Ecological Metric to Facilitate the Evaluation of Site Closure and Corrective Action Options. Presentation at the 19th Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 15-19, 1998, Charlotte, North Carolina.
* Kubitz, J.A., R.K. Markarian, M.L. Rockel, S.L. Friant, and M.J. Kealy. 1998. Restoration-Based Compensation: A Proposal for Reducing Costs at Superfund Sites. Poster presentation at the 19th Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 15-19, 1998, Charlotte, North Carolina.
* Kubitz, J.A., S. Friant, and R. Markarian. 1997. A Comparison of Hazard Quotient and Probabilistic Techniques for Investigating Ecological Risk. Poster presentation at the 18th annual meeting of the Society of Environmental Toxicology and Chemistry. November 16-20, 1997, San Francisco, California.
* Friant, S.L., J.A. Kubitz, and R.K. Markarian. 1996. The role of ecological risk assessment in the risk management process. Poster presentation at the 17th annual meeting of the Society of Environmental Toxicology and Chemistry, November 17-21, 1996, Washington, DC.
* Markarian, R.K. et al. A Critical Review of Toxicity Values and Evaluation of the Persistence of Petroleum Products for Use in Natural Resource Damage Assessments, American Petroleum Institute. Pub. 4594: January 1995.
* Nicolette, J.P., T.R. Barber, R.K. Markarian, T.W. Cervino, and D.V. Pearson. 1995. A Cooperative Natural Resource Damage Assessment (NRDA) Case Study: Colonial Pipeline Release, Reston, VA. Proceedings: Toxic Substances in Water Environments, Assessment and Control: Water Environment Federation. May.
* Hughes, A.I., R.K. Markarian, C. Lee, D.J. Letinski, and D.R. Peterson. Hydrocarbon Biodegradation Potential in Weathered Oily Soils. Accepted in Environmental Toxicology and Chemistry.
* Girling, A.E., R.K. Markarian. 1992. Aquatic toxicity testing of oil products – some recommendations. Chemosphere 24(10): 1496–1472.
* Hughes, A.I., R.K. Markarian, and D.R. Peterson. Comparative Biodegradability of Linear and Branched Alcohol Ethoxylates. Submitted to Journal of the American Oil Chemists Society.
* Fiocco, R.J., R.K. Markarian, H.O. Jahns, and J. Bock. 1991. Development of Corexit 9580 - A Chemical Beach Cleaner. Proceedings of the International Oil Spill Conference. API Pub. No. 4529.
* Markarian, R.K. 1990. Assessing the Aquatic Toxicity and Hazards Associated with Oil Products: What are the Appropriate Methods? Proceedings: Workshop on Petroleum Products: Swedish National Chemicals Inspectorate, September 1990.
* Markarian, R.K., M.L. Hinman, M.E. Targia, and K.E. Stokley. 1990. Acute and Chronic Toxicity of Selected Nonionic Surfactants. Society of Environmental Toxicology and Chemistry, November.
* Hughes, A.I., D.R. Peterson, R.K. Markarian, and C. Lee. 1989. Comparative Biodegradability of Linear and Branched Alcohol Ethoxylates. 80th American Oil Chemists' Society Annual Meeting. May.
* Konkel, W.J., R.K. Markarian, and K.W. Pontasch. 1989. Comparative Toxicities of Selected Surfactants to Aquatic Organisms. Society of Environmental Toxicology and Chemistry. October/November.
* Smith, J.D., R.K. Markarian, et al. 1988. Ecotoxicology of Petroleum Products – A Review of Published Literature. CONCAWE, Report No. 88/60, November.
* Hughes, A.I., C. Lee, R.K. Markarian, and D.R. Peterson. 1988. Hydrocarbon Biodegradation in Soils from a Land Treatment Site. Society of Environmental Toxicology and Chemistry. April.
* Letinski, D.J., C. Lee, R.K. Markarian, and D.R. Peterson. 1988. Evaluation of Hydrocarbon Reduction in Soils from a Land Treatment Site. Society of Environmental Toxicology and Chemistry. April.
* Markarian, R.K., D.R. Peterson, L.T. Connor, and A.W. Maki. 1984. Acute and Chronic Toxicity of the Water Soluble Fraction of EDS Synthetic Fuel Materials to Pimephales promelas, Salmo gairdneri and Daphnia magna. Society of Environmental Toxicology and Chemistry. November.
* Peterson, D.R., R.K. Markarian, A.W. Maki, and A.I. Hughes. 1984. Modeling the Environmental Fate and Effects of Complex Hydrocarbon Mixtures. Society of Environmental Toxicology and Chemistry. November 1984.
* Schupner, J.K., R.K. Markarian, L.T. Connor, and E.L. Leonard. 1984. A Daphnia magna Culturing System for the Continuous Production of Neonates for Toxicity Testing. Society of Environmental Toxicology and Chemistry. November 1984.
* Markarian, R.K., M.C. Mathews, and L.T. Connor. 1981. The toxicity of nickel, copper, zinc, and aluminum mixtures to the white sucker (Catostomus commersoni). Bulletin of Environmental Contamination and Toxicology 26:2.
* Markarian, R.K. 1981. A study of the relationship between aquatic insect growth and water temperature in a small stream. Hydrobiologia 75:1.
* Markarian, R.K., J. Means, and W. Henry. 1979. The Toxicity and Geochemistry of Copper in Natural Waters. Battelle Report to Copper Development Association, Inc.
* Markarian, R.K. and P. Van Voris. 1979. Development of an Aquatic Damage Assessment System and Value Estimate Methodology. Sponsor: Ohio Department of Natural Resources, Division of Wildlife. March 30, 1979, 41 pp.
* Markarian, R.K., M.E. Davis, M.A. Eischen, W.M. Henry, J.L. Means, R.P. Morgan, II, and D.A. Tolle. 1979. A Review of the Toxicity and Geochemistry of Copper in the Aquatic Environment. Sponsor: Copper Development Association Inc. May 31, 1979,140 pp.
* Eischen, M.A., M.C. Mathews, and R.K. Markarian. 1979. Factors Effecting the Toxicity of Copper in Aquatic Systems. Sponsor: Copper Development Association Inc. July 19, 1979, 27 pp.
* Markarian, R.K., R. Morgan, and A. Buikema, Jr. 1979. Critique of the Ambient Water Quality Criteria for Copper and Related Topics. Sponsor: Copper Development Association Inc. August 31, 1979, 33 pp.
* Tolle, D.A., R.E. Thomas, R.K. Markarian, and V.Q. Hale. 1979. Environmental Assessment of Coal Cleaning Processes: Selection of Test Sites for Source Test Program EPA-600/7-79-073d. July, 1979.
* Markarian, R.K. and K. Fleming. 1978. An Experimental Stream for Ecological/Toxicological Studies. Battelle Columbus Report.
* Markarian, R.K. 1978. A Review of Biomonitoring Techniques. Sponsor: Pine Bluff Arsenal, Department of the Army. August 11, 1978, 14 pp.
* Markarian, R.K. 1977. The Effects of Varying Temperature Regimes on the Growth of Aquatic Insects. Abstract, Fortieth Annual Meeting, American Society of Limnology and Oceanography.
* Markarian, R.K., J. Balon, and A. Robinson. 1977. Review of Current Interest and Research in Water Hyacinth-based Wastewater Treatment. National Aeronautics and Space Administration Report. No. BCL-0A-TFR-77-1.
* Markarian, R.K. 1973. Project Sevan. The Study of an Artificial Recirculating Stream System. M.S. Thesis: Washington State University.